RE-112-201005-Public Environmental Report - Viru Wharf

Land and Maritime Connectivity Project (LMCP)

Prepared for

Asian Development Bank

October 2020

Cardno

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ABBREVIATIONS

ADB	Asian Development Bank
ARI	Average Recurrence Interval
AOA	Agricultural Opportunity Areas
AP	Affected Persons
BSSE	Bismarck Solomon Seas Ecoregion
BMP	Building Material Permit
CEMP	Contractors Environmental Management Plan
CCA	Climate Change Adaptation
CCDRVA	Climate Change and Disaster Risk Vulnerability Assessment
CITES	Convention on International Trade in Endangered Species
CPIU	Central Project Implementation Unit
CSS	Country Safeguard System
DC	Development Consent
DN	Defect Notice
DMM	Department of Mines and Minerals
EAC	Environment Advisory Committee
ECD	Environment and Conservation Division
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMS	Environmental Management System
EO	Environmental Officer
ERP	Emergency Response Plan
ESO	Environmental Safety Officer
IUCN	International Union for Conservation of Nature and Natural Resources
IEE	Initial Environmental Examination
LCT	Landing Craft
LO	Liaison Officer
The Project	Strengthening Domestic Transport Connectivity in the Pacific
MDG	Millennium Development Goal
MECDM	Ministry of Environment, Climate Change, Disaster Management and Meteorology
MMERE	Ministry of Mines, and Energy and Rural Electrification
MHMS	Ministry of Health and Medical Services
MID	Ministry of Infrastructure and Development
MMA	Marine Managed Area.
MNR	Ministry of Natural Resources
MPA	Marine Protected Area

OBM	Outboard Motorboats (usually Glass Reinforced Plastic hull with a 15 to 60 horse power (HP) outboard engine)
OH&S	Occupational Health and Safety
O&M	Operation and Maintenance
OTB	Over The Beach
PAA	Public Access Areas
PACCSAP	Pacific-Australia Climate Change Science and Adaptation Planning
PE	Project Engineer
PER	Public Environment Report
PSE	Project Supervising Engineer
QERP	Quarry Extraction and Rehabilitation Plan
RCP	representative concentration pathways
SDO	Social Development Officer
SIG	Solomon Islands Government
SPC	South Pacific Communities
SPS	Safeguard Policy Statement
SIWA	Solomon Island Water Authority
TOR	Terms of Reference
TNC	The Nature Conservancy
TRTA	Transaction Technical Assistance
WWF	World Wildlife Fund

DEFINITIONS

Definitions associated with wharves and wharf operation

Bollard	A short, vertical post on a ship or wharf / jetty used for mooring boats,
Boat Jetty	A structure built in the water at the edge of the sea used by people getting on and off OMB
LCT (Landing Craft)	Small flat-bottomed vessels designed for transporting and landing of equipment / supplies onto / or across a beach or (in this project) up a prepared ramp. Usually equipped with a lowerable ramp, rather than a conventional bow.
OMB	Outboard Motor Boat. Inshore craft, usually with a Glass Reinforced Plastic (GRP) hull, petrol powered by a 6 to 60HP outboard motor. Used for fishing and small goods island transfer.
Wharf	A structure on the shore of a harbour or on the bank of a river where ships may dock to load and unload cargo or passengers

1. EXECUTIVE SUMMARY

The Asian Development Bank (ADB) have identified domestic transport connectivity as critical to social and economic development in Solomon Islands. Road and inter-island shipping transport provide access to essential services, improve trade and tourism, and facilitate access to domestic and international markets.

The focus is on improving aspects of road transport, including pavement quality, flood and climate resilience and road safety. The centrality of roads in providing connectivity to existing and planned sea and air transport nodes accompanies these considerations. Cardno Emerging Markets (Australia) Pty Ltd (Cardno) was appointed in January 2019 to lead a transaction technical assistance (TRTA) for feasibility studies and detailed engineering design of nominated sub-projects in Solomon Islands.

The outlying provinces in the Solomon Islands rely on sea trading routes to transport both goods and passengers as air cargo and passenger transportation is too expensive for many and is unlikely to change in the foreseeable future. The completion of the Viru Wharf was prioritized under the Land and Maritime Connectivity Project (LMCP). The Project is implemented through the Central Project Implementation Unit (CPIU) of the Ministry of Infrastructure Development (MID), the Executing Agency.

The Project include the rehabilitation and upgrading of the selected road sections in Honiara and Guadalcanal, the upgrading of the International Ports of Noro and Honiara. Including seven wharf improvements, upgrading or new wharf construction.The wharves considered are:

- Viru Wharf, Western Province (This document);
- Buala Wharf, Isabel Province;
- Matangasi Wharf, Malaita Province;
- Waisisi Wharf, Malaita Province;
- Moli Wharf, Choiseul Province;
- Kirakira Wharf, Makira Ulawa Proince; and,
- Ahanga Wharf, Renbel Province.

The Viru Wharf sub-project site was subjected to a screening exercise and risk assessment to determine the reporting level required for the sub-project. Given the scope of works required for the Viru Wharf, it is concluded that the level of reporting is a Public Environmental Report (PER), which is equivalent to ADB's Initial Environment Examination (IEE) Report. The PER will be submitted to Environment Conservation Division (ECD) of the Ministry of Environment, Climate Change, Disaster and Meteorology (MECDM) who will approve and issue a Development Consent for the Project to proceed.

The scoping assessment was undertaken in March 2019 and a follow-up visit was done in February 2020.The PER is based on field studies and secondary information that were available in other reports. Public consultations were undertaken to determine community attitudes to the possible development. This has been carried out to ensure that potential or likely adverse environmental impacts were identified and mitigated to acceptable levels. Based on the scope of works this sub-project is classified as Category B according to the ADB Safeguards Policy Statement (SPS), and Tier 3 according to the MID Safeguards Procedures Manual (MID SPM) and will not require a full EIA as required by the SIG. Detailed Engineering Layout Plans are prepared and provided by the Design Engineers, Cardno Emerging Markets Pty Ltd.

This Public Environmental Report (PER) has been prepared to provide an account of the baseline environmental conditions and to describe and evaluate likely impacts which will be caused by the proposed wharf construction and operation. The environmental evaluation and subsequent management, mitigation and monitoring of the development scope of works are detailed in this report. Mitigation measures for each potential physical, environment and social impacts may be negligible, minor, marginal and significant based on the impact itself and if it is not mitigated.

The major environmental impacts are predicted to occur during the construction phase from piling, extraction of aggregates and materials, compaction of approaches, filling and back filling, grading clearing and excavation works. The scoping assessments anticipate that deterioration to water quality; sedimentation and siltation; waste disposal problems and potential oil / fuel spillage are expected. The approach to addressing the potential environmental impacts is to mitigate them or avoid the impact altogether. Overall, the earth works does not traverse any sensitive ecosystems, protected areas, archeological or historically significant sites, ecologically sensitive or densely populated areas. However, there will be no significant impacts on any terrestrial conservation and/or protected area, sites of cultural, customary or heritage significance nor any national or international terrestrial endangered or protected species. No impacts on critical habitats are associated with this sub-project.

Possibilities for other likely environmental and socioeconomic impacts including climate change and disaster risks are also identified and the importance discussed in this report. Mitigation measures to avoid and minimize the potential environment and social impacts are also considered. The scale and significance of potential impacts arising from the sub-project is rated from minor to moderate if not mitigated. The project area is a highly disturbed natural environments due to a village or settlement, agricultural activities and activities relating to the communities' livelihoods. The outcome of the project will be construction of a new, safe and accessible wharf at Viru Harbor.

Potential social impacts are likely to be low provided the Ministry of Infrastructure (MID) and contractor follow or comply with the EMP and standard health and safety practices and coordinate closely with the nearby communities who themselves are very supportive of the project. Land acquisition will not be required for the site and only properties will be removed. Additional consultations will be carried out and ongoing with the land owners during construction. Inventory of non - land assets was done in February 2020.

The Environment and Conservation Division (ECD) of the Ministry of Environment, Climate Change, Disaster Management and Meteorology (MECDM) is the lead agency for implementing the Environmental Act 1998, Environmental Regulation 2008 and the Environmental Impact Assessment Guidelines, 2010 and issuing of development consent for project development. This PER will be used by the Supervision Consultant (SC), as a Public Environment Report (PER), forming the basis of the development consent application. The application will be prepared by the DC and lodged by MID as the 'developer'.

An Environmental Management Plan (EMP) developed for the sub-project will be detailed by the Contractor during the construction stage or whenever further engineering information is available. The SC through the CPIU will approve the updated EMP before physical earth works shall commence. The institutional framework under the EMP section summarizes the overall responsibilities for EMP implementation.

For the environmental management and monitoring tasks specific technical assistance will be provided by the environmental specialists that is part of the SC.The Contractor will be required to prepare a detailed environmental management and monitoring plan based on Section XIV and what is set out in the contract documents. A review committee comprised of MID-CPIU, SC and MECDM will be responsible for monitoring and compliance, review contractor's monthly monitoring reports and suggest ways to improve the mitigation measures.

A Grievance Redress Mechanism (GRM) will be developed for the sub-project as it is possible that people may have concerns with the projects environmental performance and social issues including the implementation of the EMP. Most complaints arising during construction are expected to be minor complaints concerning noise and vibration that should be able to be resolved easily.

During construction, all complaints arriving at the Site Office are to be entered in a Register that is kept at the site by: Date, Complainants Name; Contact Address and Reason for the Complaint. If the AP is dissatisfied with the determination from the PS in the MECDM, the AP may appeal to the National Court. This will be at the AP's cost but if the court shows that the PS, or the CPIU have been negligent in making their determination the AP will be able to seek costs. During the operation of the infrastructure, all complaints will be directed to TSFRP through CPIU.

The project shall comply with the Solomon Islands Environment Act 1998 and no further environmental study is required for the Viru Wharf under the LMCP. The recommendations of this PER are as follows:

- That the PER be accepted by MECDM and ADB as the statement of the sub-projects environmental effects and how they will be mitigated;
- That the Contractor be assisted by the SC to prepare a CEMP based on the generic model included in this PER; and,
- That the sub-project impacts and mitigation measures thereof be mitigated as per the enclosed monitoring plan.

2. CONTACT DETAILS OF THE PROJECT PROPONENT

Name of Proponent/ Applicant:	Ministry of Infrastructure Development (MID)
Address:	Ministry of Infrastructure Development (MID) Central Project Implementation Unit (CPIU) P O Box G8, Honiara
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3. CONTACT DETAILS OF THE EIA CONSULTANT

Name of EIA Consultant:	Jaysie Boape
Official Designation:	National Safeguards Officer
Address:	Transport Sector Project Development Facility (TSPDF) Ministry of Infrastructure Development (MID) Central Project Implementation Unit (CPIU) P O Box G8, Honiara
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4. INTRODUCTION

4.1. Project Background and Summary

The Government of Solomon Islands (SIG) with assistance from the Asian Development Bank (ADB) in providing funding for the rehabilitation and upgrading of selected infrastructure under the Land and Maritime Connectivity Project (LMCP) 'the Project'. The project seeks to rehabilitated and upgrade roads in Guadalcanal and Honiara, the international ports of Noro and Honiara and seven domestic wharves in six provinces in the country.

This will include the rehabilitation and upgrading of the following road sections in Honiara and Guadalcanal:

- Hibiscus Avenue from Pt Cruz Hot Bread roundabout to Town Ground including the Mud Alley Road
- Road from the Honiara City Council to Town Ground (section of the main road from the city centre towards the West)
- Port Access Roads – (3 road Sections)
- East – West inner bypass road (Holy Cross to Hibiscus Avenue)
- Town Ground to White River – Upgrade from two lanes to four lanes (existing sealed, urban)
- White River to Doma – Rehabilitate (existing sealed, rural)
- Tambea to Naro – Upgrade and sealing (existing unsealed, rural) – including the Bridge at Kesao)
- Naro Hill to Lambi – rehabilitate (existing unsealed rural) – including the bridge at Malachchi)
- Henderson to Mberande – Rehabilitate (existing sealed, rural).

Including seven potential wharf improvements, upgrading or new wharf construction.The wharves considered are:

- (i) Viru Wharf, Western Province;
- (ii) Buala Wharf, Isabel Province;
- (iii) Matangasi Wharf, Malaita Province;
- (iv) Waisisi Wharf, Malaita Province;
- (v) Moli Wharf, Choiseul Province;
- (vi) Kirakira Wharf, Makira Ulawa Proince; and,
- (vii) Ahanga Wharf, Renbel Province.

Also the upgrading of the International Ports of Noro and Honiara.

The LMCP is implemented by the Solomon Islands Government (SIG) with assistance from the Asian Development Bank (ADB) through the Ministry of Infrastructure Development (MID) as the executing agency (EA). The Central Project Implementation Unit (CPIU) of the MID is the implementing agency (IA).

The project overall day to day management is done through the CPIU under which MID is the executing agency. The focal point is the Permanent Secretary (PS) of MID with assistance from the MID Civil Engineering Director and the MID designated project job manager. Cardno Emerging Markets of Australia in partnership with LBS Engineers Ltd a local established

engineering consultancy firm are engaged as the design consultants had undertaken feasibility studies of the project sites and had done detailed design consultancy for the upgrading and rehabilitation of the prioritized assets.

Therefore, this report is prepared specifically for the construction of a new wharf at Viru Harbor in the Western Province. Viru Harbor, is located south of the main New Georgia Island. An important project requirement is a PER which meets the requirements of the Ministry of Environment, Climate Change, Disaster Management and Meteorology (MECDM) according to the Environment Act 1998 and the Environment Regulation 2008. Following the approval of the PER, the Director of the Environment and Conservation Department (ECD) within the MECDM will issue a Development Consent to MID for the construction of Viru Wharf.

4.2. Overview

The Solomon Islands comprises a double chain of 992 islands (volcanic and coral atolls) that forms an archipelago stretching approximately 1,600 km across the South-western Pacific Ocean between the latitudes of 50 – 120 South and longitude 1520 – 1700 East (Figure 2-1). The total land area is approximated to be 28,000 km^2 with an Exclusive Economic Zone (EEZ) of 1.6 million km^2 (SPC, 2017) which represents the third largest archipelago in the South Pacific Ocean. The nation is bordered to the west by Papua New Guinea (PNG), south by Vanuatu, east by Tuvalu, north east by Nauru and the Federated States of Micronesia to the north. The unique geography and scattered nature of islands has given rise to a heritage of considerable environmental and ecological diversity.

Figure 1: Solomon Islands indicating different island groupings

Western Province is located at 8o0S'157o0E' and is one of the largest provinces of the Solomon Islands comprising of many small islands and hosts the largest lagoon in the South Pacific. The islands of the western solomons are renowned for their beautiful tropical islands, excellent diving and snorkelling sites, coral reefs and WWII wrecks, ecotourism lodges, and head-hunting shrines. The province contains many small lagoons and most of the country's tourist trade outside Honiara.

New Georgia island is the largest islands in the Western Province located at 8o15'S 157o 30'E. It has an area of 2037km^2 and measures approximately 85km long and 41km wide with the

highest elevation of 860m. The island is a volcanic island surrounded by coral reefs and atolls. Viru harbor is located south of New Georgia Island.

Figure 2: Western Province indicating island groupings

The Asian Development Bank (ADB) has identified domestic transport connectivity as critical to social and economic development in Solomon Islands, Vanuatu and Tonga. Road and inter-island shipping transport provide access to essential services, improve trade and tourism, and facilitate access to domestic and international markets. However, in the target countries there are several common obstacles to the effective maintenance and resilience of transport assets, including:

- Insufficient capacity of the institutions responsible for infrastructure delivery to implement sustainable routine and periodic maintenance programs;
- Inadequate fiscal budgets to allocate required financial resources for recurrent maintenance and rehabilitation;
- Vulnerability to natural disasters and anticipated climate change; and
- Limited transport sector policy and legislation.

To address the identified needs, ADB established a Transaction Technical Assistance (TRTA), TA-9331 REG: Strengthening Domestic Transport Connectivity in the Pacific (the project). Cardno Emerging Markets (Australia) Pty Ltd (Cardno) was appointed in January 2018 to lead the TRTA. The project will improve national and regional connectivity through new investments. It will also support the participant countries in formulating and updating transport sector policy and investment planning, and identify institutional gaps and capacity development activities to support transport sector development.

4.3. Objectives and Scope of the PER

This report has been prepared to meet the requirements of the ADB Environmental Assessment Guidelines and SIG Environmental Act for the Land and Maritime Connectivity Project (LMCP). It describes the environmental impact assessment of the sub-project, Viru wharf, located in Western Province. Thereport includes description and evaluation of the existing institutional arrangements for environmental management. The impacts on the

existing physical, biological and social environment are assessed, resulting in an EMP to mitigate the effects.

This has been prepared, in accordance with the Environment Act and Regulations and following MID's Safeguards Procedures Manual (SPM), so that it can be used as a Public Environment Report (PER) for a development consent application. It is equivalent to an IEE for categorized projects, in accordance with ADB's Safeguards Policy Statement (SPS). As a Public Environment Report (PER), forming the basis of the development consent application. The application will be lodged by MID as the 'developer'.

The main aim is to assess the potential impacts of the wharf reconstruction on the adjacent biological, physical and social environment. Including designing mitigation measures to decrease environmental impacts as the works will include pile driving, clearing and grubbing of the approach road and gabion protection works.

Therefore the objectives and scope of the PER is to:

- Assess the existing environmental conditions in the vicinity of the sub-project site including identification of environmentally sensitive areas;
- Assess the proposed location, design, construction and operation activities to identify and evaluate their potential impacts and determine the significance;
- Propose appropriate mitigation and monitoring measures that can be incorporated into and Environmental Management Plan (EMP) that will avoid or minimize adverse impacts so that residual impacts are reduced to acceptable levels;
- Assess relevant climate change impacts on the sub-project site;
- Ensure that public consultation was undertaken as part of the PER process to determine community attitudes to the possible development.

4.4. Objectives of the Project

The main objective of the project is to rehabilitate and reconstuct the wharf to ensure access to basic services, increase income generating opportunities and promote social cohesiveness. This is aligned with the National Development Strategy (2016 - 2035) objectives particularly improving infrastructure for better access for better access to essential services and markets.

Other benefits include accesibility, reduced safety concerns, reduced travelling expenses, immediate improvement to delivery of services and goods to those that will be accessing the wharf.

4.5. Methodology of the PER

Inorder to meet project feasibility studies requirements of MID and ADB an assessment was carried out for Viru wharf. This is in compliance with the requirements for a PER under the Environment Act and IEE under the ADB SPS. THe PER assess the potential negative impacts of constructing the wharf on the biophysical, ecological and social environments. It also proposes measures for addressing any potential impacts that may have been identified.

The study was undertaken in March 2019 and February 2020 involving community consultations and discussions, socio-economic baseline survey and site investigations. This was done by the international Environmental Specialist, National Environmental Specialist and the National Social Safeguards Specialist.

The PER was formulated after the community consultations and soci-economic survey, review of baseline data (physical, biological and social), gathering of relevant information from ther line ministries, identification of potential impacts based on the design and scope of the proposed construction works, development of mitigation measures for potential impacts and the preparation of the Environmental Management Plan (EMP) which will be detailed according

to the specifications of the contract by the successful civil works contractor before the commencement of construction works.

5. SUMMARY DESCRIPTION OF THE PRESCRIBED DEVELOPMENT

5.1. Identification of the Prescribed Development

In August 2018, ADB approved the Solomon Islands Transport Sector Project Development Facility (the Facility). The project is a response to key lessons from previous ADB funded projects in the country where significant delays occured at project start - up stage. The causes of the delays were identified as limited capacity within national transport agencies preventing timely preparation of detailed designs, timely update and implementation of safeguards instrumentsand timely implementation of procurementnactivities. The project will help to ensure that:

- project readiness by supporting the government in preparing feasibility studies (including environmental and social safeguards assessments, resettlements plans, and economic analysis) and detailed design; and
- project implementation readiness by supporting project start-up during inception with selection of supervision consultants; compliance with social and environmental safeguards requirements; and,
- procurement activities including bid preparation, evaluation, and contract negotiations.

The facility has also been designed to support the technical capacity building for the key implementing agency that is the MID and its CPIU.

The Solomon Islands Wharf subproject focus on the rehabilitation, reconstruction or establishment of seven wharf sites identified below in Table 1 and in **Error! Reference source not found.**.

Table 1: Subproject identification

Subproject ID	Location	Description
Wharf 1	Viru Wharf, Western Province	Upgrade of existing Wharf to piled wharf with precast deck
Wharf 2	Buala Wharf, Isabel Province	Existing degraded piled wharf with precast deck replaced with new piled wharf with precast deck
Wharf 3	Matangasi Wharf, Malaita Province	Existing wooden piled and wood deck wharf replaced with new piled wharf with precast deck
Wharf4	Waisisi Wharf, Malaita Province	Existing “small boat harbor” replaced with new piled wharf with precast deck
Wharf 5	Moli Wharf, Choiseul Province	No existing wharf, new piled wharf with precast deck
Wharf 6	Kirakira Wharf, Makira Ulawa Province;	Beach landing replaced with new piled wharf with precast deck
Wharf 7	Ahanga Wharf, Renbel Province	Beach landing replaced with new piled wharf with precast deck

5.2. Category of the Prescribed Development

The project is focused mainly on the condtruction of a new wharf and ramp at Viru. Proposed works include demolition of the existing timber structure, clearling and grubbing of the access road to the proposed site, piling, concrete pouring. These works will likely result in temporary sedimentation with in the water body and have minor environmental in the area within the vicinity of the sub-project site. Hence, will produce a series of possible adverse but not significant environmental impacts.

The proposed wharf and ramp will be located south of the existing timber wharf and this does not traverse or interfere any primary forests, protected, ecologically sensitive or densely populated area and will not create any conflicts in resource use or development since the area is a highly disturbed area. Meaning it is used for local small scale agricultural purposes.

There will not be any relocation of any residential structures or other structures occupied by the people for any purpose. A market hut used by the people from Tetemare and Tombe for marketing is on site but will not be disturbed or removed as it is at a safe distance from the proposed construction site.

Removal of crops and trees including other vegetation is purposely to pave way for the access road and the proposed wharf and ramp, however there will not be any land acquisition. Specific information for relocation and land acquisition issues including compensation for lost non - land assets is documented in a separate report on Land Acquisition and Resettlement Plan Due diligence Report for the MID.

In compliance with the ADB's SPS the Project is classified and categorized as Category B. Being that possible adverse environmental impacts are site specific, few if any of them are irreversible, and in most cases mitigation measures are readily designed.

5.3. Description of the Location, Nature and Size of the Prescribed Development

Viru is located in South New Georgia Island in Western Province. The proposed subproject site is at Tetemare Village in Viru Harbour and can be located on co-ordinates $6^0$49'41.36''S and $156^0$31'22.91''E.

Figure 3: Location of Viru Harbour

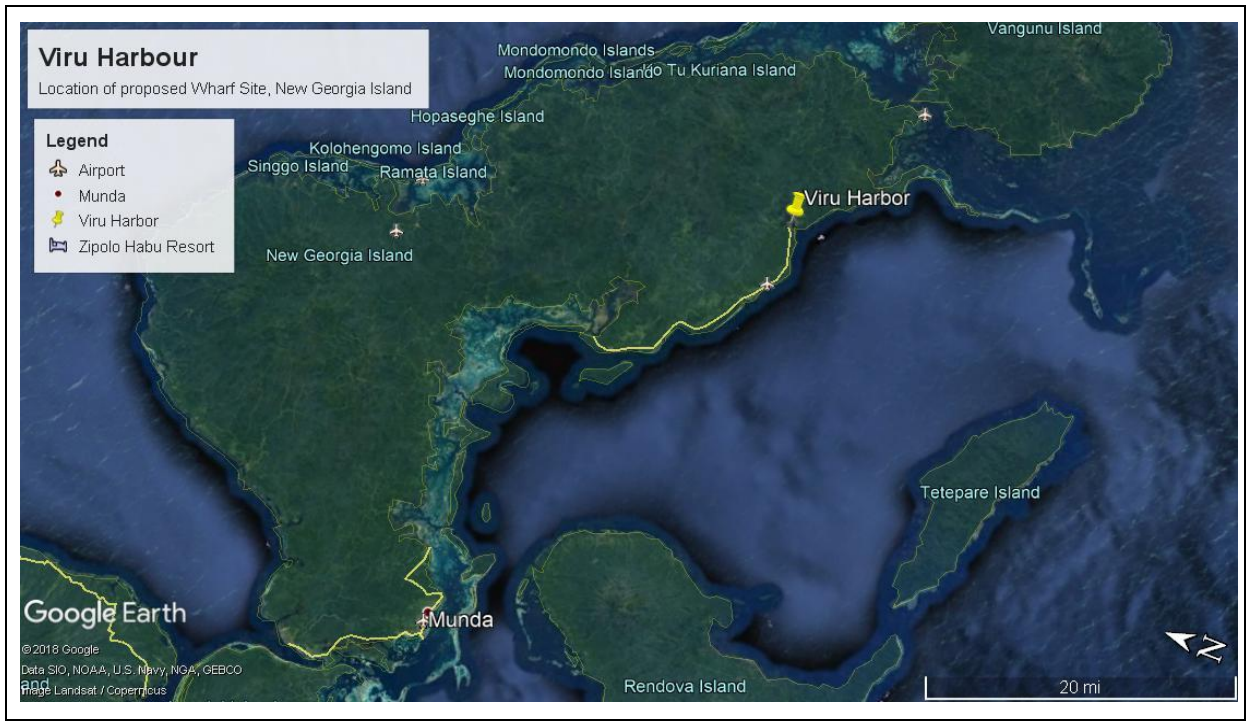
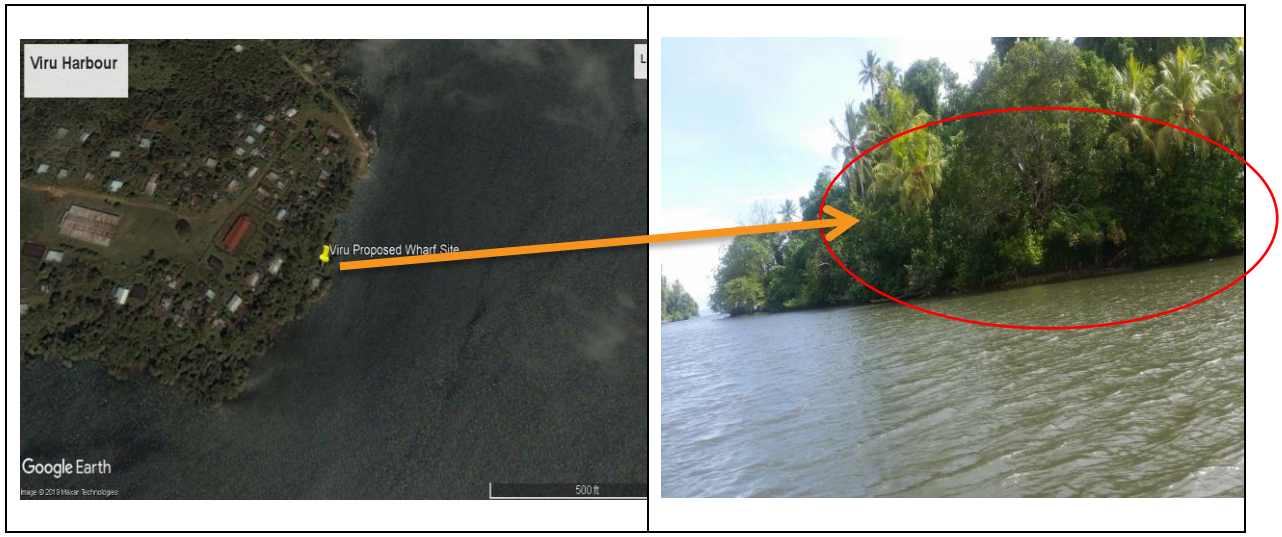


Figure 4: Proposed wharf Subproject Site



The villages immediate to the project site are Tetemara and Tombe villages. Tombe is on the opposite side of the proposed wharf site which is at Tetemara. There are other villages but are located farther inland but since roads had been constructed by the logging operation people often travel by vehicles to Viru. The produces sold at the market are fresh garden produces, cooked and baked farmed produces including fish sold fresh and cooked. The products are sold to mostly the public and also to passing passengers. The most common items on sale are sweet potatoes, tapioca, taro, banana, coconut, fruits (including pawpaw, mango and citrus), various green vegetables, other vegetables (including pumpkin and capsicum) and nuts, particularly ngali nuts and cooked marine products. The farmed produces as well as fish and sawn timbers are the main sources of income for people in this community.

Landownership at the project area is customary and ownership is traced through patrilineal lineages. Land use in most of the communities in the project area is mostly gardening and the coastal area is only used for anchorage of OBM powered boats and is over grown with littoral coastal vegetation.

The subproject will not traverse any sensitive ecosystems, protected, ecologically sensitive or densely populated areas and will not create any conflicts in resource use or development. The sub-project will have insignificant impacts on any rare or endangered species that may be present in the area or the Island. The proposed subproject site is an old log pond which is currently being used by the Eagon Company. There are no coral reef beds or corals identified in the area except for sediment or mud infiltrated into the harbour by the three river systems. There are no major effects of the wharf on the coral reefs, littoral drift and the coastal zone expected and it will be insignificant due to the existing environment, even though there is a pre-existing issue of coastal erosion in the area. The design of the wharf will cater for this issue. Armouring of the shoreline may also be required.

The sub-project will not create any major impacts on cultural or heritage (tambu) sites. No land acquisition or resettlement will be required.

5.4. Need for the Project

The sub-project feasibility and detailed design phase is under the Transport Sector Project Development Facility (TSPDF) of the MID but is to be included under the Land and Maritime Connectivity Project (LMCP) of the MID during construction. The overall project aims at improving connectivity and efficiency of trade activities in the Solomon Islands by proving improved land and maritime infrastructure.

The Viru harbor is accessed by villages as further west of the harbor as far as Roviana for transporting goods and travelling passengers to and from Honiara.The overall project is essential to improve connectivity and efficiency of trade activities by providing better access to services and markets.

5.5. Justification for the Project

The demand for access to wharf infrastructure is very high in the project area as shipping services in the area often berth at the existing wharf site. existing wharf is no longer serviceable and safe although it is still accessible due to its location and easy road access by villages.

The harbour provides safe berthing and easy landing for intra and inters island small boats and provide for safe boarding and debarkation of travelling passengers in the vessels. Also, the wharf will enable improvements to loading and off-loading of cargoes and other materials from the ships onto the wharf deck and visa-versa.

There are few ships servicing the area via their scheduled routes (North-South/South-North) on a monthly basis to no shipping services over 3 months in 2019 due to the sediment laden water surrounding the existing wharf. Most people travel in a Ship to and from Honiara due to cheap and affordable fare, despite, travelling time which takes about 2 days. Those who wish to travel to Honiara in the quickest and shortest route travels via Solomon airlines which provides daily flight services to the nearest airport at Seghe, which is about 40 to 90 minutes from Viru but it is a very expensive exercise.

Important infrastructure such as wharves are valuable assets to communities or villages in the provinces as it will not only be used by people from the immediate villages but by people from other villages that can access Viru harbor. Without such infrastructure services to support socio-economic livelihoods will remain poor and people will be unfortunate or reluctant to carry out some important livelihood activities.

5.6. Proponents endorsement of the PER

The proponent, MID was given confirmation by ECD of the MECDM to carry out assessment and prepare a PER for the Viru Wharf sub-project as part of the LMCP after the Environmental Assessment screening and submission of the Development Proposal Application in November 2019.

5.7. Structure of the PER

The PER consists of 19 sections: (I) Executive Summary;; (II) Contact Details of the Project Proponent or Applicant; (III) Contact Details of EIA Consultants; (IV) Introduction; (V) Summary Description of the Prescribed Development; (VI) Policy Legal and Institutional Framework; (VII) Description of the Proposed Development; (VIII) Location and Scale of the Prescribed Development; (IX) Description of the Existing Environment; (X) Alternatives; (XI) Climate Change and Disaster Risks; (XII) Social and Poverty Assessment; (XIII) Impact Assessment and Mitigation Measures; (XIV) Environmental Management Plan; (XV) Public Consultations and Information Disclosure; (XVI) Difficulties Encountered; (XVII) Conclusions and Recommendations; (XVIII) References; and (XIX) Appendices.

6. POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

6.1. Solomon Islands Environment Legislation and Regulations

Environmental impact assessment, management and protection in the Solomon Islands are governed under the Environment Act (1998) and the accompanying regulatory instrument, the Environment Regulations (2008). The Ministry of Environment, Climate Change, Disaster Management and Meteorology (MECDM) are the institution that administers this Act. The Environment and Conservation Division (ECD) within MECDM implements the Environment Act and Environment Regulations, which stipulate the type of activities for which development consent, must be sought and which propose developments require environmental assessment. The ECD is also the government agency responsible for reviewing and clearing development consent applications and environmental assessments on behalf of the government and is the agency responsible to manage the environmental compliance of all projects.

The proposed wharf upgrades under the Solomon Islands' subproject is required to comply with the Environment Act and Regulations.

6.2. Environment Act 1998

The Environmental Act (1998) provides for the protection and conservation of the environment, through the establishment of the Environment and Conservation Division (ECD) and the Environment Advisory Committee (EAC). The Environment Act 1998 governs the Environmental Policy of Solomon Islands. The core objectives of the Act are to provide for and establish integrated systems of development control, environmental impact assessment (EIA) and pollution control, including:

- Prevention, control and monitor pollution;
- Reducing risks to human health and prevent degradation of the environment by all practical means, including the following:
- Regulating the discharge of pollution to the air, water and land; and
- Regulating the transport, collection, treatment, storage and disposal of wastes;
- Promoting recycling, re-use and recovery of materials in an economically viable manner; and
- To comply with and give effect to regional and international conventions and obligations relating to the environment.

The Act is divided into the following four sections:

- Part I Article 4.1 provides the Act with considerable power which states that in the event of conflict between the Environment Act and other legislation, the Environment Act shall prevail;
- Part II establishes and defines the powers and role of the ECD;
- Part III establishes the requirements for environmental assessment, review and monitoring. This provides for an environmental assessment to consist of either a Public Environmental Report (PER) or if the development is shown to be of such a nature as to cause more serious impacts then the developer is required to submit an Environmental Impact Statement (EIS) to the MECDM;

- Part IV details requirements for pollution control and emissions (noise, odour and electromagnetic radiation) and requirements to permits for the discharge of waste. Noise (restrictions on emitting unreasonable noise) is covered in Article 51(1).

Key functions of the Act are to:

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

The project is required to comply with the Environment Act in order to obtain development consent.

6.3. Environment Regulations 2008

The Environment Regulations (2008) establish the procedures for undertaking the environmental assessment of any projects categorized as 'Prescribed Activities'. The developer is required to first submit a "Development Application" following which the MECDM determines the next step. The results of the review may include:

- No further assessment is required, as such the Development Application is accepted;
- A PER is required, (a PER is roughly equivalent to an ADB IEE and therefore this document also meets government's requirements); or
- Where major projects are considered such as logging, large agricultural developments, mining and large scale tourism developments and infrastructure projects, an Environment Impact Statement (EIS) is required which includes technical, economic, environmental and social investigations.

Both the PER and EIS require public consultation. Following approval by the MECDM the projects Development Consent is issued either with or without conditions.

The Solomon Islands do not have emissions or water quality standards. While environmental standards are not provided in the regulations, the MECDM requires the use of World Health Organization (WHO) standards to be used. While the Guidelines provide for licenses to discharge waste or emissions, the enforcement of these are problematic without defined national standards.

The project must also comply with the Environment Regulations in order to obtain development consent.

6.4. Environmental Impact Assessment Guidelines 2010

The Environmental Impact Assessment Guidelines 2010 has been developed to administer the second schedule of the Environment Act 1998. The guidelines comprise EIA procedural descriptions, stakeholders in the EIA process and fees required for development type. "The guideline was prepared by the Environment and Conservation Division (ECD) with the aim of simplifying the procedures in the Act, provide basic advice and guidance to government officers, planners, developers, resource owners on the environment impact assessment process" (MECDM, 2010). These guidelines conform with the proposed amendments to the Environment Act 1998 and the Environmental Regulations 2008. At the time of writing, these guidelines are scheduled to be tabled for discussion and acceptance in the Parliament in June 2018. Advice

from ECD indicated that these guidelines have been adopted and are to be used by all environmental assessments.

6.5. Mines and Minerals Act 1996

This Act establishes the regulatory system for all mining applications and licensing and provides the system to regulate and manage mining activities including the management and permitting process required for all alluvial mining (rock, gravel and sand extraction). Construction materials must be sourced by the Contractor, in accordance with the guidelines and processes outlined in the Act. The Contractor will be required to provide a site extraction plan and the use of existing permitted quarries should take preference to the use of new locations.

6.6. Wildlife Protection and Management Act 1998

The objective of the Act is to regulate the international trade of flora and fauna so as to protect and conserve them for the long term sustainability of the country's biological diversity. The Act was developed to meet the obligation of Convention on International Trade in Endangered Species (CITES) signed by the government in year 2007. A similar process equivalent to CITES was developed to manage the flora and fauna identified in Schedule I (Section 11) on Prohibited Exports of the Act. Section 26 of the act indicates concerns over possession of illegally obtained species of animals, plants and individual from marine and terrestrial environment in the country.

6.7. Wild Birds Act (1978)

The objective of this Act is to provide protection of a number of bird species throughout the nation by providing a mechanism for the establishment of bird sanctuaries and the management of hunting of several species.

6.8. Fisheries Act (2015)

The Fisheries Act (2015) provides the framework for marine, brackish and freshwater fisheries management, protection and development, including licensing of fishing vessels and fish processing plants. It also lists prohibited fishing methods and provides for the establishment of Marine Protected Areas (MPAs) and the preparation of coastal management plans. The Act regulates the utilisation and conservation of marine resource and includes resources associated with estuarine and freshwater coastal river systems.

6.9. Protected Areas Act (2010) and Protected Areas Regulations (2012)

- The Protected Areas Act 2010 and Protected Areas Regulations 2012 establish procedures for the establishment and management of protected areas and to conserve and regulate biological diversity. Some key objectives of the Protected Area Act (2010) are as follows:
- to establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity;
- to develop, where necessary, guidelines for the selection, establishment and management of protected areas or areas where special measures need to be taken to conserve biological diversity;
- to regulate or manage biological resources important for the conservation of biological diversity whether within or outside protected areas, with a view to ensuring their conservation and sustainable use;
- to promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings;

- to promote environmentally sound and sustainable development in areas adjacent to protected areas with a view to furthering protection of the protected areas; and
- to rehabilitate and restore degraded ecosystems and promote the recovery of threatened species, such as, through the development and implementation of plans or other management strategies.

In addition:

- Part 3 of the Act allows for the declaration, registration and management of protected areas;
- Part 5 of the Act prohibits any unauthorized bio-prospecting research in these areas except if given permission by the Advisory Committee;
- Part 6 provides for the appointment of inspectors to enforce the provision of the Act. There are sections throughout the Act that highlight fines and breaches of the Act.

6.10. Provincial Government Act 1997

The Provincial Government Act of 1997 provides power to the provinces to create their own legislation in respect of environment and conservation. Its Schedule 3 provides a list of activities for which the provinces have responsibility and have the power to pass ordinances.

According to the country's draft 2008 State of the Environment (SOE) Report, a total of eight (8) provincial ordinances related to environental and natural resources management had already been passed. But these ordinances were passed by five (5) provinces only. Isabel Province paseed the most number of ordinances with environmental and natural resources management had already been passed. But these ordinances were passed by five (5) provinces only. Isabel Province passed the most number of ordinances with 3, followed by Malaita Province with 2, and one each for Guadalcanal,Makira, and Temotu.

6.11. Land and Titles Act (1988)

The Act manages and defines all lands and sets out the procedures for land acquisition (lease or purchase).

6.12. Town and Country Planning Act (1979)

The Act applies to all urban areas (Capital city – Honiara and Provincial towns) and includes the management of land (all ownership), the management and planning functions for urban and rural areas including development.

6.13. Forestry Bill (2004)

The forestry bill effectively replaces the Forest Resources and Timber Utilisation Act of 1991 and governs licensing of felling trees and sawmills, timber agreements on customary land, establishes State Forests and Forest Reserves and provides for the conservation of forest and its management.

6.14. River Waters Act (1973)

The River Waters Act (1973) provides the legal mechanism to manage and control river water for the equitable and benefit use for all and includes a number of specific activities that manages (through acquisition of permits) construction (e.g. bridges) and the removal of key environmental habitats and biological resources. In addition, the act provides a specific order for the management of the use of water and activities associated with six specific rivers systems located

on Guadalcanal including; the Mataniko, White, Mbalasuna, Ngalimbui, Lungga and Mamara rivers.

6.15. Waters Resource Bill

The Bill has been prepared to go through parliament and if approved passed by the parliament and gazetted, it will supersede

Rivers Waters Act 1996. The Purpose of the Act is to:

- Provide for the integrated water resource management of Solomon Islands;
- To promote most efficient, fair and beneficial use of natural water;
- To ensure the natrual water resources are available for sustainable use for the benefit of all present and future Solomon Islanders;
- To provide for the protection of natural water courses and water catchments;
- To provide for the control of activities occuring over or beside water ways or water courses; and,
- To provide for the control of activities occuring over or beside water ways or water courses.

A Waters Resoources Advisory Board is required under the Act, whose function is to advise the Minister on Matter pertaining to the Act and Consult the Director of Water Resources on technical matters. The Director with his/ her staff shall administer, manage, and implement the Act accordingly so as to achieve the above goals.

The Act covers all water bodies, rivers, streams whether in a registered or non - registered, public or private or customary land in Solomon Islands. The Ministry has the authority to control the use and development of all water catchments and riverbanks. Logging, mining and sands and gravel extraction in water catchments, riverbanks and river beds may be restricted by the Ministry according to the requirements of the catchment management and conservation. Section 21 of the Act provides for the Ministry to recommend to the Board to declare a water body such as a catchment, ground water or flood control zone as a Water Control Area. If approved by the Minister and gazetted, mining and sand and gravel extraction will be prohibited. This also includes any contraction, altering, removing or in any way impede or be likely to impede flow or movement of surface water. This is a very important clause as it may have a direct impact to sand and gravel extraction in the future if the current activities are not managed or sustainable.

The Act clearly states that a development must not obstruct, divert or dam the river, if so it must make application to the Minister who upon receiving the request will assess and if agree will issue a license accordingly.

6.16. Safety at Work Act (1996)

The Safety at Work Act (1996) states that it is the duty of every employer to provide a safe workplace and to ensure the health and safety of employees under their control. This Act is linked to the Labor Act (1978) and the Safety at Work (pesticide Regulations (1983).

6.17. Bio-Security Bill (2013)

The Bio-Security Bill (2013) is a proposed Act to; (i) prevent the entry of animal and plant pests and disease into Solomon Islands; (ii) to control their establishment and spread, (iii) to regulate the movement of animal, plant pest and diseases and of animals and plants and their products; and (iv) to facilitate international cooperation in respect of animal and plant diseases and related matters.

6.18. International Agreements and Treaties

Solomon Islands is a party to a number of international and regional Multi-lateral Environment Agreements. These MEAs have been instrumental in the development of national environment management strategies to address major environment issues. The country is currently developing major national strategies under the Rio Conventions. This includes the National Biodiversity Strategic

Action Plan (NBSAP), the National Adaptation Plan of Action (NAPA) and the National Action Plan to Address Land Degradation (NAP).

6.19. Environmental Management in the Transport Sector

The National Transport Plan (NTP) finalised in 2010 and revised in 2016, provides the strategies and objectives for the national transport system until 2030. The plan provides direct reference to the long term management of environment safeguards and notes that the environment is the key to the country's economic development, and that the transport sector needs to be planned and implemented in such a way that minimizes adverse environmental impacts. The NTP identifies a number of adverse transport related impacts, which include:

- Marine pollution from shipping;
- Land degradation and pollution of water courses resulting from poor infrastructure design;
- Destruction of landscapes as a result of poor operating practices at quarries and construction sites;
- Air pollution from both road traffic and air transport; and
- Land degradation as a result of inadequate facilities for the disposal of transport related waste.

The NTP adopts four policy interventions to minimise negative environmental impacts associated with development of the transport network and also notes that past transport activities have had less than satisfactory environmental outcomes. Therefore, one of the key objectives of the NTP is to improve safety and reduce accidents, injuries and deaths associated with the transport network.

MID, in conjunction with support from ADB-funded support projects, developed a Safeguard Procedures Manual (SPM) to guide the management of environmental and social impacts and risks. These could arise in the course of implementing the NTP. The SPM is based on the national environmental assessment process and further elaborates on the existing procedures for avoiding, minimizing, and offsetting the environmental and social impacts.

The NTP identifies the types of infrastructure required and prioritises the area for financing which include in descending order: i) Road and maintenance and rehabilitation; ii) Wharf maintenance and repair; iii) New wharves; iv) Maritime navigation aids and maintenance; and v) Airfield maintenance. The Central Projects Implementation Unit (CPIU) of MID categorizes these priority activities in three tiers based on their environmental and social impacts, which include:

- Tier 1 – community based routine and preventative maintenance through Labour Based Equipment Supported (LBES) contracts, mainly for roads;
- Tier 2 – Machine Based Maintenance Contracts (MBMC) for roads, wharves, and airfields; and
- Tier 3 - major rehabilitation, reconstruction and/or new construction contracts for roads, wharves, and airfields.

Each of these tiers has different environmental and social impacts, the management of which requires different mitigations under the Country Safeguards System (CSS) and development partner requirements. MID is required to ensure that its procedures meet both the legislative requirements of the Solomon Islands as well as the policy requirements of its development partners. The three tiers of NTP activities collectively trigger the environment assessment and land acquisition and resettlement (LAR) safeguard policies of the development partners as well as CSS. Among the tiers, Tier 3 activities, major rehabilitation and new works, are anticipated to have the most environmental and LAR impacts. Therefore, this IEE for SOL1 incorporates this level of assessment.

Environmental impacts and risks for Tiers 1 and 2 are considered low and can be managed with straightforward standard practices and tools that have been developed, and refined through use, under the ADB-funded Transport Sector Development Project (TSDP). The impacts and risks will be site-specific, which can be mitigated and managed. Under the CSS for environment, Tier 1 and the majority of Tier 2 are not listed as 'prescribed activities' and are therefore waived from requiring a development consent issued under the Environment Act 1988.

Tier 3 works comprise prescribed activities that require application for development consent and some level of environmental assessment. As a result of more extensive works and the larger footprint, effects of these activities will require environmental assessment. The impacts of the Tier 3 activities (equivalent to category B under ADB SPS requirements) are also generally well understood and in most cases do not require more detailed impact assessment. These types of activities in compliance with the Environment Act typically require the preparation of an environmental assessment, a Public Environment Report (PER), the level of which is comparative to an IEE.

MID will follow a set of planning and implementation procedures for each activity which builds on the nations existing environmental procedures. The environmental screening, assessment, planning, implementation and monitoring process involves a number of stages and parallel steps within each stage which are set out in the SPM for each tier of activity. These include:

(i) All activities, irrespective of the tier, require screening and scoping to establish the planning and resourcing requirements for further work;

(ii) For Tier 1 activities, smaller scale effects can be addressed through environmental, health and safety guidelines and checklists (which have been developed by CPIU/MID) that are included in the civil works contract;

(iii) Training is provided to contractors on awareness and monitoring of contractors' compliance is undertaken. For Tier 2 activities, contractors are required to prepare a site-specific construction environmental management plan (CEMP). Tier 3 activities require environmental assessment and development consent (see (iv) below);

(iv) Tier 1 and 2 activities, while the procedure is abbreviated, still require significant engagement with the affected community for the contractor to establish and maintain a Community Advisory Committee (CAC) for all activities. The CAC engages in the supervision and problem solving during the construction; and

(v) Tier 3 activities are more complex and will be required to complete additional steps of conducting a feasibility study. A feasibility study includes technical, environmental, social as well as financial and economic assessments and analysis. Climate change and adaptation requirements are also included. A Climate Change Manual for Reducing Risk and Design of Mitigations has been prepared by MID under TSDP and will be utilized as an additional resource to support the procedures set out in this SPM.

The SPM processes have been incorporated into the SOL 1 IEE. In addition, the SPM provides detailed procedures to address the impacts and risks associated with the projects LAR, these

procedures have been taken into account during the due diligence of the SOL 1 social assessments.

6.20. ADB Safeguards Policy Statement

The ADB Safeguard Policy Statement 2009 (SPS) has the objectives to (i) avoid adverse impacts of projects on the environment and affected people; (ii) where possible; minimize, mitigate, and/or compensate for adverse project impacts on the environment and affected people when avoidance is not possible; and (iii) help borrowers/clients to strengthen their safeguard systems and develop the capacity to manage environmental and social risks. The environment safeguard requires due diligence which entails addressing environmental concerns, if any, of a proposed activity in the initial stages of project preparation.

The SPS categorizes potential projects or activities into categories of impact (A, B or C) to determine the level of environmental assessment required to address the potential impacts.

ADB assigned an Environment Category B classification through their Rapid Environmental Assessment (REA) checklist indicating that potential adverse environmental impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed readily.

A category B classification was confirmed by the consultant during the project inception phase. Accordingly, this IEE has been prepared as the requisite level of assessment to address the potential impacts in line with the SPS.

6.21. Solomon Islands Environmental Assessment Requirements

The projects scope of works (including all sub components) has been initially screen by the Environment and Conservation Division (ECD) under the Ministry of Environment, Climate Change, Disaster Management and Meteorology (MECDM) resulting in the project being categorized as a ‘Prescribed Activities’ and as such a Public Environment Report (PER) is required for the sub components of the project.

The PER consists of seventeen sections and includes the following sections: (I) Executive Summary, (2) Details of Project Developer; (3) Details of the EIA consultants; (4) Introduction; (5) Policy, Legal and Administrative Framework; (6) Summary description of the prescribed development; (7) Description of the proposed development; (8) Location and scale of the prescribed development; (9) Description of the Environment; (10) Alternatives; (11) Climate and Disaster Risk (12) Social and Poverty Assessment (13) Environmental Impact Assessment and Mitigation Measures; (14) Environmental Management and Monitoring Plan (EMP); (15) Public Consultation and Information Disclosure (16) Difficulties encountered (17) Conclusions and Recommendations.

Through discussions with the projects consultant, the ADB, ECD and the developer (MID) it was agreed that two separate IEE/PER will be required to be developed for the sub-project subcomponent.

7. DESCRIPTION OF THE PROPOSED DEVELOPMENT

Viru Wharf is located on the southern coast of New Georgia Island, the largest of the islands in Western Province. The wharf is in a sheltered location on the west side of a north / south orientated sea inlet. Sand and alluvial soil sediment from the Manggo River (upper end of the inlet) is being deposited in the area immediately north of the wharf. The original wharf structure was built about 30 years ago but over time the wharf subsided and within the last ten years was upgraded by a local logging company with a new wood facing with backfilling behind to raise wharf level. The existing wharf location suffers from siltation immediately to the North making access difficult for vessels. Despite the state of the wharf, inter-island ships still utilize the wharf because of its strategic location. The location of the existing Viru Wharf in terms of the Solomon Islands is indicated in is shown in

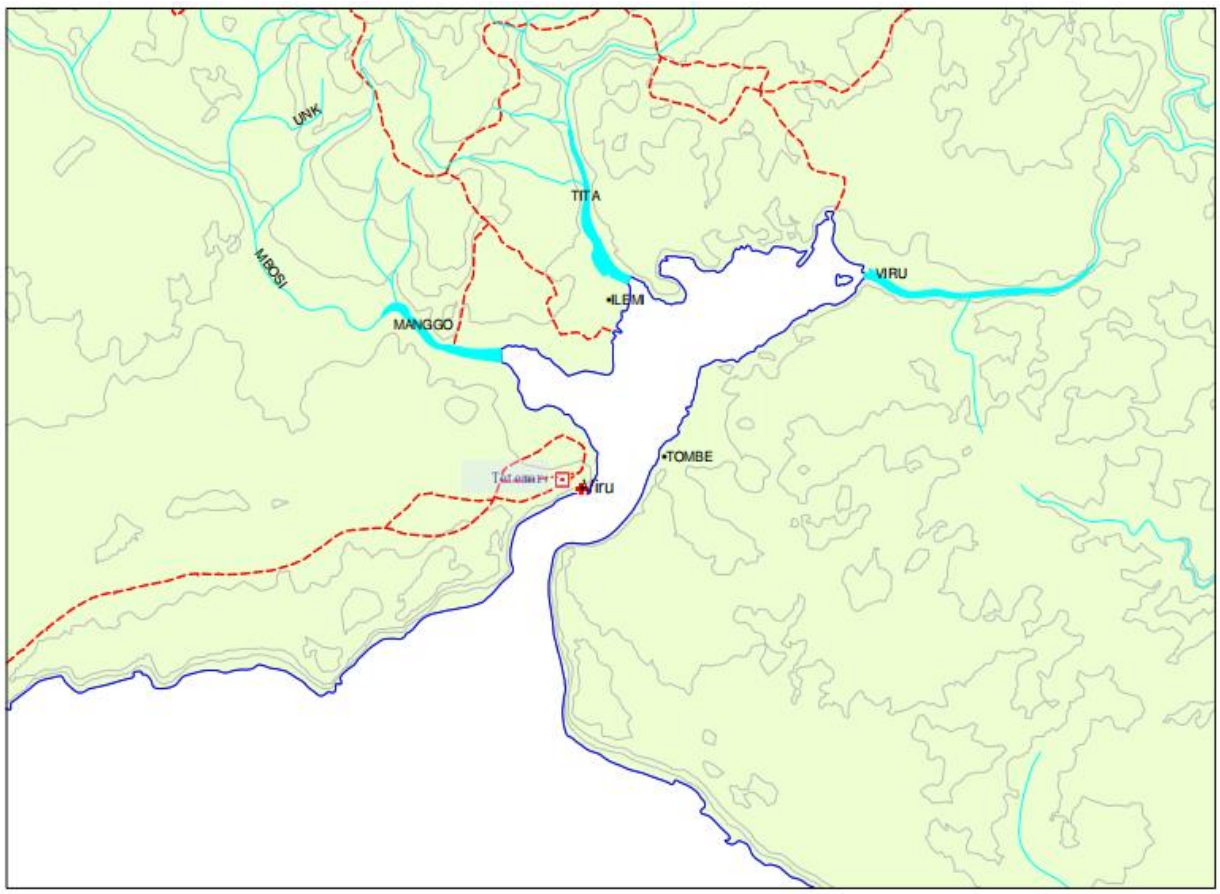


Figure 8.

There is no cranage at the wharf. If required vessel mounted cranes transfer good from vessel to shore, though generally cargo is manhandled from vessel to shore or direct to OBMs for distribution. An iron pipe and a nearby coconut tree serve as bollards.

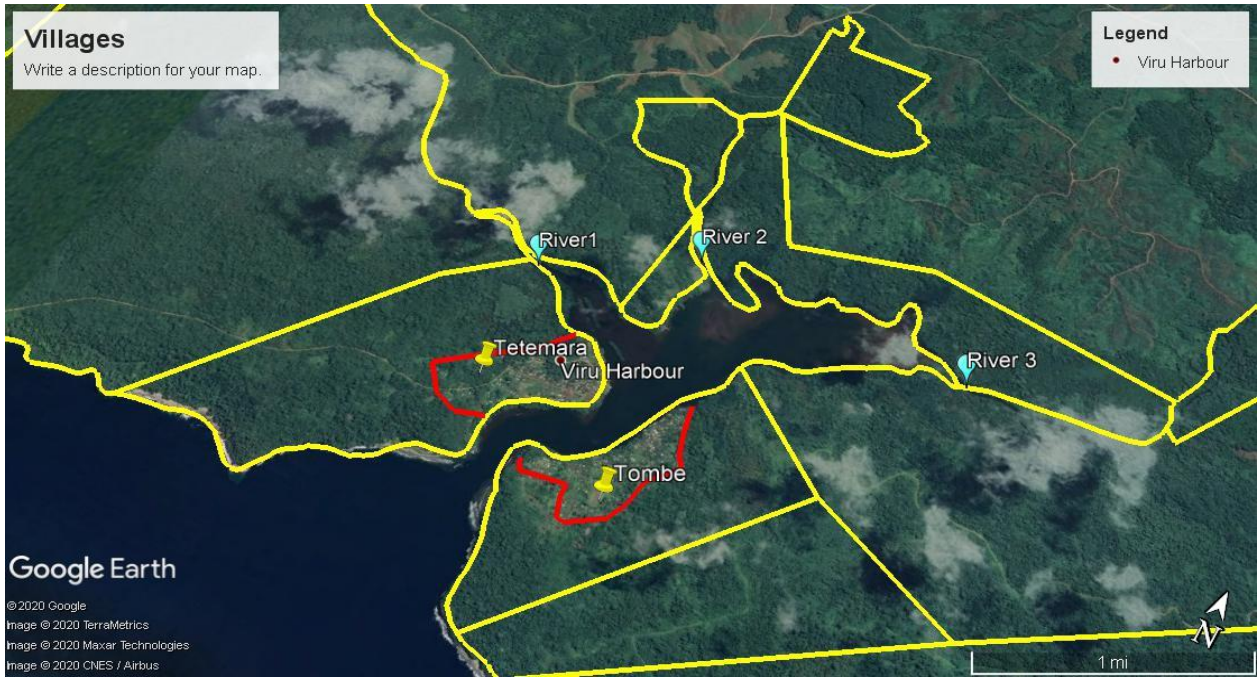
Due to siltation the current wharf site is not preferred for redevelopment and the preferred location for a new wharf is 100 m to the south of the current wharf. The new site has eroded over time, but is otherwise well protected from adverse wind and wave conditions.

The village is situated to the west of the wharf, on a hilltop shielding most of the village from direct line of site of the wharf. There is a steep scarp slope between wharf and village (See Figure

9:). The site was visited on 14th March 2019 from 09:00 to 13:45. A road leads inland from the wharf up through the village and beyond to other villages1.

Figure 5: Viru Wharf – Global context

Figure 6:Google Map of the Viru Harbor



[1] Pers comm. Pen Haro spokesperson for Chief Dilenti

Figure 7: Map of the location of Viru Harbor

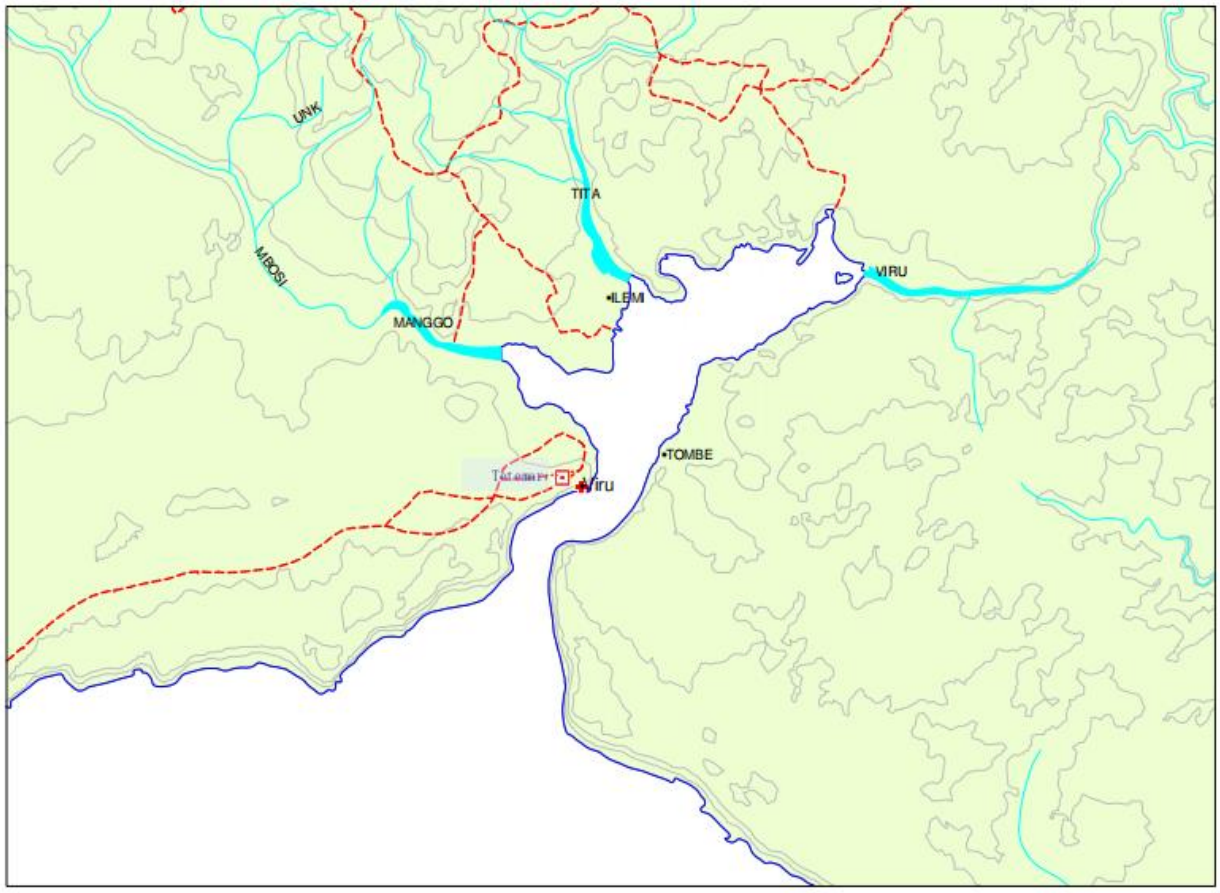


Figure 8: Viru Wharf – Local context

Figure 9: Existing Viru Wharf (March 2019)

Figure 10: Viru Wharf – Proposed location

The current wharf is characterised as being:

- The main wharf in the area connecting to the interior;
- A wooden structure built out from the shoreline comprising wooden facing with backfill; and,
- Difficult for vessels to access due to shallows immediately to the north. Vessels need to reverse from the wharf on departure and can only approach from the south.

7.1. Construction activities

The scope of works involves the removal of the existing structure and its replacement with a combined wharf / boat jetty and a boat ramp for LCR approximately 100m south of the existing wharf. All structures are concrete piled with a pre-cast concrete deck. It will also require site establishment, piling, erection of precast concrete units, small scale concrete works and finishing (handrailing and rectoration of site).

7.1.1. Clearing and grubbing

Clearing an grubbing are required for the Viru wharf and ramp construction to bring the access roads to acceptable standards. As the site for the proposed structures has no access road to it. Clearing will be minor as the area has been distrubed by people. Before the commencement of works, the Contractor's CLO with assistance from the LMCP SC shall consult the village chief or elders to determine the rightful owners and seek permission for the permanent use of the land. This is by explaining the intended actions, clearly delineating or demarcating the areas identified for clearing and grubbing and which crops or trees will be removed. After this an agreement to commence works will be signed by MID, Contractor and the righful land and property owners.

All waste materials and debris including spoils from the cleareing will be disposed of by burning unless otherwise directed by the Engineer. Materials and debris which cannot be burned, may be buried or piled outside of the required access route at an approved site agreed by the Engineer and the landowning units.

7.1.2. Filling, shaping and compaction of the access road

The construction of the access road will require backfilling, shaping and compaction of the materials. Safety considerations and climate change adaptive measures are integrated in the road design due to the proximity of the proposed road to the coast. Village elders and land owners will be consulted by the Contractor for additional land requirements and if there is a need for a signed agreeement or understanding between MID, MLHS and the landowners the SC, the Contractor's CLO and the Engineer will facilitate signing.

Figure 11: Mini excavator for access road works

7.1.3. Coastal Protection

Coastal protection works will include the installation of gabion or rip rap along the coast to reduce coastal erosion and protect the access roads.

7.1.4. Piling works

Piling works will be carried out on site for the new wharf. The works will comprise of the supply, delivery, storing, handling, pitching, driving, splicing, testing, withdrawing, trimming and preparation of the piles, welding of toe reinforcements ofshoes and shear rings, protective coating and all other ancillary operations necessary for the satisfactory completion of the work. But depending on the Engineer's approval, piling should be driven down at an approved depth. There will also be a need for coffer dams as all works will be at the designated coastal area which is sea water infused during both high and low tides. The responsible Engineer will advise and approve the use and installation of coffer dams.

The activity will have temporary impacts on the water quality, noise levels and the movement of small boats in the harbor.

Figure 12: Pumping excess water from pile casing (Note Steel I beam inside pile casing)

7.1.5. Concrete works

Concrete works on site will be required for the wharf and ramp construction for the abutments, encasements, deckings and beams which will be prepared off site. Steel casing will be filled with concrete and pre-cast "concrete muffs" fixed to the head of the pile linking it with the precast concrete beams to form a stable platform. While the precast concrete decking beams will be manufactured off-site and attached to the piles infilled with grout produced on site in small batches. Decking slabs will also be produced off-site and will be attached to the pile caps by reinforcements and grouts produced on site.

Figure 13: Fixing precast concrete decking on pile cap (PPE violations noted)

Gravel and cement will be from a source approved by the Engineer. Camples of concrete will be submitted to the Engineer prios to any concrete works on the structures. Sand, coars aggregate and water mixtures shall be at approved proportions. If there will be a need to use materials sourced locally or on site a mini - crusher will be installed by the contractor approximately 30-50m away from river banks or any water bodies with proper drainages and sediment / silt control measures in place to avoid run-off to the river or other water bodies.

7.1.6. Demolition

After the completion of the new wharf and ramp the contractor will start demolition of the existing wooden structure. If tghere is likely to be opportunity for reuse of material in the local community the material will be salvaged by the community people. But if there will not be any use of the materials, the contractor will consult with the village chief and the land owners for disposal of the materials at an approved site.

7.1.7. Restoration of Site

After the works will be completed, the contractor will be responsible to restore the site to pre - construction condition or to the satisfaction of the Engineer. All waste shall be removed and dumped at an approved site.

7.2. Gravel and fill materials

The construction of the road and grout production on site and off site will require significant amounts of river gravel and coronous (road) materials. The road will also require fill to raise the carriageway above frequent inundation levels to reduce risk of coastal flooding and coastal protection to reduce risk of coastal erosion.

During the consultations, there are known sources of coronous and rier gravel materials that have been used by logging companies on the island with close proximity to the site,but this has to be tested and approved by the Engineer and MID before it can be used by the Contractor for the works. Resource owners will be consulted by the Contractor, MID and SC for the use of the materials if approved and an MOU ro MOA will be signed by MID through MLHS with the land owners.

The contractor shall be responsible for consultations and with approval of the landowner or local community for locating and establishing the material sources and negotiations, arrangements, compensation, royalties and maintenance of the pit to the satisfaction of the Engineer. The contractor will submit details of the material location, material test results and evidence that an MOU or MOA had been signed and in place to the Engineer for approval before any extraction of materials.

The contractor shall provide a material source assessment which shall include an investigation of geological site, characteristics and source material properties. This will also include extraction and production operations and plant capacity to process the material.

The operation of crusher on site to crush river materials and seggregate specified sizes needed for the works has to be located 30-50m away from any water bodies with proper drainage and sediment and silt traps installed to avoid siltation into the surrounding environment.

The contractor will identify sources of coronous and river gravel to be userd for the sub-project and will prepare an extraction plan according to the Aggregate Extraction Guideline prepared for the project. The extraction plan will include a description of the existing environment. The volume of material to be extracted, identification of the impacts of the extraction as well as the means of mitigating adverse impacts. The extraction plan will be reviewed and approved by the MECDM and CPIU. All proper environmental permits and clearances from MECDM will be secured for this activity.

7.3. Other materials

Other materials such as hydrocarbons including diesel fuel, petrol and engine oil will be used by the contractors equipments and machineries during the works. Accidental spills and leakages may occur, and will be mitigate by applying the mitigation measures described in the Environmental management Plan.

7.4. Equipment and workforce

The current wharf at Viru is a wooden structure that is not suitable for access by larger vessels operating the interisland passenger and cargo trade. The proposed works will replace the wooden wharf with a precast concrete deck on piled foundations, a landing craft (LCT) ramp and a boat jetty. The ramp, wharf jetty arrangement is presented in the Appendix.

The sub - project will be part of a competitive bidding contract and will require construction workforce of plant operators, skilled and unskilled labor, supervisors and construction team, manager, engineer and ancillary staff including cooks and security guards. Therefore, a construction force of about 20 people maximum will be required and will be based on site till the completion of the works.

For recruitment of unskilled or skilled (if required on site) workers priority will be given to residents of the villages at Viru to minimize hiring of transient workers and reduce social tension.

The equipment and plant to be used during the works will include excavator, concrete mixer and piling equipment. Staging areas for temporary storage will be required on site.

Table 2: Machineries and Equipment

Items.	Description
1	Barge, tug-boat and piling equipment ● Barge will include a piling rig and equipment associated with piling, small concrete batching plant and associated storage areas and water bowsers and steel pile casings and precast concrete decking.
2	Crane (barge mounted) to lift precast units into position.
3	Concrete mixer
4	Excavator (“bobcat” type)
5	Hand tools - electric powered
6	Plate compactor - Vibrating (15hp)
7	Welding Set - Electric (300-400amps)
8	Bar cutter and Bar bender
9	Water Pump and Air Compressor
10	Electricity GenSet, 500kw
11	Falt bed truck (if needed)

7.5. Temporary storage areas and Construction camp

It is very likely that the selected contractor will work from a barge containing all construction materials, piling rig and ancillary equipment. The barge will be moved to site by a dedicated tug-boat and moved to the next site by the same tug boat. The barge or tug-boat will be equipped to accommodate all of the construction plant and materials necessary for the work. The Contractor may develop an on-land compound for an administrative office and material storage, this camp would be fenced to exclude casual access. Non local workforce would be accommodated in the village by negotiated arrangement between contractor and community. Altenatively the

Contractor will develop a small construction camp comprising administration, accommodation, canteen and toilet / ablution facilities.

Small temporary storage / laydown areas and a site office will be secured adjacent to the wharf site. These areas will be clearly identified in the site-specific EMP (SEMP) to be prepared by the Contractor.

Figure 14: Typical office accommodation inside converted TEU containers

Source: Author. March 2017 PNG

7.6. Waste Materials Generated

Waste generated during the construction works will include spoil, debris and other solid wastes including plastics, paper, cans/tins and bottles. Fuel and oil spillage or leakage from machineries are also expected to occur during works. This will be managed according to the EMP and the Contractors Waste Management Plan which will be prepared by the Contractor and approved by the SC and the Engineer.

7.7. Estimated Construction Duration

Construction activities are estimated to take between 3 to 6 months (mobilisation to demobilisation).

8. LOCATION AND SCALE OF THE PRESCRIBED DEVELOPMENT

This section provides the map and plan of the appropriate scale of where the proposed wharf and ramp will be constructed.

8.1. Proposed Project Activities

The table below presents the proposed project activities which will be carried during the construction works.

Table 3: Proposed project activities

Sub - project Site	Proposed Development	Proposed Activities
Viru Wharf	Construction of a new wharf and ramp.	1. Site establishment 2. Clearing and Grubbing 3. Shaping, filling and compaction of access road 4. Gabion protection works at the coast 5. Piling 6. Pumping off water from pile casing 7. Concrete works 8. Installation of pile caps 9. Attachment of precast beams and decks on pile caps 10. Demolition of the exisitng structures 11. Restoration of Site 12. Demobilisation

8.2. Aggregate required for the works

During the construction works the contractor will be requiring aggregates for the following activities:

- Concrete or pre-casts;
- Access road works; and,
- Coastal erosion control.

9. DESCRIPTION OF THE EXISTING ENVIRONMENT

The Western Province is an archipelago of 11 islands stretching about 350km from Shortland Islands in the North to Mbulo in the south. It is located 8º0'S and 157º0' E and is one of the largest provinces in the Solomon Islands. It is comprised of various many islands and atolls. The province has a population of 5475m^2 and according to the 2009 census report the province had a population of 76,649 with a population density of 14/km^2.

9.1. Physical Component

9.1.1. Climate and Air Quality

Western Province has an ocean equatorial climate with an average temperature of 27ºC and high humidity all year round. The islands in the province experience cold months from June to August while months of higher rainfall averaging between 2900mm to 3500mm is expected from November to April.

Seasons are separated by wind directions prevailing from the west or northwest from November to April. At this time there are long intervals of cal, interrupted by storms and strong winds with likely cyclone events which often moves towards the south.

9.1.1.1. Climate

The Solomon Islands has a typical tropical oceanic climate (high temperature and high humidity) throughout the year with a pronounced wet season from November to March and a dry season from April to October. The nation is subjected to tropical cyclones that are associated with the south-easterly trade winds (November to March) and is also vulnerable to the effects of tsunamis generated from volcanic activity in the Asia-Pacific region.

9.1.1.2. Climate Change

Wave climate and climate change trends around the Solomon Islands are affected by processes occurring over large areas of the Pacific Ocean, from the northern to the southern subtropical zones (35°N to 35°S), as described above.

Climate change projection scenarios are typically divided into four "representative concentration pathways" (RCPs), based on a range of emissions output scenarios. These were developed by others and refined by the Pacific-Australia Climate Change Science and Adaptation Planning (PACCSAP) Science Program supported by the Australian Government used global climate modelling experiments (CMIP5). The Climate Change and Disaster Risk Vulnerability Assessment (CCDRVA) undertaken for this Project (RP-004-180309-Climate change and disaster risk vulnerability assessment-3.0-FINAL, issued 16 May 2018) adopted RCP8.5, which is a worst-case (business-as-usual) scenario for its assessment.

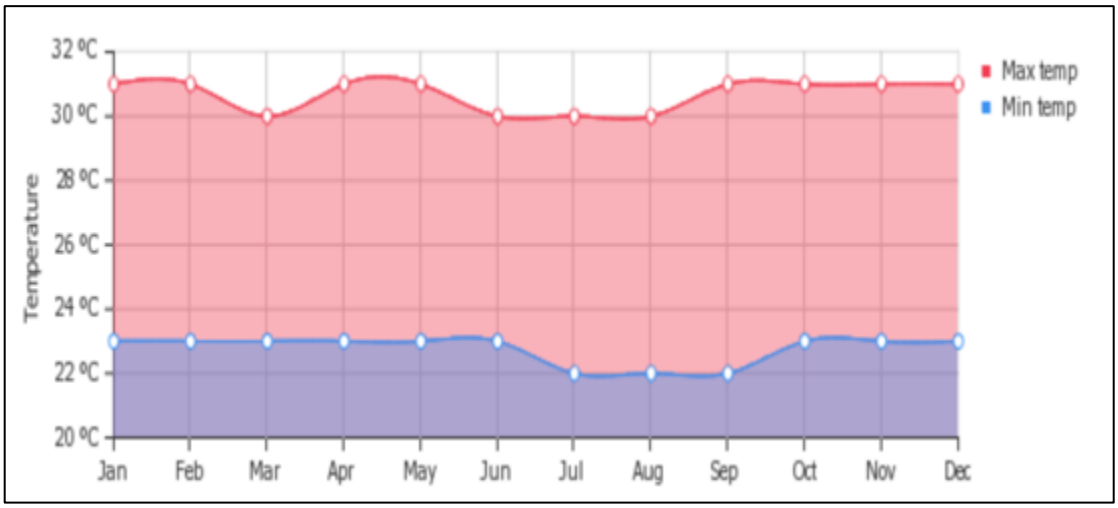
Climate change induced risks to wharf infrastructure include:

- Sea level rise;
- Storm surge; and,
- Changes in wind and wave climate, resulting in potential increases in extreme wave heights.

9.1.1.3. Temperature

Solomon Islands has a relatively uniform temperature ranging from 22 degrees Celsius (°C) to 31°C throughout the year. The monthly average maximum temperatures are 30ºC to 31ºC and the monthly average minimum temperatures range from 22ºC to 23ºC. The monthly average maximum and minimum temperatures observed for 2016 in Honiara are as shown in Figure 10 below.

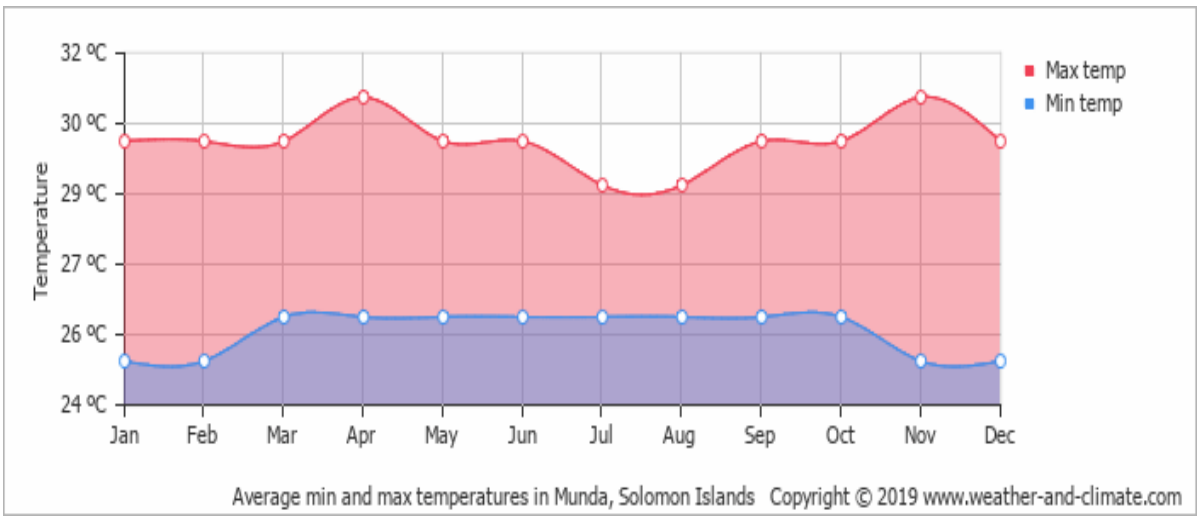
Figure 15: Average annual (2016) min & max temperature ^{0}C for Honiara



Source: www.weather-and-climate.com

For Western Province, on average the temperature is always higher than Honiara.The warmest month is April with an average maximum temperature of 31°C (87°F). The coldest month is January with an average maximum temperature of 29°C (84°F).

Figure 16: Average minimum and maximum temperatures in Munda

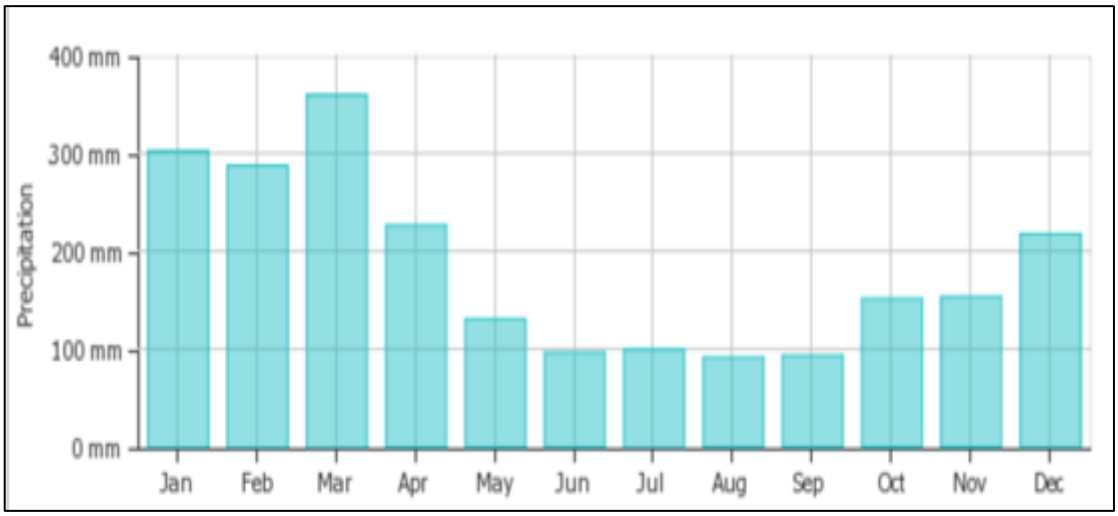


9.1.1.4. Precipitation

The average annual rainfall is mostly within the range 3000 to 5000 mm with the majority of monthly rainfall amounts in excess of 200 mm. In most of the Solomon Islands, the wettest months are during the Northwest monsoon season (January to March averaging 380 mm), with a tendency for reduced amounts during February when the equatorial trough is normally furthest south. Locations on the southern sides of the larger islands (e.g. Guadalcanal) tend to have rainfall maximums between June and September. The average monthly rainfall per month in mm for 2016 for Honiara is given in

Figure 17.

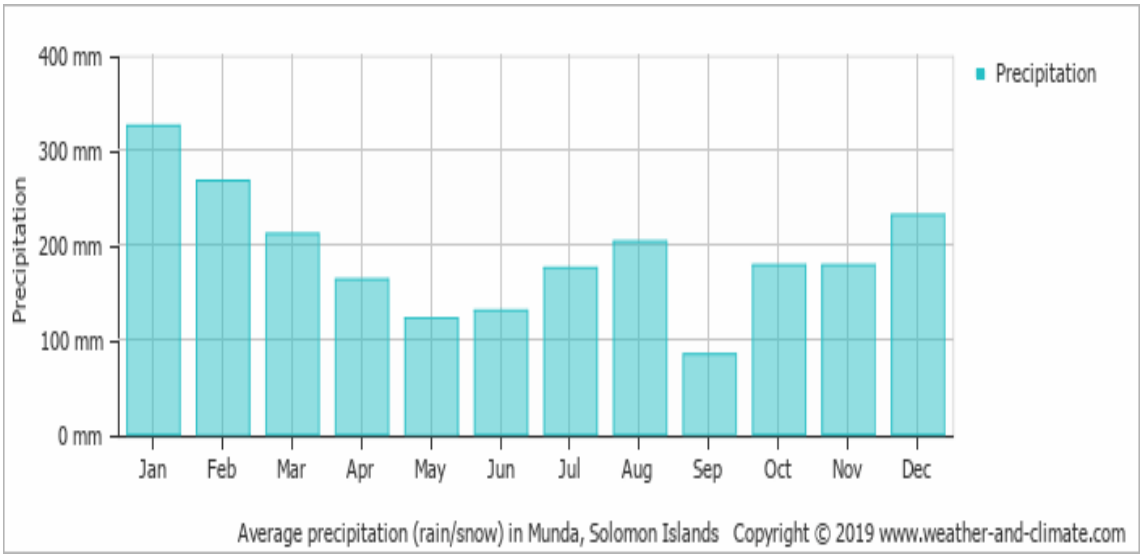
Figure 17: Average annual monthly rainfall in mm for Honiara for the year 2016



Source: www.weather-and-climate.com

Based on the weather pattern in Munda, Western Province a lot of rain (rainy season) falls in the month of: January, February, March, April, July, August, October, November and December.January is the most wet month. This month should be avoided if you are not a big fan of rain.September is the driest month of the year.

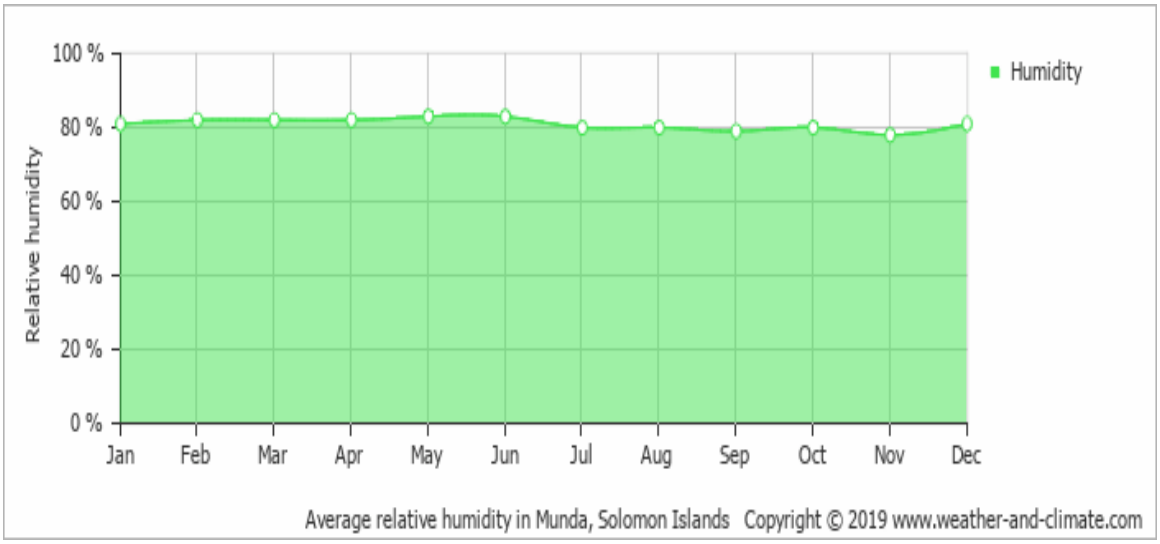
Figure 18: Average rainfall in Munda



9.1.1.5. Humidity

Relative humidity throughout the nation shows little seasonal variation however it does have a marked diurnal fluctuation. Humidity is highest in the morning and frequently reaches 90 percent. For Munda in Western Province, humidity is below 90%.

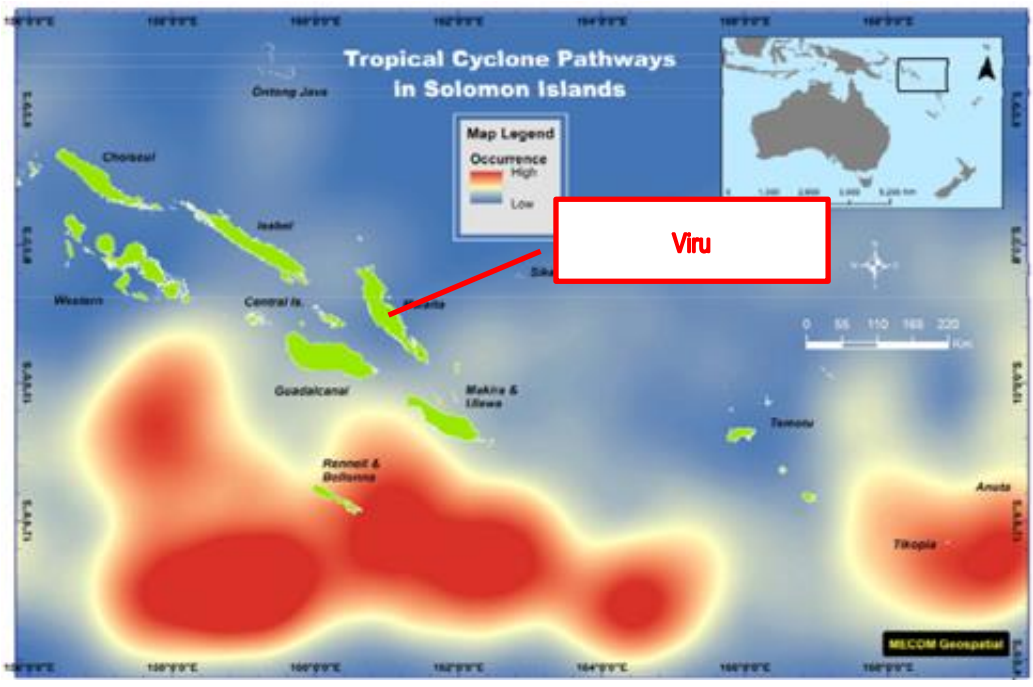
Figure 19: Average relative humidity in Munda



9.1.1.6. Cyclones

A number of tropical low pressure systems occur each year over the Solomon Islands at times when the equatorial trough is in the vicinity, but few of these develop into tropical cyclones. The average frequency of tropical cyclones is between one and two per year, tending to increase southward. Because the tropical cyclones are usually in the early stage of their life cycle, they are relatively small but can result in serious damage due to strong winds and heavy rainfall.

Figure 20: Tropical cyclone pathway in the Solomon Islands



Source: MECDM, 2018

In addition, tropical cyclones will naturally result in abnormally high ocean tides that may rise up to 3-6 m above the regular tide. This is due to the pooling of seawater by the frictional effect of very strong winds persistently gusting on shore as the cyclone approaches a shallow coastline. This can result in inundation of low lying coastal plains and impacts on the shoreline and beach on beach profiles.

In the last 50 years Western Province has recorded only five (5) cyclones.

9.1.1.7. Air Quality

Air quality in Solomon Islands is very good, largely as a result of there being very few industries and a relatively small vehicle fleet generating emissions. There are no air quality or emissions standards in Solomon Islands and no monitoring is undertaken. Recent road rehabilitation and upgrading activities associated with the nation's capital, Honiara has caused significant increases in air born dust as a result of the construction of the road. These temporary increased levels of dust are expected to greatly subside once sealing activities are undertaken. Elevated air quality parameters will need to be mitigated and closely monitored during the construction phase.

However, in Western Province particularly in Viru the air quality is very good and clean due to no industrial activity and very low number of vehicles operating on the island. Dust and other fumes are not an issue.

9.1.2. Water Resources Availability and Quality

Freshwater availability varies considerably across the archipelago. On the large volcanic islands (e.g. Guadalcanal) water resources derived from river systems are abundant due to the mountainous topography and weather conditions whilst, the nation's coral atolls and islets have no perennial surface water resources and rely on rainwater and thin fresh groundwater lenses (SOPAC, 2007, SIWA, 2013). Aquifers on the islands are small and depend mainly on precipitation for recharge (Sullivan and Guglielmi, 2007).

The total annual renewable water resources in the country are estimated at 44,700 million m^3 and is estimated that about 50-70% of rural population have access to piped or improved water supply while coverage in urban areas is about 80-90%.

The larger islands, surface water in the form of streams, springs or rivers are the main source of drinking water. Some communities on the higher volcanic islands also use groundwater for domestic purposes. On the small atoll islands and islets where water is scarce, rainwater is collected for drinking and brackish water from shallow hand-dug wells is utilized for most of their other domestic needs.

Freshwater quality in general throughout the nation is of good quality, however water resource quality associated with the urban and village areas, especially Honiara is in decline.

The key institutions responsible for water resources management are:

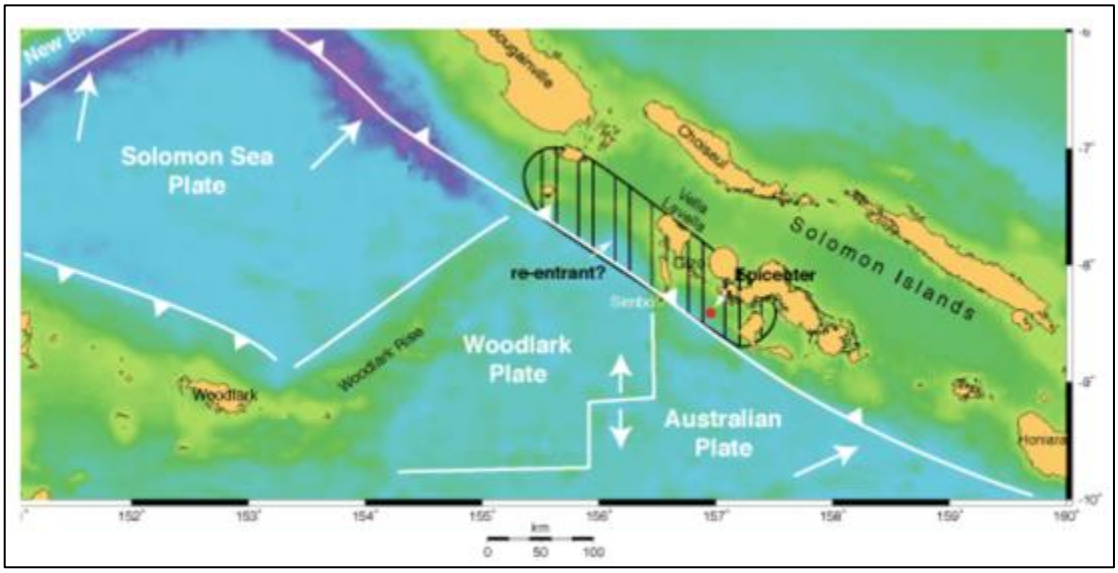
- The Ministry of Mines and Energy (MME): is responsible for providing national coverage related to water resources assessment, management and the development of groundwater;
- The Solomon Islands Water Authority (SIWA): is responsible for providing management and development of water resources and sewerage services in the capital Honiara and main urban areas, while provincial governments are free to choose SIWA or to operate their own supply; and,
- The Environmental Health Division of the Ministry of Health and Medical Services (MHMS): is responsible for providing safe water and sanitation to rural populations in Solomon Islands.

9.1.3. Geology, Topography and Soils

Solomon Islands lies at the boundary of three major tectonic plates which form part of the Solomon Islands Subduction Zone, which include the Pacific, the Australian and the Woodlark (PNG) plate. In addition, and further northwest of the Solomon Islands is the Solomon Sea plate, which is the source of the majority of volcanoes in the Solomon Islands Figure 21. The uplift of the pacific plate along with intermittent volcanic and seismic activity has contributed to the island masses that now

form the Solomon Islands. The islands are, geologically speaking relatively young, and the larger islands are almost entirely volcanic in origin and consist of basalt surrounded by uplifted coral terraces.

Figure 21: Tectonic plates associated with the Solomon Islands



source: www.walrus.wr.usgs.gov/tsunami/solomon07

There are 27 soil groups identified in Solomon Islands. Depending on parent material and land use, soils exhibit a range of fertility. The basalt volcanic derived soils are generally rich in nitrogen, phosphorous and organic carbon, but poor in potassium. The alluvially deposited soils are deep, freely drained yellowish brown to red humus-rich medium to coarse textured soils with limited profile development and reasonable natural fertility. The hill soils are older and have weathered to well-structured clays with somewhat poorer internal drainage. These soils have inclusions of limestone within their profiles and may overlie weathered coralline rock materials. Such soils have limited use and where they are retained in forests, are used for subsistence gardens, otherwise, these areas have reverted to extensive areas of grassland and have limited agricultural use.

9.1.4. Geological Hazards

The Solomon Islands is prone to natural hazards including cyclones, earthquakes, tsunamis and landslides. Due to the location of Solomon Islands at the junction of the tectonic plates, there is constant seismic activity including earthquakes and volcanic eruptions.

Western Province has experienced hazards from tectonic activities and is one of the island grouping in the Solomon Islands which had experienced disasters resulting from earthquakes, see table below for disasters occuring in the western province from 1950 to 2010.

Table 4: Natural disasters in Western Province, 1950-2010

Disasters	Periods					
	1950-1960	1961-1971	1972-1982	1983-1993	1994-2010	Total
Cyclone	0	4	1	0	0	5
Earthquake	3	21	43	Not Available	67	134
Tsunami	3	0	1	0	2	6

Landslide	0	0	0	0	2	2
Flood	0	0	0	0	6	6
Drought	0	0	0	0	2	2
Volcanic Eruption	0	0	0	0	0	0
Total	**6**	**25**	**45**	**0**	**79**	**155**

Source: Bennett, G., Cohen, P., Schwarz, A.M., Albert, J., Lawless, S., Paul, C., Hilly, Z. (2014). Solomon Islands: Western Province Situation Analysis

9.1.4.1. Volcanoes

The volcanoes of the Solomon Islands form a NW-SW trending island chain continuing along to the Bougainville Island chain (which forms part of Papua New Guinea). The islands belong to a volcanic arc caused by the subduction of the oceanic crust of the small Solomon Plate under the Pacific Plate Figure 22. New Georgia Sound constitutes the junction between the New Georgia-Kolombangara-Vella Recent volcanic province and the older Choiseul Cretaceous-Early Tertiary basaltic platform. The main observed faulting is NW-SE. This area is tectonically complex, marked by the interaction of several closely spaced oceanic microplates separated by subduction zones and short spreading centres, such as one extending from SE New Guinea to Kavachi volcano. There are 11 volcanoes in the vicinity of the Solomon Islands of which four have been active in the recent past, Kavachi and Cook are submarine and Savo and Tinakula islands. The closest volcano to Guadalcanal is Gallego (9'13S and 159'.82E) however it is listed as dormant (Figure 4-9). The Solomon Islands are exposed during eruptions to impacts such as ash fall, ballistics, lahars and pyroclastic and lava flows from landmasses and neighbouring islands.

Figure 22: Solomon Islands & Papua New Guinea Volcanoes known to have Holocene eruptions

Source: Siebert, Simkin and Kimberly, 2010

One of the active volcanoes in the country is located in the Western Province that is Simbo Island. The island is inhabited and is south of the province.

9.1.4.2. Earthquakes and Tsunamis

Earthquakes are common in Solomon Islands with 66 earthquakes reported for the year 2017; as such they are a near-weekly event. The active seismicity is directly linked to the location of Solomon Islands at the junction of several tectonic plates that results in constant seismic activity including earthquakes and uplifting of land and reef areas. Solomon Islands remain vulnerable to future earthquakes.

The most recent destructive earthquake was on the 6th of February 2013 with a magnitude 8 which struck the island of Santa Cruz in Temotu Province leading to a tsunami which generated a peak sea level change of 0.9 - 1 m. Similarly, a destructive earthquake and tsunami occurred in Western and Choiseul provinces on 2 April 2007. In the 1970's an earthquake affected the populations of Guadalcanal causing considerable destruction to village on the weathered coast resulting in three new villages, New Duidui, New Gorabau and Vatuloki, being constructed at Aruligo in the north west in 1977 after the people's original homes on the weather coast were completely destroyed by the earthquake.

The World Bank's Natural Disaster Hotspots study (Dilley et al., 2005) identifies the Solomon Islands as the number one pacific nation and the 10th and 25th country in the world most exposed to three or more hazards and relatively high mortality risk for multiply hazards, respectively.

Tsunamis are caused by the vertical displacement of seabed fault lines during earthquakes, or by other processes such as a volcanic eruption, volcanic collapse or submarine landslide. Tsunami-generating earthquakes tend to be shallow and of relatively-large magnitude (i.e., greater than Richter Scale magnitude 7.0), hence the occurrence of a large shallow earthquake located beneath the ocean will more often than not produce a tsunami, providing there is vertical offset of the sea floor.

The Solomon Islands has been impacted by 22 tsunami events between 1926 and 2016. The majority of tsunamis were caused by earthquakes in, or close to, the Solomon Islands whist two were caused by a distant earthquake and one by landslides on a volcano. Four tsunamis caused loss of life, and at least five tsunamis caused significant damage to structures, four of which had increased sea wave heights of 3 to 6 m. The largest in more recent times was in April 2007 that was triggered by an earthquake of magnitude of 8.1 (Richter Scale) and resulted in considerable damage and loss of life predominately in the western province of the nation. The tsunamis generated a wave with a focus run of up to >12 m in some areas (Newman, et al., 2011). The Pacific Tsunami Warning Centre in Hawaii provides tsunami warning advice for the Pacific Island Countries, including the Solomon Islands.

Earthquakes are most common in the Western Province, as recorded from 1950 to 2010 there were at least 134 potentially damaging earthquakes. Particularly in the northern group of islands, Shortland islands which is the most seismic active area in the country. One of the most damaging earthquake struck the province in April 2007 which resulted in a Tsunami and had affected various islands including Gizo, Simbo, Vella Lavella and the Shortland Islands. Claiming 52 lives, 1000 homes and had left thousands if people homeless. Another earthquake with a magnitude of 7.2 triggering a tsunami, occured on 5th January 2010 and had destroyed 200 homes and left one-third of the population homeless. From this it was considered that the province is highly susceptible and vulnerable to earthquakes and tsunamis.

9.2. Biological Component

9.2.1. Marine and Coastal Habitats, Flora and Fauna

Solomon Island has an open marine tenure system that allow anyone to fish the inshore waters (high water mark to 12 nautical miles offshore) and is subsequently managed by the national government, although historically and currently, communities claim some authority (which varies

between islands and communities) over adjacent community marine and coastal areas with respect to resource ownership and extraction.

Solomon Islands' main fisheries zones include: the freshwater streams and rivers and associated wet lands; the shallow fringing coastal reef or intertidal zone; the sub-tidal areas and reef slope including fissures or canyons in the reef slope (to about 25 m depth); the deep reef and near-shore deep-water areas below 25 m; and the open ocean or pelagic fishery. All of these areas are of critical subsistence importance, as well as being a local income generation opportunity. The first four zones are usually considered to be part of the "inshore fishery" and the latter referred to as the "offshore fishery". Commercial fishing (foreign fishing licenses focusing on pelagic resources - tuna species specifically) is permitted between 12 nautical miles from the coast to the nation's EEZ boundaries some 200 nautical miles out from the shoreline.

Marine systems, especially the first three zones (intertidal, sub tidal, and inshore reef areas) have been heavily exploited for subsistence and small scale artisanal livelihood activities whilst the deeper water slope benthic fisheries are becoming increasingly targeted. These activities have used a wide range of traditional and modernized fishing gear and techniques targeting a wide range of resources.

The marine and coastal ecosystems of Solomon Islands are part of the Western Pacific centre of marine biodiversity. The coastal zones are characterized by highly variable patchy ecosystems that include estuaries, lagoons, beaches, mangroves, coral reef areas, sea grass beds, algal beds and small islands. Coral reefs are narrow, fringing, and intermittently distributed around the high islands, with barrier reefs and expansive inter-tidal reefs not common. The coral reefs are most often associated with either uplifted shores attached to volcanic coastlines or seaward elevated coral limestone beaches.

The dominant marine ecosystems of adjacent to the sub-project site includes coastal foreshore is made up of littoral vegetation and other coastal species. There are no seagrass beds and coral species as the harbor is filled with sediments and silt washed from the 3 rivers in the area. Extensive areas of sea grass are recorded inshore, coral reefs further offshore and small patches of sandy lagoon habitats occur where the reef interacts with outflow from streams and small coastal lagoons have formed at the mouth of many of the rivers. Therefore, the coastal biodiversity is only restricted to those that can thrive in high turbidity waters.

Figure 23: Natural coastal habitat at the sub-project site

9.2.1.1. Coral Reefs

The marine fauna of the Solomon Islands is considered highly diverse. According to a study conducted by Coral Reef Initiatives for the Pacific (CRISP) in 2007, the Solomon Islands have one of the highest coral diversities in the world. 494 species were recorded (485 known species and 9

unknown species, which may be new species). These reef systems support one of the richest concentrations of reef fishes in the world with a total of 1,019 fish species identified. The coral reefs are mainly fringing and intermittent around islands and occur along mostly shallow coastlines where the water is clear and warm and maintains a constant level of salinity. Coral reefs support extraordinary diversity of species by providing food, shelter, nursery and feeding grounds for many fish species and crustaceans. The reefs protect coastal areas from storms and erosions by forming natural breakwaters. Furthermore, Solomon Islanders depend on the coral reefs for subsistence fishing.

However, there are no coral reefs at the sub-project site but coral reefs can be found at the entrance to the harbor.

9.2.1.2. Sea grass

Sea grass communities (meadows) are a significant coastal habitat and contain high biodiversity value in the Solomon Islands. They are essential marine ecosystems as they are the main diet for species such as the endangered green sea turtle (Chelonia mydas) and dugongs (Dugong dugon), which are found throughout the Solomon Islands. Sea grasses grow fully submerged and rooted in soft bottom estuarine and marine environments and can be found in habitats extending from the intertidal zone to sub tidal, along mangrove coastlines, estuaries, shallow embayment's and also coral reef, inter reef and offshore islands. In the Solomon Islands there are ten species of sea grass identified with significant patches recorded around Guadalcanal. Malaita Province has been identified in having the most extensive meadows within Solomon Islands, including one that is more than 1,000 ha in size.

9.2.1.3. Mangroves

Mangroves are important ecosystems for aquatic organisms and provide critical breeding habitats for a wide variety of reef and coastal invertebrate and vertebrate species. They provide structural protection to coastlines and act as a buffer between land and sea and act as a sink for sediments, nutrients and other contaminants to maintain coastal water quality, and so promote the growth of coral reefs and sea grass. Mangroves have a range of uses within the Solomon Islands (e.g. fire wood, construction).

Mangroves are a significant coastal habitat and contain high biodiversity value in the Solomon Islands and are located throughout the nation. The Nature Conservancy (TNC) reported that there are 20 species and two hybrids of mangroves found in the Solomon Islands. They include: Heritiera littoralis, Aegiceras corniculatum, Sonneratia alba, S. caseolaris, S. gulngai, Osbornia octodonata, Lumnitzera littorea, Rhizophora apiculata, R. stylosa, R. lamarckii, R mucronata, Bruguiera gymnorrhiza, B. parviflora, B. sexangula, Ceriops tagal, Excoecaria agallocha, Xylocarpus granatum, X. mekongensis, Avicennia alba, A. marina, Scyphiphora hydrophyllacea and Nypa fruticans. There are no mangrove forest or individual trees associated with the roads projects area of influence.

There are no mangrove species found at the proposed wharf and ramp site but it can be located more than 100km north of the site. The mangroves will not be affected under the sub-project.

9.2.2. Threatened and Protected Species

As with other Pacific Nations, there is currently little understanding of threatened and protected species knowledge in the Solomon Islands. At present there is limited regional resource documenting the types of species that exist and/or are threatened in the Solomon Islands or the Pacific region. Data is often dispersed, taxonomic expertise is absent, and nomenclature and classification systems can be disputed for various species.

The International Union for Conservation of Nature and Natural Resources (IUCN) undertakes a global assessment to classify species at varying risk of global extinction. The 2012 IUCN Red List

provides the most up-to-date collated information for the Solomon Islands. It identifies and assesses the list of threatened species, which includes 245 bird species, 19 amphibians, 75 fishes, 60 plants, 75 mammals, 522 invertebrates and 6 reptiles.

Two species of bird have been declared Extinct in the Solomon Islands – the Thick-billed Ground Dove, Gallicolumba salamonis and the Choiseul Pigeon, Microgoura meeki.

Five marine turtle species are found in the Solomon Islands and all are listed as protected species on the IUCN red list and include the Critical Endangered Hawksbill turtle (Eretmochelys imbricate); the Endangered Green turtle (Chelonia mydas), Olive Ridley turtle (Lepidochelys olivacea) and Loggerhead turtle (Caretta carreta); and the Vulnerable Leatherback turtle (Dermochelys coriacea). None of the species are recorded to nest on the beaches along the northern coastline of Guadalcanal. The identified nestling sites for turtles in Solomon Islands include:

- Arnavon Islands (Isabel/Choiseul Provinces);
- Ramos Island (Malaita Province);
- Russell Islands (Central Province);
- Litoghahira (Isabel Province);
- Rendova and Tetepare Island (Western Province); and
- Vacho and Sasamunga Islands (Choiseul Province).

9.2.2.1. Cetacean

Whales and dolphin species are common in Solomon waters and their habitat is usually major rivers, mangroves and open ocean environments such as oceanic islands, oceanic fronts and upwelling, seamounts, canyons, deep-sea trenches and the water column itself. As one of the few equatorial regions worldwide where hemispherical oceanic exchange of a wide variety of marine life occurs, The Nature Conservancy (TNC) conducted a survey in 2006 to trace movements of these cetaceans. According to a survey, cetacean movements between the South Pacific and North Pacific are known or suspected (depending on the species) to occur through the major island passages of the Solomon Islands' archipelago, such as Indispensable Strait, Bougainville Strait - separating the Solomon Islands from Papua New Guinea (PNG), Manning Strait and New Georgia Sound. These areas have been classified as the migratory corridor for these marine mammals. There is no known readily available information on their seasonal migrations. As these mammals in general are off shore the projects scope of works will have no impact on the nations cetaceans.

9.2.2.2. Dugong

Dugong (Dugong dugon) is a medium size marine mammal (up to 3 m long and 400 kg) that can travel long distances and spends its entire life in the ocean, predominately in shallow coastal areas. The status on the IUCN threatened red list is Vulnerable (IUCN, 2012). The animal is exclusively herbivores feeding only on sea grass and as such is closely linked with sea grass habitats. Dugong populations in the Solomon Islands have decreased considerably over the past century and current population stocks are very low and are predominately found associated with the nations large sea grass ecosystems. As such the shallow water coastal waters adjacent to the scope of works project for SOL 1 very have limited sea grass beds and as such no resident populations of dugongs, however anecdotal information gathered during the assessment indicated periodically small numbers of individuals can be seen moving through the waters adjacent to the reef systems directly opposite the commercial centre of Honiara and the commercial port. Therefore, the projects scope of works will have no impact on the Dugongs.

9.2.2.3. Crocodiles

Crocodiles (Crocodylus porosus) are found throughout the Solomon Islands and is listed as threatened on the IUCN Red list as a Low Risk and is currently protected from export (skins and parts) under the conservation act. This species of crocodile is large (up to 6 m in length) and its preferred habitat is associated with rivers, wet lands, lagoons and coastal areas and as such has been reported in these ecosystems associated with the project area. The incidence of an individual being seen in the waters adjacent to the projects scope of works is very low and as such threat to human safety is seen extremely low as long as “common sense” is practices when in the preferred habitats.

9.2.2.4. Endemic Species

The Solomon Islands is included in the east Melanesian Island biodiversity hotspot and as such has a high level of endemism, predominately associated with the nations fauna. This includes 19 mammals (14 bats and 5 rats), 67 birds, 19 reptiles, 3 amphibians (frogs), 2 butterflies and 1 vascular plant.

9.2.3. Marine and Terrestrial Protected Areas

There are a total of 22 Marine Protected Areas (MPA) in the Solomon Islands and one designated marine conservation area (Arnavon Marine Conservation Area), none of which are located along the north western coastline of Guadalcanal and as such are well beyond the projects area of influence. Figure 24 illustrates the MPA in the Solomon Islands see following figure and a list of names of these areas is presented in Annex C.

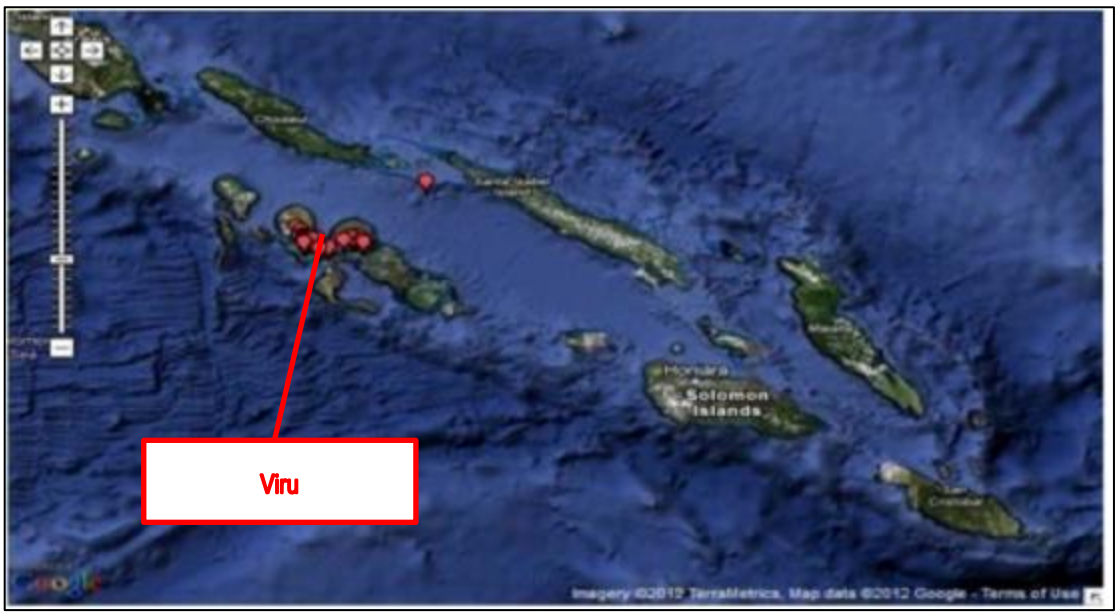


Figure 24: Marine Protected Areas in the Solomon Islands

In addition, the communities of the nation have and are continuing to develop additional Marine Managed Areas (MMA) throughout the nation based principally on the traditional and community ownership that is intricately tied to land and water ownership. It is reported that in total 127 MMA (2016) are located throughout the nation see following figure.

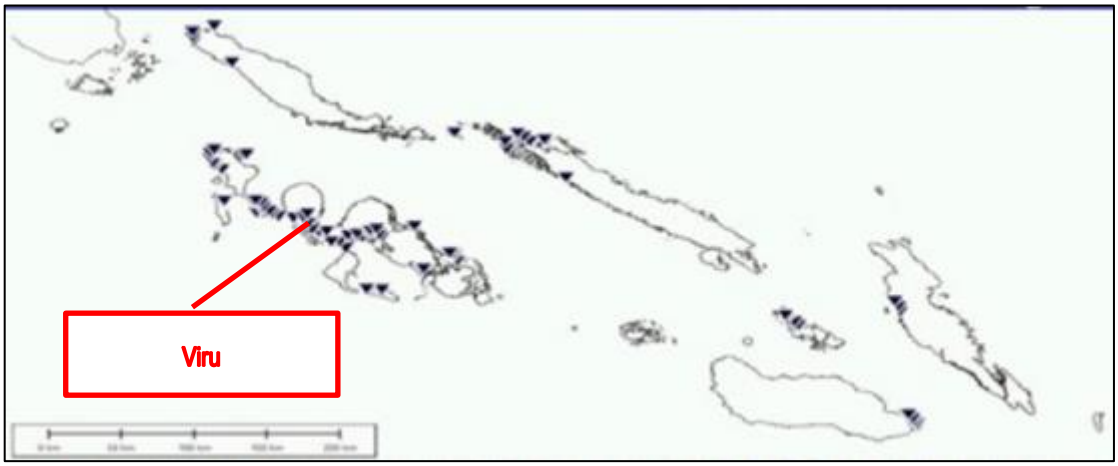


Figure 25: Community Marine Managed Areas in the Solomon Islands

MMA's are informally designated and include the customary management areas established in Roviana and Vonavona Lagoons. These two lagoons have high marine diversity and are important nurseries for bumphead parrotfish and humphead wrasse. They form part of the Bismarck Solomon Seas Ecoregion (BSSE), an ecoregion defined by World Wildlife Fund (WWF). Additionally, a number of marine conservation areas have been established by communities in Marau Sound, Ngella, Marovo Lagoon, Tetepare, Roviana Lagoon and Gizo. Similar areas are likely to be established for marine resource management in the Shortland Islands, Russell Islands, Three Sisters Islands, Leli Island, Lau Lagoon, Suafa Bay, Langalanga Lagoon, Are'Are Lagoon and Small Malaita, Northern Isabel and Northern Choiseul.

The only registered MMA on Guadalcanal is located in the eastern end of the island in Marau Sound, however recently the communities located in the western end of the island have developed small MMA which have as yet to be officially registered. These small MMA are not located anywhere near the projects area of influence.

There are 17 reported terrestrial protected areas in the Solomon Islands, two of which are located on Guadalcanal none of which are in close proximity to the projects area of influence. These are summarized below and detailed in Annex E:

- Two in Guadalcanal Province;
- Four areas in the Western province;
- Three in Choiseul Province;
- Three in Isabel Province;
- Two in Makira Province;
- Two in Malaita Province; and
- One in Temotu Province.

9.2.4. Terrestrial Habitats, Flora and Fauna

9.2.4.1. Flora

Solomon Islands is characterized by a high level of biodiversity of plants including 3,210 species of vascular plants, although this is believed to be an underestimate. It is likely that there will be up to 4,500 plant species when those that are unrecorded are included. While diversity is high, endemism is low, with no endemic families and only three endemic genera. Endemism of species is not accurately known but is thought to range from ten per cent of fern species to 80% of pandanus species. The islands with the highest rate of endemism are Santa Cruz (Temotu) and Guadalcanal.

The main groups of flora include 340 species of ferns, 277 species of orchids, 33 species of palms, 26 species of other nuts (ngali nut, cut nut and alite nut), 20 species of pandanus, 14 species of Eleocarpacae trees, and 11 species of shrubs.

Forest in Solomon Islands covers up to 86% of vegetation communities with low altitude forest accounting for the vast proportion of this. Crop land and bush account for 10% of the vegetation communities.

9.2.4.2. Fauna

The terrestrial fauna of Solomon Islands is extremely diverse, probably with a greater diversity of land animals that any other Pacific island country and has a high level of endemism (UNDP et al., 2002). Fauna includes 223 species of birds (173 residential terrestrial species and 50 other species of shore/sea birds and visitors) including 19 species globally threatened (Annex E), 52 mammals, 61 species of reptiles (25 are endemic), and 17 species of frogs.

In terms of distribution, there is a relatively high level of island endemism. While Western Province records the largest number of species (41), Choiseul and Guadalcanal Provinces have the highest rate of island endemism with six species being found on only one or two islands. Field observations did not show any significant wildlife species within the subproject area and as the wharf is a modified environment.

9.2.5. Freshwater Habitats, Flora and Fauna

Freshwater systems throughout the Solomon Islands play a critical role in the location of villages and the community's daily life.

The freshwater resources of the Solomon Islands show a high level of biodiversity and endemism throughout the nation, especially among the aquatic insects. Polhemus, et al (2008) through an island-wide assessment of the freshwater river systems of the nation, recorded 93 species of Heteroptera representing 28 genera in 12 families of which 60% are endemic at the species level and at least 31 of the species collected are new to science. Sixty-three species of Odonata representing 37 genera and 12 families were recorded of which 44% are endemic at the species level and at least 1 new species was discovered. Nine described species of Gyrinidae, representing two genera and ten described species of Simuliidae, representing 2 genera, were reported of which 90% of both are endemic at the species level.

In Solomon Islands, as with other mountainous islands of the Indo-Pacific Region, Gobioid fishes are the dominant fresh water fauna, and are mainly represented by members of the Gobiidae, Eleotridae and Rhyacichthidae families. 43 species of fish belonging to 26 genera and 14 families of which at the time of the report there were no endemic species. One species of Gobiidae (Lentipes solomonensis) subsequently was found to be endemic through additional analysis.

Like other tropical islands of the Indo-Pacific Region, all native fish species encountered in inland freshwater are migratory species with a life cycle that alternates between ocean and river. Two main migration patterns are followed: catadromous and amphidromous. Eels are catadromous fish with adults migrating to the ocean to spawn, and juveniles migrating back into freshwater systems to grow to maturity. Most of the other aquatic species, such as Gobioids are amphidromous. Spawning occurs in the rivers, and larvae drift passively to the ocean before migrating back as juveniles to the freshwater system where they grow into adults. The factors triggering upstream migration of juveniles are not completely understood. However, it is postulated that flooding, which causes high turbidity, and lunar cycles, play a role for triggering migration in some species.

9.3. Social Component

9.3.1. Community and Family Structure

Community and family structures in Solomon Islands are based mainly on the various tribal groupings and lineages in each island. To be part of a group or kinship is a significant aspect of the communities and families in the country. In most islands settlements and villages are often established on tribal lands comprising of individual families belonging to one tribe or lineage living adjacent to each other. Each household is occupied mainly by the parents and children and in some cases grandparents who needs care and support from their families.

Men are considered as the head of each households as they are the ones who often make critical decisions as they are acvcountable to negotiate and make decisions. Although men make the decisions, women often play a vital role in these decision making processes. In most cases under which is under little observation women are clearly more influential in making decisions affecting their households and families, women affairs and those involving other relatives who are under their care.

In Western Provinces, lineages or tribe are tracked matrilineally and men follow their wives when they are married. Children also are raised in the matrilineal side of the family as land is matrilineally inherited. However, when it comes to decision making in the family, and land issues women are more observatory and do not speak out as men are entrusted on their matrilineal land to speak on behalf of their tribe or lineages.

Villages or communities have a governing body comprising of village elders, tribal chiefs and church leaders. The governing body ensures that peace and stability exists in the village or communities as well as in the families. In Viru, this chiefly system still exists and is very active as they are well respected and are the responsible to allocate tasks to village members and often welcome visitors. Although it is a matrilineal society chiefs or village elders are men of the main tribe or lineage in the village or communities.

Figure 26: Typical village setting at Tetemara Village

In Western Province, each island has a Paramount Chief ruling certain areas and managing the affairs of the tribal and village chiefs and elders. Disputes arising in the villages are often sorted out at the village level but in extrame cases it can be handed over to the police for law and order in the communities.

9.3.2. Population and Growth

The estimated population for the nation 2018 is approximately 667,044 (SIG, national Statistic Office) with a sex ratio of 1.07 males to females, an annual population growth rate of 2.0%, a

medium age of 19.9 years, a life expectance average of 74.2 years (76.9 females, 71.6 males) and a density 22 persons per square kilometre. This reflects a sharp increase from the 17 persons per square kilometre recorded in the 2009 census.

9.3.2.1. Settlements

The population density of the Solomon Islands at 22 persons/km2 is still considered relatively low by global standards. The subject site at Viru is a small village community. At onsite discussions the local representative advised that there were 500 residents in Viru but there is upto 4,000 served by the wharf in four villages in the area2.

9.3.3. Economic Sector

The economy of the Solomon Islands comprises a mix of subsistence production – on which the majority of the island citizens rely and a monetised sector, which includes the public service and commercial business of which the resource development based enterprises are the largest. In 2016, Solomon Islands was the 108th exporter in the world and exported US$430 million of goods and imported US$450 million resulting in a negative trade balance of 20 million US$. The top 2016 export commodities in order of US dollars exported include: rough wood ($248 million); processed fish ($26.4 million); palm oil ($25.8 million); wood stakes ($23.6 million) and cocoa beans ($12.6 million).

In 2016, the estimated national Gross Domestic Product (GDP), including the value of subsistence production, amounted to US$1.2 billion, all most doubling since 2000 (US$57 million) showing positive annual net growth of around 3% over this time period. Gross Domestic Income (GDI) in 2016 was US$ 1,880 (WB, 2017), slight down from the reported 2015 figure of US$1,920 (ADB, 2017) with gross domestic investment rate of 17.6 % of GDP and an inflation rate of 1.1 for 2016.

Western Province, is one of the major contributor to the national economy. The main sources of income in the islands are from tourism, fisheries and logging industries including farming. For the villages in the sub - project site their main economic sectors are logging, timber milling, marketing and small business.

Figure 27: Market hut at the old wharf site

[2] Pers. Comm. Pen Haro (for Chief Dilenti) on 14 March 2019

9.3.4. Health Sector

Western Province is one of the provinces in the Solomon Islands that has extended its health services and facilites to most people in the rural areas. That is 95% of the population has access to basic health services from 60 health facilities comprising of 24 health center s, 29 nurse aide posts, 5 area health centers and 2 hospitals. The 2 hospitals are Hellena Goldie Hospital which is administered by the United Church located in Munda and Gizo Hospital which is administered by the SIG. These provides operating theatres, radiography, pharmacies and basic laboratory facilities.

Major health services provided are outpatient, clinics, family planning, immunisation and health education including awareness programmes. As a result it was reported by the Provincial Government that life expectancy of the province had increased. However, infant mortality is still high and the most common health problems are malaria, pneumonia and diarrhoea. Also STI in areas such as Gizo, Munda and Noro is high due to major industries such as SOLTUNA and logging companies operating in the areas and Gizo being the provincial capital.

Limitation to access to health centers are mainly caused by access due to poor infrastructure and constraints faced are due to shortage of medical supplies and nursing staff issues.

Viru has a health center which is accessed by both villages in the harbor and other villages such as Arara and others further west of the area. However, critical patients are transported via boats to Munda and Gizo.

9.3.5. Education Sector

The Province has recorded 123 primary schools, 29 community high schools, 5 secondary schools and 6 rural training centers. According to the Provincial Government Report, there are challenges faced in effective delivery of services due to poor infrastructure in some areas and geographical locations of villages.

According to the 2009 Census Report for Western Province, 69.9% of the provincial population had attended or completed primary education, 18.8% had attended or completed secondary education, 4.2% had attended or completed tertiary education and 1.6% had attended or completed vocational training while 4.1% had no attended or completed formal education.

Within the subproject site there are 2 Early Childhood Education Centers, 2 Primary Schools and 1 Secondary School. These are located at both Tetemara and Tombe villages while the Secondary School is located in Tetemara village. School age groups in the schools are between the ages of 3 to 17 years old.

Figure 28: Primary School at Tetemara Village

9.3.6. Livelihoods and Employment

Solomon Islands economy is dominated by subsistence agriculture and fisheries related activities, which support around three-quarters of the total population, including almost the entire rural population. This is the case at Viru and its surrounding catchment. During consultations in March 2019 it was suggested that outgoing (export) products across the existing wharf were small quantities of agricultural / market products, taro and ginger. On the day of site visit (14 March 2019) diesel fuel was being manhandled from the vessel to shore or onto OBM and there were sacked building materials (sand) standing on the jetty.

9.3.6.1. Fisheries

The EEZ waters of Solomon Islands support commercial purse seine, long line and pole and 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 12 nautical miles outside of the nation's islands and outer boundary of the nation's EEZ.

There is commercial fishery in the Solomon Islands particularly in the Western Province, Noro is a host to the tuna industry which produces canned tuna for both local and international markets. Considerable inshore resource exploitation principally for individual and family subsistence and small-scale commercial activities supplying local demand throughout the country and this appears to be the case in Viru where there is inshore fishing for local consumption and selling to workers of the logging company operating on the island.

9.3.6.2. Forestry

Timber harvesting and export has been the dominant exporting product of the nations for several decades averaging between 20-35% of foreign exchange earnings over this period of time.

Where wood is for customary or domestic purposes and not for sale, no license is required. If forest owners would like to sell timber, there are local timber harvesting license and community timber

harvesting license available. A community may combine their efforts to cut up to 2,000 m3 per year under a community timber harvesting license. During the consultations it was understood that there is a commercial logging concessions in the area west of the village operating on land owned by the SIG.

9.3.6.3. Land Use and Land Ownership

Land ownership in the Solomon Islands is complex and in general is described as, “land is held by a group or community who are linked by a combination of blood relationship, by residence or by contributing to a village enterprise” (Corrin, 2006). As such the majority of land throughout the Solomon Islands is refer to as non-registered customary land and is estimated to make up approximately 84 % of all land. The remaining land is either registered alienated land (10%) with the balance being owned by Government (4%) and private owners (2%).

In Western Province land ownership and inheritance is from the matrilineal side of the family thus children inherit land from their mothers.

Land use at Viru, is mostly for small scale subsistence farming and housing and rarely largescale farming in the area.

9.3.7. Transport and Infrastructure Services

Transport: While there are approximately 20 small domestic airports throughout the nation serving the communities there is no airport directly servicing Viru.

There are international wharf facilities in Honiara (Point Cruz) and Noro (Western Province) servicing general cargo, bulk fuel and the fishing industry. Other coastal communities rely on sea transport with people and cargo are transferred at sea into tenders or outboard motorboats (OBM) or direct to small dedicated wharfs. At Viru interisland vessels moored at the wharf to discharge and take on passengers and cargo. Some vessels had mechanical cranes but most relied on manhandling of goods across the jetty.

Power Supply: There is no grid-connected electricity power at Viru village. There are some diesel generators and solar power collection systems in the village to supply local needs.

The local community also use kerosene lamps for household lighting and kerosene, wood and gas are used for cooking.

9.3.8. Noise

Noise levels generated during construction will be site specific (limited to the wharf) and directly associated with the activities undertaken. Percussive piling and engine noise generated by construction machinery, primarily diesel-powered lifting equipment and electric power generators will be the major source of temporarily elevated noise levels.

A noise monitoring exercise was carried out at the site on 17th March between 08:30 and 09:00 and determined a background average noise level on the wharf of 33dB(A) with a maximum level of 52.6 dB(A) and a minimum of 28dB(A). This is consistent with a rural location without powered mechanical noise sources (road traffic, industrial machinery, etc.)

The village development at Viru is over 300m from the wharf site and there is topographic shielding due to the scarp slope immediately east of the wharf site shielding the village from direct line of sight. Therefore construction noise is not expected to be a significant issue for residents. A noise monitoring exercise was carried out at the site on 14th March between 09:30 and 10:30 and determined a background average noise level on the wharf of 38.2dB(A) when there was no activity on the wharf. 60.2 dB(A) when a vessel crane was operating and 58.2 dB(A) when goods were being manhandled from vessel to wharf. This is consistent with a rural location without powered mechanical noise sources (road traffic, industrial machinery, etc). Standard noise mitigation practices are proposed to mitigate the impacts (refer Section 5) with piling activity to be avoided in

the early morning and evening, overnight and at the weekend. It is important that the Contractor undertake baseline noise monitoring as part of developing the SEMP, to clearly identify ambient levels for comparison with levels from activities/equipment etc.

9.4. Cultural Component

9.4.1. Cultural and Historic Sites and Resources

Special, sacred or restricted sites, or tambu areas, including elements of the landscape as well as monuments, represent the history, lineage and society of different clans and lines and have local cultural as well as regional historical significance throughout the Solomon Islands. Traditional medicines and resources derived from terrestrial (native and cultivated flora) and to a lesser extent marine resources play a significant role in the traditional and cultural lives of all communities.

The National Solomon Islands Museum keeps a National Tambu Site Register, which records several thousand sites. Some provinces also maintain tambu site registers but due to insufficient funds and manpower the recording and registration of all sites is not systematic.

The projects community consultation meetings for Viru Wharf did not indicate any tambu sites in the vicinity of the wharf. However, there is a monument erected on site which is recommended by the community to not be damaged as it is dedicated to the memoryof the first SDA Missionary in Western Province.

Figure 29: SDA Missionary Monument at the Old wharf site

9.4.2. Archeological and Sacred Sites

It was reported that there are no records of archeological and sacred sites within the subproject sites and most of these sites are located in land. There are records of such sites but are not within the vicinity of the proposed subproject site.

9.4.3. Unique Landscapes

From observations there are no unique landscapes within the vicinity of the subproject site.

10. ALTERNATIVES

10.1. Alternatives to Locations

The project scope is to construct a new ramp and wharf at Viru about 100m south of the exisitng log wharf. This will also include the construction of an access road and coastal erosion measures will be integrated as climate proofing works to make the proposed road reliable and feasible overtime. There is no other realistic alternative to the existing location that will provide the same economic, environmental and social advantage as the proposed location.

10.2. Alternatives to Technology

The contractor will be required to use light to heavy machineries for the proposed works and will also recruit local community members (men, women and youths) for unskilled labor.

10.3. Alternatives to Design

Alternatives to the design of the structures (wharf and ramp) are mainly limited to the availability of funds and land for expansion. However, land required for temporary use by the contractor will be negotiated by the contractor and assisted by the Supervising Consultant and MID.

The recommended option for the proposed structures are standard MID wharf and ramp taking into account the environment, social and economic considerations of the site.

For climate proofing climate change adaptation measures were integrated into the design of the structures and applying coastal erosion measures.

10.4. Alternatives to Operation

The construction works will require the use of both heavy and light machinery such as piling equipment, excavator, cranes and other machineries and equipment required to complete the works. The machines and equipoment are required for the proposed works which will be carried out at the subproject site. The proposed wharf and ramp will operate in an all weather condition and will be accessed by all types of vessels.

10.5. The ‘No Project’ Alternative

Without the construction of a new wharf and ramp at Viru the people will continue to face challenges in terms of access to essential services. The village population is growing and more people will be affected by lack of shipping services to this area. Safe transportation of goods to market and to the village without damage is also an issue which will become increasingly marginalized including access to other services and commercial outlets.

10.6. Reasons for selection of the Proposed Sub - project

The construction of a new wharf and ramp at viru will improve access to services to the communities in the area. Construction is relatively harmless as there will not be any resettlement required abd there are few or minor environmental, physical or social impacts associated with the proposed works. Generally, communities express strong support for the construction of the wharf and ramp at Viru.

11. CLIMATE CHANGE AND DISASTER RISKS ASSESSMENT

11.1. Historic Weather Observations

Climate in Solomon Islands is hot and humid with a variation in rainfall and air temperature due to the vertical landscapes. The country has two distinct seasons of a wet season in November to April and a hot season from May to October. This is determined by the monsoon trough which changes in duration at various locations.The air temperature also changes with the altitude meaning it is higher inland and decreased at the coast. Therefore varies fro 30^{o}C and 26^{o}C at low lying areas.

Like other countries in the South Pacific, Solomon Islands is highly exposed to the impacts of climate change. Overtime the air temperature and precipitation patterns had changed dramatically. Hence, the islands had experienced unexpected extreme climate events which affects the economy and even resulted in loss of life. Therefore, climate change will be a hindrance to the accomplishment of sustainable development in Solomon Islands as all economic and social sectors are likely to be adversely affected and the cost of adaptation will be disproportionately high.

Analyses of trends in extreme daily rainfall and temperature across the South Pacific for the period 1961 to 2003 show significant increases were detected in the annual number of hot days and warm nights, with significant decreases in the annual number of cool days and cold nights, particularly in years after the onset of El Nino, with extreme rainfall trends generally less spatially coherent than were those of extreme temperature (Manton et al., 2001; Griffiths et al., 2003). Variations in tropical cyclones, hurricanes, typhoons in all small islands' regions are dominated by ENSO and decadal variability which result in a redistribution of tropical storms and their tracks, so that increases in one basin are often compensated by decreases in other basins.

Studies have shown that the that the annual and seasonal ocean surface and island air temperatures have increased by 0.6^{o}C to 1.0^{o}C in the South Pacific region. While it was also recorded that in Solomon Islands the temperatures have increased by 0.15^{o}C since 1951. Analysed rainfall data has also shown significant increase from 1961 to 2003 with little to no variations. Also increased annual number of hot days and warm nights and reduction in the number of cool days and cold nights specifically in years after the onset of the El Nino with extreme rainfall days. Solomon Islands has recorded an average rainfall of 3000mm to 5000mm. During the dry season Honiara has recorded an average month and 300mm during wet season. While the eastern islands of the Solomon Islands receives more constant rainfall yearly with an average of 280mm to 420mm per month. Sea level rise is also an impact of climate change which has increased by 8mm per year and would likely increase by 20cm to 70cm by 2100.

It was also reported that there will be intense and extreme cyclone events and days of severe heavy rainfalls leading to flush flood events across the country.

The National Adaptation Program of Action (NAPA) shows that surface air temperature for Guadalcanal taken at Henderson has increased by 1o C from measurements taken from 1962 – 2007 while the sea level has increased by +0.77mm/yr, according to the International Panel on Climate Change (IPCC). Whereas rainfall varies greatly, data provided by NAPA had shown that droughts will be expected for parts of the country due to more frequent El Nino Southern Oscillation (ENSO) effects and had predicted that there will intense and frequent tropical cyclones. Other impacts of the changes in the current climate and weather conditions include droughts; increased temperatures, coastal erosion and flooding; sea level rise; storm surges; occurrence of pests and diseases and ENSO – related changes to temperature and rainfall.

Regardless of deficiency of various practical data in the NAPA report to validate these expectations it will still be wise to adopt the precautionary principle and conclude that climate change will affect Solomon Islands especially the low islands. Therefore, climatic changes are assumed to occur based on the IPCC global assessment. For Solomon Islands it was found that;

- For Honiara minimum and maximum air temperatures have increased by 0.15oC every decade since 1951 and it is consistent with the Global pattern of warming. While global

temperatures rises between 1.1oC and 6.4oC during the 21st century with the best estimate for temperature to rise by 1.8oC to 4oC;

- Rainfall however, show no clear trends in annual or seasonal rainfall and no substantial variation yearly since 1950; and,
- Sea level has risen around Solomon Islands since 1993 by 8mm per year, which is somehow larger than the global average of 2.8mm to 3.6mm per year which will be by 2100 rise by 18cm to 59cm as ocean water expands including glaciers and ice sheets continues to melt.

It was projected that for Solomon Islands there will be continuous increase in temperature and by 2030 sea and air temperature will increase by 0.4oC to 1.0oC these will result in very hot days and warm nights and decline in cool weather conditions. Average and annual rainfall is projected to be increasing over the 21st century and there will be occurrence of extreme rainfall seasons more often, including less frequent but more intense tropical cyclones.

11.2. Climate Change Impacts

Based on the Roviana Climate Change Resilience Plan 2013 -2017, it was reported that the areas in New Georgia island are highly vulnerable to the impact of climate change. Major issues include sea level rise and degradation of ecosystems.

According to the Solomon Islands National Infrastructure Investment Plan (SINIIP,2013) report in Western Province Gizo, Vella la Vella and Kolombangara experiences high level of loss due to cyclones and earthquakes. Water resources are under pressure particularly in Gizo and there are considerable changes in the rainfall patterns and sea level rise would likely reduce the availability of water. Also since the province is a host to the only Tuna processing and manufacturing, it is projected that tuna stocks are expected to decrease with the warming ocean temperatures and acidification. This poses a risk in one of the main economic activity in the province and the country as a whole.

Changes in the climate also has impacts on the infrastructure of the country and the islands causing major damages and losses of bridges, roads, wharves, airstrips including utilities. The major impacts climate change hazards and impacts on shipping infrastructure is described in the table below.

Table 5: Climate change hazards and potential impacts on shipping infrastructure

Climate Change Hazards	Potential Impacts
Temperature increases resulting in very hot days and heat waves	Corrosion of reinforced concrete sub-structures due to increase in salt levels, cracking of deck surface.
Sea level rises and associated storm surges	Damage to wharf deck and substructure due to prolonged submergence in salt water and increase in salt levels, shipping lanes experiencing sea level rise may be able to accommodate larger ships, changes in the rate and pattern of sedimentation of bays
Increase in rainfall	In land flooding and landslides may reduce access to routes from wharf – inland.
Cyclones/hurricanes and frequent strong storms	Increase probability of structural failures due to inadequate design provisions to withstand changes.
Increase in wind speeds	Structural damage to wharf/jetty structures which have not been designed to withstand severe wind loads.
Earthquakes	Uplift and destruction of asset

Ocean acidification	Increased rate of deterioration of concrete and supportive structures

Source: SINIIP Report, 2013

11.3. Other Impacts

Other impacts associated with climate change which causes damage and destruction to the infrastructure is due to human induced impacts such as logging and increased agricultural practices closer to catchment areas. Human induced activities such as logging also reduces water availability and increases erosion and sedimentation which in trun decreases the natural ability of ecosystems or habitats to respond to climate change. During the consultations it was reported that flood is usual in this part of the island and climate change only makes it more occasional occurring in periods it normally occurred in the past. There are now extreme rainfall resulting in flooding. It was compared that the waters at the location of the existing timber wharf at Viru used to be deep and ships do not have issues. But now ship owners and operators hesitate to berth at Viru with an issue raised as the increased sedimentation in the harbor.

The incorporated design will not only include climate change adaptaion designs but adaptaion to the various sizes of ships now servicing the islands. Climate change adaptation measures include increased deck heights and pillar lengths, increase strength and design of structure to withstand storm intensity, include coastal protection measures and use of less corrosive materials.

11.4. Hazard Maps

Figure 30: Tropical Cyclone Pathway and Exposure in Solomon Islands

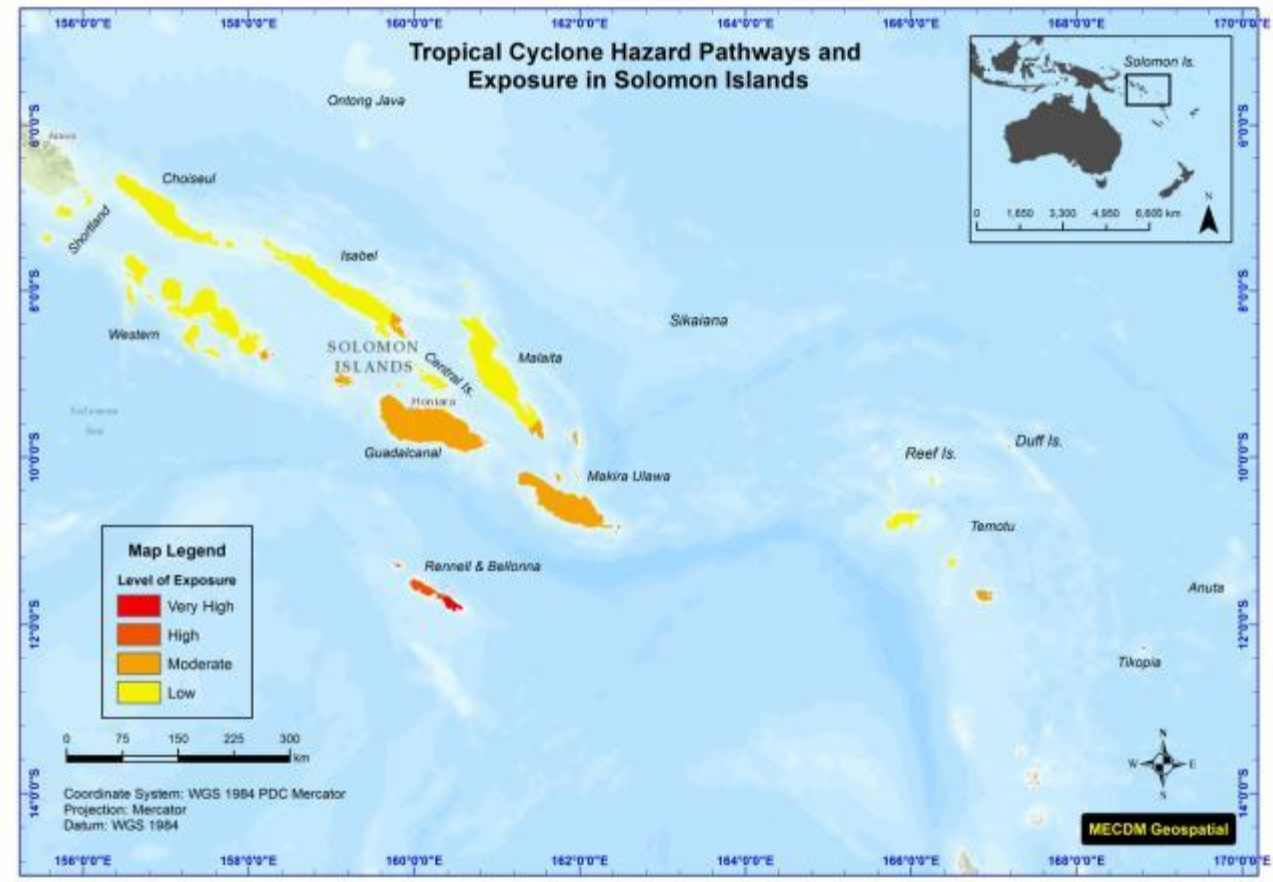
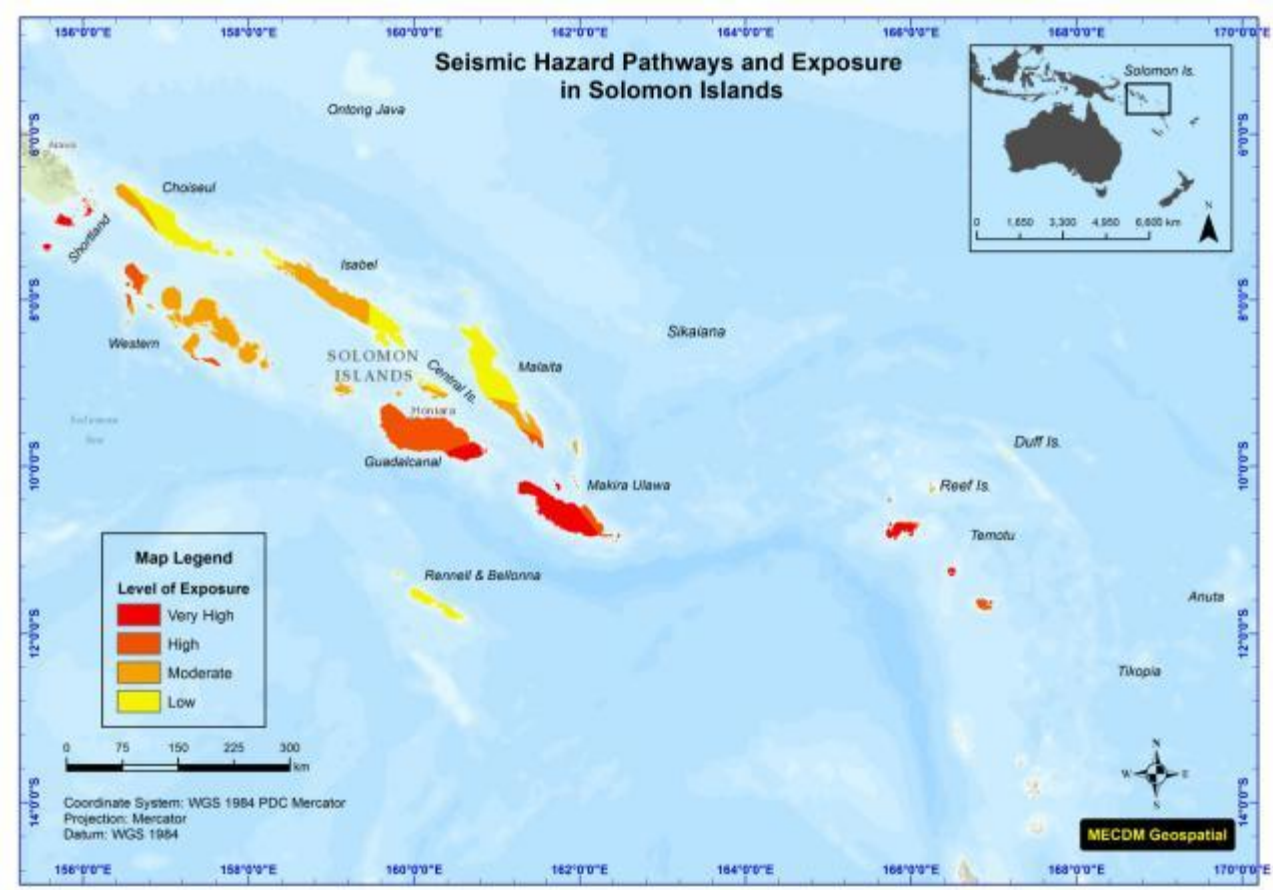


Figure 31: Seismic hazard pathway and exposure in Solomon Islands



12. SOCIAL AND POVERTY ASSESSMENT

In Solomon Islands Poverty does not mean hunger or destitution but rather means households struggling to meet basic household daily needs and expenses specifically those involving cash payments and, constant the increasing demand for household expenditure. As indicated by the analysis of the Household Income and Expenditure Survey (HIES) in 2005 and 2006 by UNDP, it was showed that the average national incidence of basic needs poverty was 18.8% of all households and 22.7% of the population. While for rural areas the rate of basic needs poverty was equivalent to 15.2% of households and 18.8% of the population. According to the HIES, 2006, 22.7% of the total population of Solomon Islands lives under the poverty line. This definition of poverty line counts 1.25 USD (equivalent to 9.96 SBD) per day per capita income

Based on the HIES provincial data suggests that the remote or the most densely populated areas holds the highest proportion of poor households are Choiseul, Malaita, Makira and Temotu. On average, rural Solomon Islands households provided substantially more of their own food (58.6%) than those in both provincial urban areas (16.7% and Honiara (8.5%). The greatest difference is found among households in the lowest expenditure quintile: amongst rural families the proportion was 69% compared to 14.5% and 6.9% of provincial urban and Honiara households, respectively. These figures represents both the greater subsistence production and the levels of food security of rural households, as well as the general lack of organized markets in these areas; it also signifies the greater need for cash for food purchases in Honiara and the provincial – urban centers. Households that appear to be the least disadvantaged in terms of the poverty line are those in provincial – urban centers, followed by rural area households.

Based on the socio-economic baseline survey undertaken for the sub-project site it was found that the wharf will have positive impacts on the villages within Viru Harbor and other villages that have access to the area. It would also improve the standard of living of the people and contribute to economic growth and poverty reduction by reducing travelling costs, improving accessibility to market opportunities, economic and social services, and generate employment opportunities and income.

Housing provides shelter and security for family and individuals although it fulfills a variety of other social roles. It is an important aspect for human survival so it is a fundamental basic necessity in life. Within the subproject site as it was found that 0% of houses are traditional thatched houses; 10.5% are semi-permanent and only 89.5% are permanent houses. As found from the 2009 Census Survey Western Province 58.7% of the population used timber or wood for walls; 84.7% of the population reported that the flooring materials used timber or wood and 48.96% reported roofing materials used as copper or roofing iron. Compared to the rural communities who 73% dwell in their own homes Honiara has more permanent houses which only 43% of occupants dwell in their own houses, mainly due to the fact that people own the land which they build and reside in rural areas.

For access to water supply based on the 2009 Census Report for Western Province, 30% of the households are connected to communal water supply, 33% used water tanks and 18% used communal water tanks. While 14% fetched water from rivers and streams. For Viru, 68.4% used communal water supply, 15.8% used water tanks and another 15.8% used rivers and streams. The water sources connected or accessed are mainly used for drinking, washing, cooking and bathing or shower.

12.1. Economic Environment

Western Province is one of the major tourist destination in the Solomon Islands with various resorts and other tourist attractions including the only tuna processing factory in the country. The sub-project area has no major economic activity except for a logging operation involving in harvesting and

replanting of trees by Eagon Pacific Plantation Limited (EPPL) on SIG land. Based on the data collected people living in the communities produce and sale (i) Vegetables; (ii) trade or small business; (iii) root crops; (iv) fruits; (v) other crops; (vi) livestock; (vii) timber; (viii) non – timber products and (ix) remittances and royalties.

Production of cocoa and copra is not common in the communities surrounding the subproject site as most of the people rely on royalty payments and farming root crops such kumara and cassava including vegetables.

In the rural areas of Solomon Islands formal employment is scarce and limited, hence most of the people are engaged in unpaid labour in the subsistence economy and agricultural sector. People living within the subproject area and areas further east and west rely mainly on the road and bridges to travel to Honiara or nearest markets to sell their produce which also include cooked food. As can be seen along the roads, selling of barbecue or roast food is now a common practice. As found during the survey, most people sell their produce at the nearest market outlets rather than on farm.

It is anticipated that once the wharf is constructed, shipping services to the area will be increased and there will be economic impact. Transport services will be reliable and easier for transportation of produces to market outlets including Honiara. Business operators will be transporting their goods and cargo more easily and enhance their services. The community will benefit from easier and reliable access to services and facilities provided in Honiara and other parts of the province such as health centers, banks and even schools. This will inturn improve household well-being and income thus the standard of living.

12.2. Socio – economic Benefits

12.2.1. Anticipated Benefits after Works

It is anticipated that there will be an increase in the number of ships to Viru after the construction of the wharf and ramp. As found during the consultations and surveys there are limitations to access important services and facilities such as markets, schools and health centers due to the poor infrastructure and unreliable shipping services to this part of the island. People often hire boats to travel to other areas to board a shipping which is very expensive and transportation of cargoes to and from the village causes damage to goods due to the use of boats, time consuming, dangerous and very expensive. Women also encounter problems with accessing markets to sell their produce due to poor infrastructure resulting in unreliable transport services.

It is foreseen, that by improving the wharf infrastructure to enhance connectivity to the rural communities there will be improved access to markets; schools; health centers and other facilities to Honiara and within the province. Also people will be motivated to do large scale farming for marketing; access to other resources will be easier; travelling will be improved, comfortable and reliable, and time travel will be reduced. Opportunities will be available for the poor and disadvantaged especially women during construction and after construction for maintenance works.

12.3. Potential Negative Impacts and Risks

12.3.1. Conflicts

One of the main social risk associated with the project is potential conflict arising between the local land owners or residents of the communities within the subproject sites and the contractor. That is if workers abuse the rights of the people and disrespect women and girls in the communities. This may include sexual harassment or abuse; rape; lead on women and girls into sexual relationships; damage properties; theft; drunkenness and disrespecting people, and causing socially related problems with local men and outsiders.

12.3.2. Risk of Spread of Communicable Diseases

The transmission of communicable diseases such as Sexually Transmitted Infections (STIs) and Human Immuno – Deficiency Virus (HIV) is likely to occur during the project implementation phase by infected workers or locals. This is possible if workers are engaged in commercial sex or prostitution and sexual relationship with local women and girls, or men. The risk of spreading STIs or HIV associated with the project is related to a number factors, this include; (i) Current knowledge about the risk of spreading the diseases; (ii) period of time the contractor and his workers will be occupying the site and (iii) Engagement of workers in high risk behaviors such as increased alcohol consumption and having multiple partners.

12.3.3. Impacts on Health and Safety

Health and safety hazards are also likely negative impacts of the project during the implementation phase caused by machineries and emissions. This include, (i) air pollution; (ii) noise; (iii) contamination of water bodies especially water supply or source; (iv) disposal of waste water; (v) risk of accidents during works at work sites and (vi) traffic and work safety issues. These health and safety issues are dealt with in the Environmental Management Plan (EMP).

12.4. Other Social Impacts

Construction of contractor's camp can put pressure on the natural resources and infrastructure of adjacent communities that could result in resentment between people and the contractor. To avoid such problems arising in the subproject area, contractor along with the MID should consult the communities for suitable and preferred locations for the camp and negotiate on a lease with the land owning group. This consultation process will be adapted if another camp is needed by the contractor with provision of temporary facilities.

Within the camp site the contractor will provide temporary health care facilities; mess and dormitories for workers; a chef or cook and provide meals; water and electricity and telecommunication facility in order to not burden the existing facilities. After the completion of works and all activities relating to the project the contractor is liable to remove the temporary structures and reinstating the land to its pre – project condition.

12.4.1. Resettlement and Land Issues

There will be no land acquisition required for the subproject site as stated by the community people during the consultation. Due to the fact that the wharf is a need for the people and the land being communally owned, therefore an MOU was signed by the village and community elder in 2019, see attached in the annex. However, if there will be land acquisition this shall be discussed with the land owning group by MID. In order to avoid such problems it is vital to consult with the communities and land owners regularly to gain their support and approval for the project to continue.

12.4.2. Gender Assessment

Generally women represent near half of the population with a ration of 102males per 100 females, as recorded by WHO in 2009 and the fertility rate of women aged between 15 and 49 years is in the order of 4.6.

Women depended on selling goods, agricultural products, handicrafts and cooked food for income. These informal activities are an important source of income for women. It was also reported in the Demographic Health Survey Data that 54% of women aged 15 years and older are economically active however only 15% of women (compared with 31% of men) are employed formally or paid for working. As found by the UNDP Common Country Assessment study on women's' traders in informal economic activities, two thirds of women are self-employed and that most are engaged in small businesses as it is the sole income earner for half of the female traders. Included that more

than three quarters of women spend more than 16 hours per week on income generating activities. That is 38% are engaged in gardening; 21% in food preparations; 15% in crafts and 11% in textile production. Not all the women are well educated with 20% having no formal education and half reaching primary education while a quarter of the women in trading are illiterate.

Gender inequalities in education is of major concern almost everywhere in Solomon islands particularly in the villages and rural areas where more males attend formal education than females including males attain higher qualification than females. One main cause of this is when school fees are unaffordable families mostly parents tend to withdraw their daughters rather than sons from attending school and concentrate with household chores or married them off.

Violence in the homes or domestic violence and violence against women remains a key issue among families in the Solomon Islands and the country was recorded as having one of the highest rates of violence against women. In 2002, Solomon Islands was ratified under the Convention on the Elimination of All Forms of Discrimination and Violence Against Women (CEDAW). Inorder to end discrimination against women and the Government responded in support by the Government who also established a national policy to eliminate violence against women.

As in most rural Solomon Islands community the women and men in the communities surrounding the subproject sites has different roles, needs, perceptions and responsibilities. But there is an equal distribution of labour between men and women with women working longer hours than men in routine tasks to maintain their homes. Women and young girls are usually involved in home- based works and heavily involved in household chores like cooking, washing, collecting firewood, fetching water, cleaning and sweeping, looking after the young children and ensuring education and health needs of the family are met.

According to the socio-economic survey undertaken for the Viru sub-project, it was found that 100% of the women sell cooked food and other farmed produces at the market for income. Including some women, less than 30% are selling handicrafts, and only a few are involved in tailoring and sewing.

From the survey, it was also found that women in the communities are more involved in household activities, agricultural activities, household industries and issues affecting households or individual families. When it comes to decision making women are more involved in making decisions relating to own family's or household matters. It was also claimed that women are involved in decision making for household financial matters; education and health welfare of children including purchasing of household assets, and make decisions in household daily activities and other activities.

Women are also involved in selling and producing to meet household income due to the demand of household needs and security for the family. Security is mainly a key responsibility of the household head which in most cases are males to ensure protection of their children and household as a whole. Additional roles played by women specifically taking over the role of the male in a household headed by a female is very demanding, tiring and strenuous for women. The improved infrastructure will reduce hardships to women who are carrying out family roles as a mother and father at the same time. This will improve transport services making it easier to travel to market outlets and it will also reduce travelling costs.

Sick people, women and children access health centers that are considered the closest. For communities at Viru there is a Rural Health Center at Tetemara village which is accessed by the people. While those requiring urgent medical attentions such as women in labour and very sick children including major accidents and injuries are referred to Munda or Gizo Hospital as well as Honiara.

Children have equal access to education facilities which include both Primary and Secondary Schools including Early Childhood Education (ECE). For children in the area there are 2 ECEs, 2 Primary Schools one of which is administered by the SDA Church and 1 Secondary School that can be accessed. There are also other schools in the province which can be accessed by the children.

From the survey it was found that more than half of the school children, 52.3% are female and 47.7% are males.

The construction of a new wharf and ramp at Viru will have major impact on those who are highly involving in income generating activities such as women; those that need to access health and education facilities and other services and facilities provided in Munda, Gizo and Honiara. Better accessibility to major services and facilities is very important to the people residing in the area surrounding Viru Harbor and easy transportation of farmed or garden produces by local producers to market outlets particularly Munda and Gizo including Honiara as the main commercial center. The construction activities will also be employing local people involving women and men for unskilled jobs so as to improve rural based income generating activities. These activities will very likely improve the standard of living of the poor and vulnerable families or groups.

13. ENVIRONMENTAL IMPACT AND MITIGATION MEASURES

13.1. Significance of Impacts

The following section provides an assessment of the Project's likely impacts on physical, biological, socio-economic and physical cultural resources and identifies mitigation measures to ensure potential environment impacts will be avoided or managed/reduced to acceptable levels. Annex B (Risk Matrix) summarises the environmental screening for the range of potential environmental impacts that could occur from the preconstruction, construction and operational activities. Where the environmental impacts are deemed to be major (significant) or minor level impacts, mitigation measures are detailed, which are included in the projects EMP and need to be incorporated into the project design document.

The assessment of impact follows a risk matrix approach where the likelihood of an environmental, safety or social impact occurring is matched with the consequence (severity) of the impact occurring. The matrix ranks potential risks as low, medium, high or extreme, identifying the need for mitigation, and incorporation into the EMP. The assessment of potential severity of the impacts takes into consideration the presence and vulnerability of sensitive receptors and adopts a precautionary approach.

All risks classified as medium or higher are considered significant and require mitigation.

Figure 29, sets out the risk matrix derived for this project. This matrix approach should be adopted by the Contractor when they are developing their CEMP.

Figure 32: Risk Matrix (Likelihood vs Consequence) Used for Impact Assessment

RISK RATING	LOW 0 to 3 ACCEPTABLE OK TO PROCEED	MEDIUM 3 to 6 UNDESIRABLE TAKE MITIGATION EFFORTS (good site practice)	HIGH 7 to 10 UNACCEPTABLE CLEARLY IDENTIFIED MITIGATION WILL BE REQUIRED IN ESMP	EXTREME 11 to 12 INTOLERABLE PLACE EVENT ON HOLD

			CONSEQUENCE / SEVERITY OF IMPACT			
			INSIGNIFICANT / MINOR • Easily handled within the normal course of operations with no additional costs	MODERATE • Immediate time / resource reallocation will be necessary with a moderate estimated cost	MAJOR • Environmental conditions disrupted but can be reversed. • Potential for serious injury / fatality • Significant disruption to community • Require significant resources to rectify	CRITICAL • Catastrophic environmental damage. Fines likely. • Potential for multiple fatalities • Significant irreversible disruption to community • Significant resources needed to rectify.
			>>>>>>>>>>>>>>>>> Environmental / safety / social impact increasing in severity >>>>>>>>>>>>>>>>>			
RISK / LIKELIHOOD OF IMPACT	IMPROBABLE • Environmental / safety / social impact is unlikely to occur (<20%)	<<<<< Likelihood of impact increasing <<<<<	LOW 1	MEDIUM 4	MEDIUM 6	HIGH 10
	POSSIBLE • Environmental / safety / social impact is likely to occur (20% to 90%)		LOW 2	MEDIUM 5	HIGH 8	EXTREME 11
	PROBABLE • Environmental / safety / social impact almost certain to occur (>90%)		MEDIUM 3	HIGH 7	HIGH 9	EXTREME 13

13.2. Impacts during Pre-Construction

In addition to the measures required for the design of the wharfs, pre-construction activities require the following to be addressed:

- Update of PER (including this IEE) based on detailed design and compliance with conditions of development consent;
- Contractor preparation of CEMP for review and clearance before any work commences on site;
- Contractor identification of construction material sources and application for appropriate permits;
- Demolition of existing structures;
- Identification of land restrictions at local level; and,
- Social disruption – arrangements for the establishment of a construction camp and arrangements for accommodation in village of non native workers (limited to Site Manager / Engineer / Surveyor, Foreman and skilled plant operators). It is envisaged that semi and unskilled labour will be drawn from the local village.

13.2.1. Physical Environment

13.2.1.1. Changes in water movements due to the project

Development of the Wharf, boat jetty and ramp could potentially change water movements in the area creating new areas of erosion or deposition. However, the wharf design is a piled structure with minimal potential to disturb water movements so changes to currents and water movement at this location low. In terms of the risk matrix. The potential risk is considered to be high but the design reduces the risk to low.

PRE-MITIGATION				MITIGATIONS / WARNINGS / REMEDIES		POST-MITIGATION		
RISK	RISK SEVERITY	RISK LIKELIHOOD	RISK RATING	EIA REF (para)		RISK SEVERITY	RISK LIKELIHOOD	RISK RATING
Change in water movements due to wharf design: new areas of erosion / deposition	Major	Possible	High		The wharf design is on a piled structure with minimal potential to disturb water movements. Currents / water movement at this location low.	Minor	Improbable	LOW

13.2.1.2. Climate Change Adaptions and Resilience of project

Climate change adaptation measures have been integrated in the wharf design. Climate change adaptation design measures include:

- Increasing ambient average temperature and temperature ranges;
- Increasing average precipitation and short-term heavy rains;
- Increasing average levels of wind and short-term stronger winds;
- Changes in seismicity;
- Sea level rise and storm surges; and,
- Earthquake risk.

An upgrade of the existing wharf at the current location is the preferred option for the new wharf. It is not prone to rain-induced flooding, and due to its location there are usually no large waves. The main hazards at this location are an increase in adverse wave conditions and cyclones. This could increase the potential for flooding of access roads3.

Mitigation included attention in the design to adopt a deck level for the wharf that takes into account MHWT, current and future sea level rise.

Potential risk of the project on climate change was assessed to be high but based on considerations in design the risk rating is considered to be low.

Climate Change - Adaptation and Resilience of Project - material climate change related risks to the project	Major	Probable	**High**		Climate Resilience Built into the design of the project	Minor	Improbable	**LOW**

13.2.1.3. Natural Hazards – Seismic Conditions

The Solomon Islands are located in a region that is seismically active, See Section 9.1.4 Geological Hazards. However, the Wharf has been designed in accordance with NZS 1170.5 for earthquake loads. Potential risk to the project on seismic conditions was assessed to be medium and based on the design, risk rating is still considered to be medium.

Natural Hazards - Seismic Conditions - located in region that is seismically active	Major	Improbable	**Medium**		Wharf designed in accordance with relevant Seismic Codes	Moderate	Improbable	**Medium**

13.2.1.4. Socio- Economic Impacts

This aspect relates to resettlement, land acquisition and economic displacement. There is no project-induced resettlement, land acquisition or economic displacement associated with the wharf project. Residual Risk is considered to be low.

Socio-economic Impacts - Resettlement, Land Acquisition and Economic Displacement - No project-induced resettlement.	Minor	Improbable	**Low**		No land aquisiton required. No Land Acquisition and Resettlement Plan needed	Minor	Improbable	**LOW**

13.2.2. Biological Environment

13.2.2.1. Vegetation Removal during Surveying, Demarcation and Clearance

The wharf site has been highly modified (cleared) previously for existing wharf facilities. The new works will include minor degradation of the local ecology through the clearance of small areas of vegetation and a number of trees in the area of the new wharf. However during on-site consultations it was advised that the site was previously developed for village houses, but overtime people had relocated to houses in the village. Therefore the wharf site and its access are highly modified. These activities will result in insignificant impacts upon terrestrial fauna, whilst minor impacts on flora (predominately trees replanted by the communities) are expected. Flora includes primary colonizing grasses, weeds, shrubs and non-native trees located along the shoreline.

[3] Extract from Letter report: Solomon Islands TSPDF - Climate and Disaster Risk and Vulnerability in Seven Domestic Wharves. By Tonkin & Taylor for Cardno (July 2019)

13.2.2.2. Establishment of Construction Camps and Work Sites

The size of the work does not warrant the establishment of a construction camp with worker accommodation as non village staff will be limited to a Manager / Engineer, Forman and skilled plant operators. Semi skilled and unskilled labour will be sourced from the local population. The Contractor construction camp will be limited to office accommodation and some material storage though it is likely that materials will be stored on the construction barge. The camp and storage area can create temporary impacts resulting from site clearance – flora, fauna and habitat alteration and/or removal and possible unearthing of archaeological resources (deemed to low due to the remoteness of this site). The construction camp and storage site will be identified through consultation with village and landowners/users, as per the communications plan. It is expected that a site adjacent to the existing wharf will be used for office accommodation and materials storage.

13.2.2.3. Mobilization of the Contractor

The mobilization of the Contractor and initial establishment of work sites will require the presence of construction workers and subsequent interactions with the local business and residential communities. Prior to contractor mobilization to the site, the project's Community Development Officer will establish the communications protocol between the project and community as per the project's communications plan.

Measures to minimise disturbance by construction workers and presence of the works site/area include:

- Community protocols discussed with workers as part of awareness and mobilization training;
- The Contractor is to ensure that workers' actions outside work site are controlled and community codes and rules of conduct are observed at all times;
- The contractor will identify one member of their staff to be the liaison between the communities and contractor, as well as between the contractor and project (MID);
- Adequate signage and security provided at the work camp site and prevention of unauthorized people (including children) entering the work camp or work area;
- Provision of adequate protection to the general public in the vicinity of the work site, including advance notice of commencement of works, installing safety barriers if required by communities, and signage or marking of the work areas;
- Provision of safe access across the works site to people and businesses whose access are temporarily affected during wharf construction activities;
- To avoid, or reduce the risk of, other social impacts, the small worker population will be accommodated in rented accommodation in the village. At all times workers should respect community and land owner's cultural beliefs and activities and be cognizant of community rules and terms of conduct (especially addressing women and elders), avoiding damage to productive trees and gardens, and access to the coastline, foreshore; and,
- Implement HIV/AIDS/STIs awareness and prevention for the Contractor's workers and adjacent communities.

13.3. Impacts During Construction

13.3.1. Construction Impacts on Physical Environment

All potential construction impacts and appropriate mitigations are to be managed by the Contractor. Construction impacts will be caused by the following activities:

- Site/location clearing, earth movements, grubbing, excavations and stockpiling of materials;
- Operation of construction plant and vehicles producing dust, noise and vibration;
- Percussive driving of piles to form wharf support columns;
- Erosion and sediment control (open ground);
- Construction waste disposal, pollution for hazardous material and waste water management;
- Stockpiling of construction material such as sand, gravel and cement – likely to be brought to site as bagged material;
- Disruption of traffic across existing wharf; and,
- Presence of construction workers.

13.3.1.1. Impact on Air Quality

The quality of air at Viru is typical of a small village in the Solomon Island, with no small scale commercial industry and effectively no vehicle fleet, save for occasional vehicles that bring material to or from the wharf area. Traffic fumes from cars and small trucks are virtually non-existent. Regular breeze and the open aspect of the site will disperse any polluted air generated from construction work. Dusts levels were low, when observed in March site visits.

During the construction phase there will be minor temporary impacts on local air quality through emissions of exhaust from lifting machines used for erecting precast concrete sections, small amounts of mixing concrete but these will be very small emissions and unlikely to impact on local Sulphur Dioxide (SO2) Nitrogen dioxides (NO2) from construction of diesel and petrol fuelled equipment including nor Total Suspended Solids (TSS) from dust.

The contractor is required to maintain all construction equipment and avoid using machines emitting very dark smoke. Dust generation if encountered, will be minimized by spraying of exposed sites with water to prevent dust generated illnesses. Mitigation measures include:

Construction equipment being maintained to a good standard. The equipment will be checked at regular intervals to ensure they are maintained in working order and the checks will be recorded by the contractor as part of environmental monitoring;

- Prohibition of the use of equipment and machinery that causes excessive pollution (i.e. visible smoke);
- Material stockpiles being located in sheltered areas and covered with tarpaulins or other such suitable covering to prevent material becoming airborne and the inclusion of sediment traps to prevent discharge into the neighbouring environment;
- Damping down of any roads being used for haulage of materials, during the dry season; and,
- Periodic qualitative air quality monitoring (by observation of dust plumes rather than testing).

Residual Risk is considered to be low.

Air Quality Dust - anticipated to be minor since structural sections will be precast offsite. Minor impacts from concrete batching	Minor	Improbable	**Low**		Dust-suppression measures and well maintained equipment	Minor	Improbable	**LOW**

13.3.1.2. Climate Change

The subproject will not create any impacts on rainfall, unexpected groundwater depletion, or carbon emissions, which in turn could affect the risk of, or induce, climate change.

Where possible the Contractor should maximise use of construction materials and products with recycled or secondary and low carbon content, from renewable sources and use locally sourced materials to minimise distance materials are transported from source to site.

Residual Risk is considered to be low.

Minor	Possible	**Low**		Maximise use of construction materials and products with recycled or secondary and low carbon content, from renewable sources. Use locally-sourced materials to minimise distance materials are transported from source to site.	Minor	Improbable	**LOW**

13.3.1.3. Site Clearance – Cultural Heritage and Archaeological impacts

It is not antipated that the development of the wharf will affect any cultural heritage or archaeological resources but any site clearance, digging and excavation activities could un-earth archaeological sites or resources. In the event this occurs, work shall cease immediately and the authorities (National Museum Tambu Register, Ministry of Culture and MECDM) shall be informed. A chance find procedure will be developed in the Contractor generated SEMP

The Contractor shall be responsible for complying with the requirements of authorities, and the MID-CPIU shall monitor the same.

The unmitigated and mitigated risk for cultural heritage and archeological discovery is considered to be low.

Impacts on historic-cultural and archaeological monuments - No archaeological or cultural resources are expected to be encountered during project implementation	Minor	Improbable	**Low**		No sites identified. Contractor develops chance find procedure	Minor	Improbable	**LOW**

13.3.1.4. Impacts from Aggregate Extraction

The main source of aggregate use for this project is in concrete used for precast construction. The sources of aggregate for use in pre-cast concrete manufacture will be from approved and licenced sources. No site specific impacts are anticipated.

Should the Contractor have to source material at site the following mitigation measures would need to be considered in any application for extraction:

- Limits to volume of material extracted from any one source in light of ability of the source to regenerate and likely environmental impact as a result of the extraction;

- Access to gravel extraction sites will be negotiated with land owners and users, in the event that an access is purpose built, should the owner not want to keep the access, the contractor will be responsible for reinstating the land to its pre -project condition;
- Any rivers or streams identified as being part of a protected area (including the buffer zone of a protected area), a proposed protected area, or having conservation value, being habitat for rare or endangered aquatic species or birds, comprising part of the intertidal zone, comprising swamp or wetland, or including mangroves, will not be permitted to be used as sources of gravel;
- Any Rivers or streams that are used as a fresh water source for villages should not be used as a materials source as gravel extraction will cause increased sedimentation and turbidity. In cases where such rivers or streams must be used, alternative water sources, such as drilled or dug wells, upstream of extraction sites and works, must be provided for the villages;
- Use of approved machinery for gravel extraction from rivers such as excavator or backhoe. Dredging or similar operations will not be permitted;
- In respect of maximum volumes to be removed from any one source, any river gravel removal for the subproject will be managed in accordance with the aggregate extraction guidelines and conditions of approval for the extraction plan;
- Gravel material should not be extracted from river bends, and if required, river training be undertaken;
- Any extraction sites and borrow areas close to roads will be located at least 20 m outside the right-of-way of roads, extraction from the sides of roads in a way that could undermine the roads will not be permitted;
- Site and pit restoration will follow the completion of works in full compliance with all applicable standards and specifications;
- Any topsoil excavated from the top of sites and borrow pit areas will be saved and reused in re-vegetating the sites and pits to the satisfaction of the CPIU;
- Additional extraction sites and/or borrow pits will not be opened without the restoration of those areas no longer in use; and,
- The excavation and restoration of sites and borrow areas, as well as their immediate surroundings, will be undertaken in an environmentally sound manner to the satisfaction of the CPIU. Sign-off to this effect by CPIU will be required before final acceptance and payment under the terms of the contract.

The potential unmitigated risk is high but with mitigation in place is considered to be low.

Aggregate Extraction - potential adverse impacts on flooding, replenishment of river stream sources, impact on water abstraction	Major	POSSIBLE	**High**		Unlikely to be an issue as most aggregate requirements are for concrete that will be precast offsite and sourcd from licenced existing quarry operations	Minor	Improbable	**LOW**

13.3.1.5. Impact on Soils and Erosion

The wharf works will be carried out on the coastal fringe, with most work in the existing tidal zone.

Hydrocarbon leakages and contaminations of soil from solid waste are common problems experienced by contractors. Chemicals must be stored in an area or compound with concrete floor and weatherproof roof and fuelling of construction vehicles must be carried out under cover. Spills

must be cleaned up as per emergency response plan. Generally, oil/fuel remediation agents, oil pads, oil booms and geo-fabric cloths should be available and ready to use during spillages. The contractor is required to incorporate a liquid and solid waste management approach and an accidental spill or emergency response plan in their EMP.

Potential soil impacts and erosion will be mitigated by:

- All required materials will be sourced in strict accordance with Government guidelines, project provisions including the aggregate extraction guidelines, and the EMP;
- In the event that the contractor causes damage to agricultural land, productive land or gardens, the contractor is solely responsible for repairing the damage and/or paying compensation;
- The side slopes of any embankments, including any river bank areas will be protected and designs used that protect soils as included in the project specifications in order to reduce erosion. Gabion baskets or rip-rap will be used to reduce scour and erosion where required;
- Re-vegetation of the slope areas with fast growing species, or other plants in consultation with the land owners and village chiefs, as quickly as possible after work in the slope areas has been completed;
- Random and uncontrolled dumping of construction spoil, or any material, will not be permitted;
- Suitable permitted waste disposal sites will be designated in consultation with land owners and village chiefs. Waste disposal sites will not be permitted on the rivers, or on garden land or in areas used for livelihood production by business and villagers; and,
- Acquisition of all necessary permits or approvals for the location of construction camps, material extraction sites and sources of construction materials as per the aggregate extraction guidelines from MID and government agencies (such as Provincial Government and MECDM) prior to any construction or erection of camps and extraction of material.

The unmitigated and mitigated risk for impact on soils is considered to be low.

Degradation of landscapes and soil erosion	Minor	Improbable	Low		Minimising large open areas, reseeding, drainage channels	Minor	Improbable	LOW

13.3.1.6. Impact on Water Quality

The work will involve work close to the marine environment where there is potential for adverse impact from silt runoff. In addition, chemical spillages and runoff have the potential to degrade water quality.

The contractor will be required to use sediment control approaches including, sediment pond, construction of bunds and silt fences around the work areas whenever required to contain plumes of disturbed water from getting into water bodies. Used oils and chemicals will be discharged to designated areas proposed by the Environment Conservation Department (ECD) in consultation with local communities and not on the coast or in any waterway.

The unmitigated and mitigated risk for impact on water quality is considered to be low.

Hydrology and Water Quality - Badly managed use and disposal, potential for depletion or pollution of resource	Minor	Possible	Low		The Contractor will prepare a Waste Water Management Plan	Minor	Improbable	LOW

13.3.2. Construction Impacts on the Biological Environment

13.3.2.1. Impact on Terrestrial Flora and Fauna

Most of the work will be carried out above water with no direct impact on terrestrial flora and fauna, but there is some clearance of existing vegetation between the wharf and boat jetty. The natural ecosystem in this area has been modified by human activities, clearance and planting and as such existing flora (predominately trees shrubs) located on the coastline have been artificially planted by neighbouring residences/owners. Plant species present within the impact area are either introduced species or ubiquitous native species, which are highly tolerant of disturbances. A number of trees between the wharf and boat jetty are expected to be removed, however the number and location of which tree will be removed will be determined once the final design and layouts have been finalized. It is expected less than 10 trees are required to be removed.

Fauna within the clearance area is limited to invertebrates that are associated with the flora (trees, shrubs) and are dominated by insects. No birds or bats were identified roosting and/or nesting within the trees located in the area. There is no flora or fauna affected that has conservation significance nor is it representative of the original vegetative cover.

There is the potential for construction workers to poach edible animals and birds from the area in spite of prohibitions and poaching regulated by Wild Birds Protection Act and Wildlife Management and Protection Act. The contractor will be responsible for providing adequate information to workers regarding the protection of fauna and imposing sanctions on workers trapping, killing or wounding birds or other wildlife.

All construction machines will be maintained to minimize emission of dark smoke likely to cause nuisance to terrestrial fauna. Impacts to flora and fauna from accidental release of chemicals, oils and fuels are possible. To minimize any spillage, hydrocarbons will be stored in a shed and fuelling of construction machines must be carried out from the shed. Spill kits will be available where these operations will occur. Poaching of terrestrial fauna by workers will be forbidden.

Therefore, there will be negligible, if any, loss of valuable flora or fauna.

Terrestrial Flora and FaunaImpacts on biodiversity low due to the wharf being developed "offshore". Some loss of existing modified habitat	Minor	Improbable	Low		Work is in heavily modified alignment, avoidance when encountered, worker eductaion	Minor	Improbable	LOW

13.3.2.2. Impact on Marine Flora and fauna

The subproject will have very minor impacts (if any) on the marine and coastal habitats flora and fauna, including coral reef, sea grass beds and mangrove ecosystems. In isolation, the subproject will not induce climate change, including localized increased sea temperatures and as such there will be no risk of coral bleaching associated with the project.

Potential impacts from the wharf construction activities possibly impacting coastal and marine habitats, in particular coral reef systems is run-off or sedimentation and the re-suspension and transport of particulates by currents within these coastal ecosystems. Inshore coastal fringing reef systems can tolerate variation in sedimentation from natural processes that are specific to their location. It is considered that the relative effect of short-term increases in sedimentation that may be derived from the scope of works will be both small in volume and localized, due to the intermittent

activity and the small amount of sediment that could be released as a result of the construction activity. Thus very minor if at all impacts on the coastal and marine environment and resources are expected.

13.3.2.3. Impacts on protected areas and other sensitive ecosystems

There is no marine, coastal or terrestrial protected areas within or close to the projects area of influence and as such there will be no impact on the national protected area systems and the flora and fauna that resided within.

Mitigation measures to be implemented to ensure protection of flora and fauna within the subproject area are:

- Contractor to prepare and implement a Waste Management Plan before start of work
- Sites for Contractor's camps, rock crushers, material storage, quarries, and borrow pits will all be approved by CPIU/Engineer and will not be permitted in any ecologically important sites or areas valuable for conservation
- Vegetation clearance during construction activities, especially of trees along the road-side corridor, will be minimized
- Under no circumstances is the contractor permitted to fell or remove mangroves
- Vegetative cover cleared from the roadside during rehabilitation activities will be kept for slope protection and re-vegetation. Contractors will be responsible for re-vegetation in cleared areas
- Contractor will be responsible for supplying appropriate and adequate cooking fuel in workers camps to prevent fuel-wood collection
- Construction workers will be informed about general environmental protection and the need to avoid un-necessary felling of trees wherever possible
- The contractor will be responsible for providing adequate knowledge to construction workers in relation to existing laws and regulations regarding illegal logging. Contract documents and technical specifications will include clauses expressly prohibiting the felling of trees, not requiring to be cleared by the project, by construction workers for the term of the project
- The contractor will be responsible for providing adequate knowledge to construction workers in respect of fauna. Contract documents and technical specifications will include clauses expressly prohibiting the poaching of fauna by construction workers and making the contractor responsible for imposing sanctions on any workers who are caught trapping, killing, poaching, or having poached fauna

Mitigation measures for spillages are identified below:

- As part of the Waste Management Plan the contractor to prepare a detailed Emergency Response Plan to cover all hazardous materials/oil/ fuel storage and spillage.
- All hazardous materials secured in secure (lockable), weather proof area including impervious flooring and bund/containment wall.
- All spill waste to be cleaned and disposed at only approved permitted locations.
- No spillage allow to enter water ways (freshwater streams, drainage channels and coastline).
- All equipment (vehicles, plant machinery) are well maintained.

- Posting “no smoking zone” signage throughout the work camps and construction site were required (e.g. fuel storage areas).

Waste management mitigation measures includes:

- The contractor will provide construction workers training for all in basic sanitation, hygiene and health care issues, health and safety matters, and on the specific hazards of their work;
- Contractor will ensure safe and clean facilities including sanitation and drinking water is provided to all workers;
- Contractor will provide sufficient training in appropriate waste disposal methods;
- All wastes from work sites and camps to be disposed of in approved landfill / areas by MECDM and local land owners;
- Septic tanks and garbage receptacles will be set up at construction camp sites, which will be regularly cleared by the contractors to prevent outbreak of diseases. The garbage will be dumped only at a site approved by Provincial Development of Works and local land owners;
- No wastes to be dumped in waterways or close to the coast; and,
- Construction camps will have sanitary latrines and portable latrines provided on work site/s.

Mitigation measures to avoid impacts from stockpiling are as follows:

- All stockpiles (for materials won from the site or brought into the site) to be bunded, preventing discharge into neighbouring environment,(silt traps, sand bags) and covered (tarpaulin) to prevent increased dust;
- All soils waste material not to be used on site needs to be transported off site to an approved permitted receiving facility;
- Safety barriers and signage required on all stockpiles; and,
- All stockpile to be located on site and at least 50 m from any water way or drainage system.

Mitigation measures to avoid impacts from access roadworks are listed below:

- All road construction in areas of waterways, streams and drainage channels are to be undertaken with extreme care;
- Use of silt control devices and sediment traps/fences during all road extraction and construction activities, these to be cleaned and dewatered regularity;
- Placement of diversion ditches around all stockpiles (see above).;
- Contractor to prepare and impalement a traffic management plan before commencement of work;
- Inform neighbouring community/business of duration of scope of works and alternative road arrangements including installing temporary access ways;
- Signage used in vicinity of works and to include “flag persons” to regulate traffic flow and ensure traffic safety to workers, pedestrians and general public; and,

- Ensure public safety across all work sites are maintained including barriers to prevent entry in high risk areas (e.g. excavation sites, area with heavy machinery being used) and ensure safety passage are erected through work sites.

13.3.3. Noise and Vibration

13.3.3.1. Construction Noise - Percussive Piliing

Construction of the wharf facilities requires driving steel “H” piles into the seabed to provide a foundation to the precast concrete decking. The H piles will be driven into the sea bed by a barge mounted drop hammer. The action of pile driving will create a rhythmic, metal on metal, noise. The closest building to the works area is 50m distant to the west but shielded from direct line of sight by the scarp slope immediately west of the wharf construction area. A calculation of the residual noise at this building due to noise attenuation has been carried out4.

- Sound Power Level for a Drop Hammer driving a steel pile 126dB(A);
- Correction to obtain Predicted Noise Level at 50m from source 45dB(A); and,
- Residual noise level at building (without shielding) 84dB(A).

A sound power level of 84dB(A) is very load and ear protection should be worn for noise levels above 85dB(A) However there is no direct line of sight to the working area and noise levels will be muche reduced. This level of noise will be noticeable through the village but pile driving will be mitigated by limiting working hours to daytime with the additional restriction of no work in the early morning or evening, at the weekend or Public holidays and Holy days. The precise hours of work will be determined in agreement with the local community Particular attention will be made to avoid any impact on the village schools during exam periods and on places of worship in the village during times of worship. Even with restricted working hours there will be a residual impact on the village and if this is found to be unacceptable to village residents further restriction of working hours may be required i.e. to hour of work, hour of rest, repeated through the day. Working hour restrictions ahall be relayed to the community so that they can plan activities accordingly. The duration will relatively short though could be several months and the residual impact is considered to be medium.

Construction Noise - Piling. The structure will be formed on steel "I" beams perciussively driven into the seabed	Major	Probable	**High**		Only daytime work. No work in early morning evening or at weekends (or religeous days). Liason with schools to confirm examination times	Minor	Improbable	**Medium**

13.3.3.2. Construction Noise - General Construction

There are no noise standards in Solomon Islands. But, any noise generated by construction should be restricted to the hours of 7 am to 5 pm weekdays (Monday – Friday). Permission from MID would be required to operate outside of these hours, which may be required for certain activities. Construction noise will be intermittent, quickly attenuates with distance, and depends on the type of operation, location and function of equipment. On this site there will be limited heavy machinery (except the piling rig) other machinery will be barge crane for lifting precast decking into position, small batch concrete mixers and generators to power electric hand tools During clearing of vegetation there will be some powered mechanical equipment. The following sound power levels of construction equipment are noted:

- Crane Barge Mounted (diesel) Sound Power Level 112dBA;

[4] The information on source noise and distance attenuation has been extracted form the Hong Kong Environmental Protection Department publication “Technical Memorandum on Noise from Percussive piling. Table 2 Sound Power Levels for percussive piling and Table 4Correction factors to obtain Predicted Noise Level.

- Lorry Sound Power Level 112dBA;
- Tug Boat Sound Power Level 110dBA;
- Generator. Sound Power Level 108dBA; and,
- Concrete mixer (electric or petrol) Sound Power Level 96dBA.

The closest building is 50m away and a calculation of the residual noise at this building due to noise attenuation has been carried out5 A correction factor of 45dB(A) is applicable to an unshielded source, therefore the noise level at the boundary of the closest property could by 62dB(A), though this will be significantly reduced as the village is shielded from direct line of sight by the scarp slope. In context, during the noise monitoring exercise carried out on 14 March 2019 a Sound Power Level of 60dB(A) was recorded at the existing wharf when there was a vessel unloading at the wharf. This level of noise will be noticeable but not uncomfortably disturbing and will be limited to daytime 7:00am to 5:00pm (Monday to Friday) The precise hours of work will be determined in agreement with the local community Particular attention will be made to avoid any impact on the village schools during exam periods and on places of worship in the village during times of worship. With this mitigation in place impact is considered to be low.

Construction Noise - Noise will be generated in the course of the works but limited to powered mechanical equipment lifting precast units, small scale concrete batching and electric powered hand tools (from petrol generator)	Minor	Improbable	**Low**		Well maintained equipment, working hours, quiet plant, physical screening. Liason with local community	Minor	Improbable	**Low**

13.3.3.3. Vibration from Percussive Piling

The vibration from percussive piling will depend on the underlying geology. The principal danger is damage to property and the Contractor must carry out a precondition survey of structures in the village so that in the event of any damage the impact can be agreed, quantified and remedied.

Even with restricted working hours there will be an impact on the village which it is uneconomic to mitigate further. The duration will relatively short though could be several months and the residual impact is considered to be medium.

Construction Vibration - Close to the wharf during piling	Major	Probable	**High**		Only daytime work. No work in early morning evening or at weekends (or religeous days). Liason with schools to confirm suitable times for piling. Contractor to conduct a pre-condition survey	Minor	Improbable	**Medium**

13.3.3.4. Worker's health and safety and influx

The construction phase can cause a range of health and safety impacts. The main impacts are associated with accidental chemical spills and subsequent contamination of the surrounding land and waterways, risk associated with accidents at work and traffic accidents with the latter two resulting in potential bodily harm. There are risks associated with spread of diseases between the construction team and the residential population, including the spread of malaria, dengue fever and a range of STIs, air and water borne diseases. The contractor will need to provide health facilities, first aid kits, and safety equipment for workers and provision for taking victim to hospital from this remote location. The community at Viru has a strong religious tradition (Seventh Day Adventist) and issues related to smoking, alcohol consumption and inappropriate behaviour by construction

[5] The information on source noise and distance attenuation has been extracted from the Hong Kong Environmental Protection Department publication "Technical Memorandum on construction Noise other than Percussive piling. Table 3 Sound Power Levels for Powered Mechanical Equipment and Table 5 Correction factors to obtain Predicted Noise Level from Sound Power Levels at Given Distances.

workers, especially after hours will need to be addressed and managed by the contractor through a Code of Conduct, signed by all site workers and enforced by the Contractor.

The contractor will be responsible for providing adequate knowledge to construction workers in relation to all safety issues associated with on the job and expectations and rules outside of work (e.g. construction camps). The Contractor will recruit an approved service provider to conduct an STI and HIV/AIDS awareness program for the construction force and local community.

The contractor will be responsible for providing safety and personal protective gear (PPE) and equipment to workers, include instructions on how and when to use the equipment to manage the risk of accidents at the work sites. Provision for workers to access safe drinking water, mosquito and sun management, portable and septic latrines and garbage receptacles at the work site and camp (if developed) which are to be regularly cleaned to prevent disease outbreaks and maintain worker's health standards. All garbage collected will be dumped only at a site/s approved by local community and landowners. A solid waste management plan will be in incorporated in the SEMP prepared by the Contractor.

Mobile first aid kit/s need to be accessible at all work sites and first aid post including basic first aid and medical supplies is to be located at construction camp. To reduce the risk of incidents at the camp, access to construction camps by other than those authorized will be prohibited.

Mitigation measures for worker's health and safety includes:

- Contractor will recruit an Environmental Safety Officer (ESO) to address health and safety concerns and liaise with the CPIU and residence/business within the project area;
- Contractor to provide a health and safety management plan (HSP), in conjunction with their CEMP;
- The contractor will provide adequate health care facilities including a health post and first aid facilities within the construction camp and a mobile first aid kit on site;
- The contractor will provide construction workers training for all in basic sanitation, hygiene and health care issues, health and safety matters, and on the specific hazards of their work;
- The contractor will provide workers with personal protection equipment, such as safety boots, reflector vests, helmets, gloves, and protective clothing and goggles;
- Contractor will ensure safe and clean facilities including sanitation and drinking water is provided to all workers;
- Adequate signage and security are to be provided at the construction sites for prevention of unauthorized people (including children) entering the construction sites;
- Provision for adequate protection to the general public in the vicinity of the work site, including advanced notice of commencement of works, installing safety barriers if required by residence/business and signage or marking of the work areas will be carried out;
- Provision of safe access across the works site to people whose residences /business access are temporarily affected during road rehabilitation activities;
- The contractor will ensure that there is adequate drainage throughout the camp to ensure that disease vectors such as stagnant water bodies and puddles do not form;
- Contractor to educate and ensure worker's actions are controlled and community rules and codes of conduct are strictly observed at all times (work site and camps). Contractor

to prepare a Code of Conduct that all site workers must sign and include details of disciplinary procedures (including dismissal);

- The use of wood for fuel will be prohibited to avoid fire hazards; the camps are to be provided with sufficient and proper cooking facilities such as propane gas and burners; and,
- Posting “no smoking zone” signage throughout the work camps and construction site are required (e.g. fuel storage areas).

With these mitigation measures in place impact is considered to be low

Worker Health and Safety and Influx - Labour Conditions, influx of construction workers (small dedicated workforce, local semi and unskilled labour)	Moderate	POSSIBLE	**Medium**		Contractors will be required to develop and implement labour management plans including Worker Code of Conduct	Minor	Improbable	**LOW**

13.3.3.5. Impact on community health and safety

The Contractor’s HSP will also address community impacts and management measures in addition to worker health and safety. It is to include key components of the World Bank (WB) Group’s Environmental, health and Safety Guidelines (EHSG):

- The HSP will include agreement on consultation requirements, establishment and monitoring of acceptable practices to protect community safety, links to the complaints management system for duration of the works (in accordance to the grievance redress mechanism – GRM) and system for reporting of accidents and incidents. The CIPU and DSC to ensure these actions are enforced;
- Before construction commences the Contractor will conduct training for all workers on their requirements to engage the local community and ensure national laws are respected, special consideration and respect for women, elderly and children (including the school) are to be strictly followed;
- Community (business/resident) protocols discussed and worker awareness as part of mobilization process;
- Contractor to ensure workers’ actions and work site/camp are controlled and community rules and code of conduct is observed;
- Signage and security i.e. prohibition on unauthorized people (especially children) entering site office, construction areas, works yard and camp all in English and Pigin;
- Workers to respect landowner (business/resident) boundaries;
- STIs and HIV/AIDS awareness program through approved service provider for workers and communities (refer projects social safeguard documents);
- A communications and complaints plan will be used for liaison and correction among stakeholders;
- Contractor to appoint ESO;
- No damage to property and resources;
- Child and/or trafficked labor will be strictly prohibited for any activities associated with the project;

- Children will be prohibited from entering the worker's camps, accommodation, works area/construction zone and prohibited from playing on any equipment or machinery associated with the project;
- The contractor will implement the traffic management plan that will include traffic control and pedestrian safety measures;
- Protection for the public in vicinity of work sites and safe access across work sites provided for the public; and,
- In consultation with CIPU, the contractor will clearly fence off 'no go areas' within the construction zone and erect boundary fences to prevent the public from entering and visually seeing the construction during the construction period (or specific construction activities).

With mitigation in place workplace safety for the community is considered to be low.

Socio-economic Impacts - Workplace and Community Health and Safety - Construction activities are inherently hazardous	Major	POSSIBLE	**High**		Contractor Management Plans. Fencing of hazard areas,security at gates, interaction with local community, HSE officer	Minor	Improbable	**LOW**

13.3.4. Socio economic Impacts

13.3.4.1. Site Specific Impacts – Construction Camps

It is anticipated that for the small non-village construction management team needing accommodation on site that the Contractor will arrange accommodation within the village after consultation with the community. This will remover the need for a dedicated construction camp with worker accommodation, canteen, shower and ablutions.

If the Contractor decides to develop an accommodation camp it will produce waste water (grey water from cooking, showering), sewage and potential pollutant spillages (e.g. petrochemicals). All waste water/sewage must be managed and treated to ensure minimal impacts to the surrounding environment, (especially groundwater and coastal area contamination) and workers' health and safety. To minimise impacts the camp site must be constructed to ensure all petrochemical storage and usage are bunded and located in a water proof and lockable building, all sewage within the camp will need to be connected to a suitable septic tank systems with pump out transferred back to treatment facility (e.g. Honiara). All wastes (plastic, organic, paper, metal, etc.) generated at the camps need to be collected in suitable rubbish bins, sorted for recycling and organic material and disposed of at waste management locations agreed in consultation with the local community.

A compound will be needed to accommodate a management office and secure storage for hand operated plant, generators and fuel storage. Any loose construction materials that require stockpiling must be covered (to prevent dust generation and erosion), surround by a sediment management system (e.g. sand bags, sediment traps) to prevent material migrating off-site during rain events and be located at least 50 m from the coast. All materials not reused within the project must be removed from the site at completion of the works.

Upon completion of construction, camp sites and storage areas shall be completely demobilised and landscaped where possible to allow regeneration of local species. The contractor shall prepare a rehabilitation plan for all demobilised sites.

The community at Viru has a strong religious tradition (Seventh Day Adventist) and issues related to smoking, alcohol consumption and inappropriate behaviour by construction workers, especially after hours will need to be addressed and managed by the contractor through a Code of Conduct, signed by all site workers and enforced by the Contractor.

Site Specific Impacts (1) Construction camps - Influx of labour (health risk, crime, cultural impact)	Moderate	POSSIBLE	**Medium**		Camp Management plan and Worker Code of Conduct to be developed in the SEMP. Only small non local workforce (Management)	Minor	Improbable	**LOW**

13.3.4.2. Site Specific Impacts – Percussive Pile Driving

The impacts of noise and vibration on the Village have been discussed in 13.3.3.1 and13.3.3.3. This activity will cause some disturbance but the works are over 160m from the closest structure and over 500m from the main village. There will need to be liaison between Contractor and village community about minimising impact through specific working hours.

Site Specific Impacts (2) Pile driving - Noise and vibration from percussive piling	Major	Probable	**High**		Noise and Vibration Management plan developed in the SEMP. Avoid work at sensitive times: morning evening and weekend, times of worship	Minor	Improbable	**Medium**

13.4. Operational Impacts and Mitigation on Physical Environment

Operational impacts are likely to result from the increase in the number of boats accessing the wharf with increased potential for noise, spills and increases in particulate emissions from vessels.

13.4.1. Impact on Ambient Noise Environment

The existing wharf and its replacement are remote from the residential areas of eth village. While vessel movements are anticipated to increase it is unlikely to create additional impact reuiring mitigation, which would require restrictions in use that run counter to the development of the wharf. If there are specific areas of concern they need to be discussed between the community and vessel operators (e.g. hours of operating at the wharf). Noise impact from wharf operation is considered low.

Operation Phase Wharf Noise impacting on Village - Low use, wharf remote and shielded form direct line of sight	Minor	POSSIBLE	**Low**		Relatively low activity, mitigation options include liason with operators on specific areas of concern (e.g. excessive noise)	Minor	Improbable	**LOW**

13.4.2. Impact on Air Quality

The current conditions are not influenced by air pollution sources and the movement of vessels is relatively low. The site at Viru has good air circulation and no additional impacts on the village of Viru are identified from the operation of the new wharf, boat jetty and ramp unless there is a development in transport of un-bagged “loose loads” e.g. sand. From discussions on site, loose bulk loading is unlikely to develop at the wharf and air quality impact from wharf operation is considered low.

Operation Phase Wharf Operation Air Quality - Goods are generally bagged rather than "loose loads". Site remote from village, good dispersion	Minor	POSSIBLE	**Low**		Relatively low activity, mitigation options include liason with operators on specific areas of concern (e.g. excessive dust if non bagged trading increases)	Minor	Improbable	**LOW**

13.4.3. Impacts on Water Quality

Potential negative impacts during the operation phase to surface or marine waters due to spillage of hydrocarbons during loading / unloading operations (there will be no facilities for refuelling at the wharf, there is some potential for leakage from drummed fuel or petrochemical products being transhipped leakage, and always a potential for accidental spill). During discussions on site we were advised that there had been no significant historic spills into the marine environment during unloading / loading.

The future segregation of large medium and small vessels at the wharf, ramp and boat jetty will remove potential conflicts and crowding that could result in accidental spillage. It would be prudent to consider having a sand filled drum at each wharf / jetty to provide material that could be used to contain / absorb any small spills.

Overall, operation of the wharf should have no impact on water quality.

Operation Phase Hydrology and Water Quality - Spills to Marine waters	Minor	Improbable	**Low**		No eveidence of this being an issue from existing operations and no new impact anticipated.	Minor	Improbable	**LOW**

13.4.4. Solid Waste Management

While no littering was noted during the March 2019 site visit the increased vessel usage at the wharf and the general worldwide trend of increasing packaging waste could lead to more littering at and around the wharf area. It would be prudent to consider having a dedicated waste bin at each wharf to allow for focused collection of inert waste. This would need to be co-ordinated within the community.

Operation Phase Waste Management - periodic removal of waste accumulated from littering	Minor	POSSIBLE	**Low**		Operational Waste Management Plan. Waste bins, involveemnt of local community.	Minor	Improbable	**LOW**

13.5. Operational Impacts on the Biological Environment

13.5.1. Flora and Fauna

Minor (insignificant) environmental impacts are envisaged on the flora and fauna adjacent to the wharf, boat jetty and ramp.

There are no rare or endangered flora and fauna associated with the wharf and as such there will be no impacts as a consequence of wharf operation during the operational phase.

13.5.2. Impact on Protected Areas

There is no terrestrial, freshwater or coastal or marine protected or conservation areas within or in close proximity to the wharf. Therefore, the operation of the wharf, boat jetty and ramp will have no impact on any protected area.

Operation Phase impacts on flora and fauna: no rare or endangered flora and fauna associated with the wharf	Minor	Improbable	**Low**	No eveidence of this being an issue from existing operations and no new impact anticipated.	Minor	Improbable	**LOW**

13.6. Operational Impacts on the Social Environment

13.6.1. Noise Impacts

The expected increase in boat traffic utilizing the wharf will not significantly affect ambient noise levels after the completion of the wharf requiring mitigation.

Operation Phase Wharf Noise impacting on Village - Low use, wharf remote and shielded form direct line of sight	Minor	POSSIBLE	**Low**	Relatively low activity, mitigation options include liason with operators on specific areas of concern (e.g. excessive noise)	Minor	Improbable	**LOW**

13.6.2. Impact on Health and Safety

Traffic and pedestrian safety will be significantly improved following rehabilitation and routine maintenance of the project road. The inclusion of pedestrian footpaths, road widening (2 lanes to 4) of the road, improved shoulders and drainage systems will allow for safe passing of vehicles and pedestrians.

An increased traffic volume and possibility of higher vehicle speeds can create the potential for accidents involving pedestrians and children. Safety signs showing speed limits and pedestrian crossing need to be clearly marked and maintained to avoid accidents. Awareness raising through community meetings and through road safety programs included in schools will help mitigate this.

14. ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

14.1. Environmental Management Plan (EMP)

The environmental assessment of the construction, operation, and maintenance of project has determined that the project will have an insignificant impact on the local environment. Environmental mitigation measures have been proposed to avoid or minimize environmental impacts to acceptable levels. The proposed environmental mitigation measures are proven technologies normally associated with internationally recognized good engineering practice..

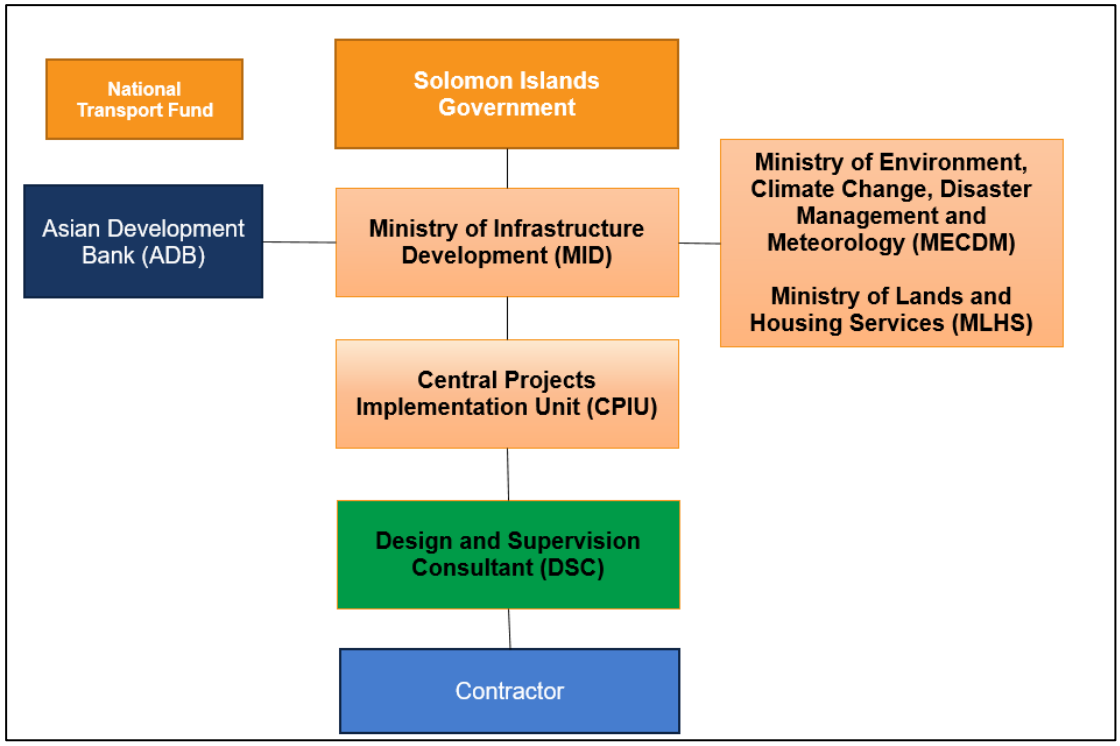
An Environmental Management Plan (EMP) for the project is presented below and complies with government and ADB requirements. The EMP includes the following information:

- Implementation arrangements for the EMP including:
    - institutional roles and responsibilities for EMP implementation throughout all stages of the project (procurement, design, construction, operation);
    - capacity building requirements for implementing agency to ensure environmental management requirements are properly understood and fully implemented; and,
    - Grievance redress mechanism.
- Environmental mitigation and monitoring matrices including:
    - potential environmental impacts that could occur during each stage of the project (pre-construction/design, construction, operation);
    - proposed mitigation measures to address each impact identified;
    - agency responsible for implementing each mitigation measure;
    - monitoring tasks to ensure mitigation measures have been implemented effectively during each stage of the project; and,
    - schedule and responsibility for monitoring.
- Costs associated with implementation of all aspects of the EMP.

14.2. Implementation Arrangements

Figure 33 is an organisation chart setting out the Institutional linkages for Project implementation

Figure 33: Organisation Chart showing Stakeholders in Project implementation



The SC will assist MID in detailed design and updating of safeguards due diligence as required, procurement (preparation of tender documents, tender evaluation) and will support MID through supervision of construction. The consultant will include an international environmental specialist to assist MID update the IEE based on detailed design and prepare the necessary documentation to obtain development consent from ECD of MECDM. The SC will ensure that MID meets all its obligations with respect to the development consent, updated EMP and the approved contractor's construction EMP (CEMP). The SC will provide training to MID staff in general environmental management of port operations and basic training in internationally recognised environmental management and health and safety good practices.

14.3. Institutional Roles and Responsibilities

14.3.1. MID/ CPIU

The Ministry of Infrastructure Development (MID) is expected to be the Implementing Agency for the project and has overall responsibility for all project related activities including inter-ministry coordination. MID retains responsibly for the environmental management and monitoring tasks of the project. MID will exercise its functions through the Central Project Implementation Unit (CPIU) and is responsible for the project delivery and day-to-day project management activities. It is expected that a Supervision consultant (SC) will be appointed for the project implementation, to undertake environmental monitoring.

Importantly, MID will retain the responsibility of submission and obtaining environmental permits for works.

Specialist staff within the CPIU are to be assigned to undertake aspects of environmental management and oversee monitoring tasks during the development and delivery of the project, in an audit role. The CPIU specialist's will assist in all aspects of implementation of the environmental assessment and permits as required. They will also be undertaking their own monitoring and

evaluation (M&E) and capacity building of other CPIU non- environmental staff and MECDM and other relevant government agencies.

The CPIU Environment Officer (EO) will:

- Prepare Public Environmental Reports (PER) as required to meet the requirements of the Solomon Islands Environment Act 1988 and amendments and ADB SPS;
- Prepare a Design Brief containing the design issues that are identified in the EMP for action by the SC and/or CPIU technical design team;
- Ensure the EMP requirements are attached to the project's Bid and Contract Documents;
- Participate as required in public consultations with the Social Development Officer (SDO) to advise affected communities of the scope and scheduling of the subprojects work to raise awareness within the communities of the likely phasing of events that will occur within their social boundaries;
- Arrange for the PER to be submitted to the MECDM and ADB for evaluation. Following approval by MECDM and the issuing of the Development Consent (DC) the EO will advise the MID, the SC and ADB of the approval;
- Review the Contractors Environmental Management Plan (CEMP) prepared by the Contractor and provide recommendations and conditions to the SC;
- Following approval of the CEMP, the EO will ensure an induction for the Contractor is undertaken, whereby the details of the CEMP are confirmed and the Contractor informs the community of the timing of the works program;
- If any, non-compliant environmental issues come to the EO's attention, they are to advise the Supervising Engineer (SE) of the SC;
- The EO will also undertake regular site visits (minimum once a month) to independently monitor the contractor's compliance with the CEMP and the SC's monitoring. Should non-compliant work be identified; the EO may issue a Defect Notice (DN) concerning the work. Defect Notices are to be formally delivered to the contractor via the SE (SC);
- MID will be responsible for ensuring that the contractor does not start construction activities until requisite approvals have been received from MECDM, MID and MMERE, as required by the contract and by law;
- Quarterly Progress Reports will be issued by the SC to MID and ADB. These will report on all aspects of the project, including those documented in the Contractor's monthly reports and environmental monitoring reports prepared by the SC and Contractor; and,
- After the completion of construction, MID will be responsible for operations and ongoing maintenance of all assets.

14.3.2. Civil Works Contractor

The civil works Contractor will be responsible for interpreting the EMP when preparing a Contractors Environmental Management Plan (CEMP), after contract award. Where changes or additional engineering information is available, these shall be taken into account in the CEMP. The SC (as the Supervising Engineer) will approve the CEMP, upon advice from the EO and ADB, before any physical works are undertaken.

The Contractor will also be required to develop an Health and Safety Plan (HSP), Emergency Response Plan (ERP), Waste Management Plan (WMP) and Spill Management Plan (SMP) and as

sections of their CEMP. The Contractor will be required to undertake its own monitoring as part of a quality assured process.

The Contractor will also be responsible for implementing all environmental and Occupational Health and Safety (OH&S) actions included in the SEMP and relevant clauses in the bidding and contract documents.

The Contractor will be required to assign an Environmental Safety Officer (ESO) whose responsibilities for the contractor will include:

- Coordinating with MID, the EO and/or DSC for updating the CEMP when required;
- Ensuring that the contractor engages a suitable organization to undertake STI/HIV/AIDS briefings and awareness raising amongst the Contractor's employees;
- Ensuring that the Contractor complies with the clauses in the contract and bidding documents in respect of the environment and OH&S issues;
- Coordinating with MID and/or CPIU in respect of continued community consultation;
- Participating in monitoring and coordinating with CPIU and the DSC to ensure that environmental management activities are reported as required;
- Ensuring that the Contractor does not commence construction activities until requisite approvals have been received from ECD, MID, MMERE and/or CPIU; and,
- Coordinating and communicating with the Contractor's Community Liaison Officer (CLO), as required, to facilitate consultation with the affected communities, various stakeholders (public, private and government), and ensuring smooth implementation of the individual subproject.

As required by the various project documents, and the ADB SPS guidelines, the Contractor and MID and/or the CPIU, may be responsible for the execution of various aspects of the project's environmental monitoring during both the construction and operational phases of project. This must be carefully considered in the development of TOR's for the SC (if any). MID, through the CPIU will also be responsible for verifying the monitoring undertaken by the SC, through audits and on site monthly spot checks.

The outcomes of the monitoring will be included in the monthly and quarterly progress reports to be submitted by the SC to MID and to ADB. This information will also be consolidated and submitted to ADB for review on a six monthly basis.

14.3.3. Environment and Conservation Division

The Environment and Conservation Division (ECD) of the MECDM is the national agency for the environment and conservation. It is essential that this division is directly involved in the various aspects of the environmental management and monitoring activities. The ECD, under the requirements of the Environment Act 1998, are required to review the Public Environmental Report (PER) and will assist in monitoring the progress of the construction activities if consent is given after the PER evaluation.

The ECD will need to be consulted during the construction phase of the project to ensure that all monitoring requirements are compliant with the CEMP. The ECD will be tasked also to assist in the auditing of implementation of the EMP and ensure that environmental management and mitigation of the project impacts is undertaken.

The ECD has been provided with a number of capacity building and technical assistance programs over the past decade, which have provided extensive policy and legislative improvements, practical training, mentoring and capacity building in all aspects of environmental assessment, monitoring

and compliance. This has resulted in considerable improved staff capacity to manage the roles and responsibilities of this division for the management of national environmental laws and regulations.

Nevertheless, insufficient staff numbers, resources and technical and management competences need to be further developed within the division to ensure long term aspirations can be attained. It is therefore recommended that the DSC provides technical, mentoring assistance through capacity building opportunities to the ECD to ensure the successful delivery of this project.

14.3.4. Ministry of Mines, Energy and Rural Electrification (MMERE)

The Department of Mines and Minerals (DMM) is located within the Ministry of Mines, Mineral and Rural Electrification (MMMRE) and is responsible for issuing Building Material Permit (BMP) for extraction of sand and aggregate. The proponent will need to abide by the Mines and Minerals Act of 2008 regarding sourcing materials from sites that have approved BMP. The potential source of gravels / aggregates will be from approved source.

14.3.5. Provincial Administration and Communities

During detailed design, the DSC will prepare a communications plan, in conjunction with MID, which will outline the types of stakeholder consultation required at various stages of the project, which agency is responsible for undertaking the consultation and which media is appropriate for the various types of consultation required to ensure the environmental management of the project. It is recommended that the delivery of the communication plan be the responsibility of a Community Development Specialist (CDS) or similar position. The Contractor will also be responsible for assigning the CLO to take on the role of liaison between the MID, the Provincial administration and the communities, to ensure effective implementation of the project components.

The development of a small body (e.g. Community Liaison Committee) with representatives from the various stakeholders including the community is suggested to ensure the efficient and effective communication of all activities associated with the project (e.g. contractor liaisons with the project stakeholders and communities, identification of suitable work camp sites if required, social and environmental awareness, prevention and implementation).

Village leaders, community organizations and private business sector need to be consulted to provide assistance in arranging meetings with, facilitating consultation with, and providing information about, affected communities and environmental impacts. An account of the process will be an integral part of the internal monitoring report prepared by the project. It needs to be acknowledged that the community stakeholders play an important role in the maintenance of roads, bridges and drainage systems through the existing labour based works programs, and as such it is important their involvement is strengthened and recognized so that they can feel ownership of the wharf and other infrastructures.

14.3.6. Non-Government Organizations (NGOs)

The projects awareness and prevention measures will link in with the existing initiatives where ever possible. There are NGOs that provides information and build links with other organizations in the delivery of awareness and prevention programmes for STIs and HIV / AIDS which are actively seeking partnership in their program deliveries to the local communities. The organizations has already developed package of instruction, education and communication materials related to STIs and HIV / AIDS and a module or standard workshop for delivery to institutions which could be ideal for delivery to the contractor’s construction force prior to construction.

The Provincial Health Authorities had developed links with the NGOs working in the subproject areas including those who are dealing with issues relating to Gender and Child Exploitation issues.

Linking with already established network and the Provincial Government for the implementation of the awareness and prevention aspects of the program aimed at villages with in the subproject site and is beneficial.

14.4. Grievance Redress Mechanism

During the course of the project, it is possible that people may have concerns with the environmental management, including the implementation of the EMP. Issues may occur during construction and again during operation. Any concerns will need to be addressed quickly and transparently, and without retribution to the Affected Person (AP).

The following process is to be used. The first step is to attempt to sort out the problem directly at local level. If it cannot be resolved at this level, then the grievance will be addressed by being referred to the SC, who will then involve MID management and other agencies, if required.

14.4.1. During Construction

Most complaints arising during construction are expected to be minor, concerning dust or noise that should be able to be resolved at the site management level. All complaints arriving at the Site Office are to be entered in a Register that is kept at the site by: date, name, contact address and reason for the complaint. A duplicate copy of the entry is given to the AP for their record at the time of registering the complaint. The Register will show who has been directed to deal with the complaint and the date when the complaint was made together with the date when the AP was informed of the decision and how the decision was conveyed to the AP. The Register is then signed off by the person who is responsible for the decision and dated.

The Register is to be kept at the front desk of the site office and is a public document. The duplicate copy given to the AP will also show the procedure that will be followed in assessing the complaint, together with a statement affirming the rights of the AP to make a complaint. For anybody making a complaint, no costs will be charged to the AP.

In the first instance, the affected person and/or people are to discuss their complaint directly with the Community Liaison Committee (CLC) or to the local council whomever is the preferred party by the complainant. If the CLC or local council supports the complaint, both persons are to take the complaint to the on-site Project Engineer (PE). For straightforward complaints, the PE can make an on-the-spot determination to resolve the issue at the mutual agreement of all.

For more complicated complaints, the PE will forward the complaint to the Environmental Officer (EO) within the MID and/or CPIU. The EO has a maximum of two days to resolve the complaint and convey a decision to the AP. The AP and the Chief, CLC or Council may if so desired, discuss the complaint directly with the PE/EO. If the complaint of the AP is dismissed, the AP will be informed of their rights in taking it to the next step. A copy of the decision is to be sent to the ECD.

Should the AP not be satisfied, the AP may take the complaint to the Permanent Secretary (PS) in the MECDM who will appoint the Director of the ECD to review the complaint. The PS will have 15 days to make a determination. The MID PS is to be copied in on the complaint and is to be informed of the decision from the PS in the MECDM.

If the AP is dissatisfied with the determination from the PS in the MECDM, the AP may appeal to the National Court. This will be at the APs cost but if the court shows that the PS, or the Mid and/or CPIU have been negligent in making their determination the AP will be able to seek costs.

14.4.2. During Operation

The GRM ceases to operate once the construction activities are completed. However, the same procedure is followed except that the complaint is now directed to the MID and/or CPIU. During operation, the same conditions apply; i.e., there are no fees attached to the AP for making a

complaint, the complainant is free to make the complaint, which will be treated in a transparent manner and the AP will not be subject to retribution for making the complaint.

14.4.3. Consultation and Disclosure

This report will be submitted to MID, MECDM and ADB and will be available for public review. The preliminary communications consultations of affected people and the local communities have expressed support for the project as they clearly seen the benefit to their communities with improved road and drainage services (refer the social safeguard reports). Additional consultations are required to be held with project stakeholders and communities in respect to finalizing the project design and will incorporate community feedback as well as continued community awareness associated with the projects implementation timing of activities and help to resolve complaints and grievances.

The communities and landowners adjacent to the road have not yet signed a memorandum of agreement (MOA) of willingness to contribute material for construction. Further consultation and disclosure will be done during implementation through:

- The project's Communications Plan;
- Disclosure of a summary of the project documents including the preparation and dissemination of a brochure in English and Pidgin, explaining the project, works required and anticipated timing of the works; and,
- Setting up a formal grievance redress committee with a representation from the affected people. The Contractor will be responsible for managing the grievance redress program.

Information regarding the approved subprojects and the proposed environmental management measures will be posted at suitable locations at the project site.

Disclosure will conform to the SPS and Public Communications Policy of the ADB: Disclosure and Exchange of Information which requires that environmental assessment reports for ADB projects be accessible to interested parties and the general public. The project's IEE as part of ADB project documents will be uploaded onto the ADB website while the IEE will be available to the public upon request.

The PER will be available to the public from MID Resource Centre upon request and on the ADB's website.

14.5. Environmental Monitoring and Reporting

Environmental monitoring is an integral component of an environmental impact assessment to, (i) combat uncertainties pertaining to unanticipated impacts; (ii) ensure mitigation measures are working; and (iii) reassure the public on the progress of the development. Progressive monitoring must accompany various stages of the subproject activities (pre-construction, construction and operational phase).

The environmental monitoring plan is based on the potential impacts, significance of the impacts and mitigation approaches identified during the environmental assessment study. It comprises parameters to be monitored, frequency of monitoring, responsible authorities and cost estimates. The contractor will be required to prepare a detailed environmental monitoring plan based on the EMP and as set out in the contract documents. A review committee that is include staff members of the MID and MECDM are responsible for monitoring compliance, review of contractors' monthly monitoring report and suggest ways to improve or strengthen mitigation approaches.

The MID and MECDM are required to:

- Review contractor's monitoring plan as part of their CEMP, based on contract documents and grant approval when requirements are met;
- Co-ordinate compliance monitoring programs and submit quarterly monitoring reports;
- Review contractor's monthly monitoring report and suggest ways to strengthen mitigation approaches; and
- Include the likely mitigation cost incurred by the contractor for implementing the mitigation approaches and recruitment of ESO in the as items in the bill of quantities.

A summary of various parties' responsibilities for implementing the EMP is provided in the following table.

Table 6: Responsibilities for Environmental Management and Reporting

Project Stage	Responsible Organization	Responsibilities
Feasibility studies and Appointment of civil works contractor	CPIU	➢ Review and approval of PER including overall EMP ➢ Prepare aggregate extraction guideline ➢ Incorporation of PER mitigation measures into bidding documents, detailed design and technical specification ➢ Translation of mitigation measures into clauses in the contract documentation
Detailed Design	Contractor	➢ Prepare detailed design ➢ Update EMP by way of preparing a CEMP based on specifics of detailed ➢ Submit CEMP to CPIU for review and approval (revise as necessary if required by CPIU) ➢ Identify aggregate extraction sites in line with the guidelines and prepare extraction plans
	CPIU and MECDM	➢ Review and approve detailed environmental mitigation and management measures including CEMP and aggregate extraction plans etc.
Construction	Contractor	➢ Implementation of CEMP ➢ Implementation of aggregate extraction plans and required environmental protection measure ➢ Work with MID/ CPIU to establish Stakeholder Committees and GRC
	CPIU	➢ Supervise contractor's implementation of CEMP and all other contractual obligations ➢ Enforce contractual requirements ➢ Audit construction phase through environmental inspections and review monitoringdata. Submission of quarterly reports ➢ Provision of Awareness training to workers and technology transfer to contractor

	MECDM	➢ Ensure compliance with Government requirement ➢ Review complicated issues arising from the project
Operation	MID	➢ Provide budget to undertake environmental monitoring
	CPIU, Maintenance contractor	➢ Undertake environmental monitoring and biannual reports ➢ Prepare maintenance reports to adaptively manage environmental risk related to operations (per EMP)
	CPIU MECDM ADB	➢ Review contractor's reports and monitoring reports.

14.6. Environmental Management Plan

An overarching Environmental Management Plan has been developed for the construction phase of the Project. This identifies the need for a Contractor to generate a Contractors Environmental Management Plan (CEMP), and supporting sub-plans to manage specific issues or activities. The relationships between these plans is as presented above and the EMP generated through this document are presented in subsequent sections. The process of plan development is illustrated in the figure below.

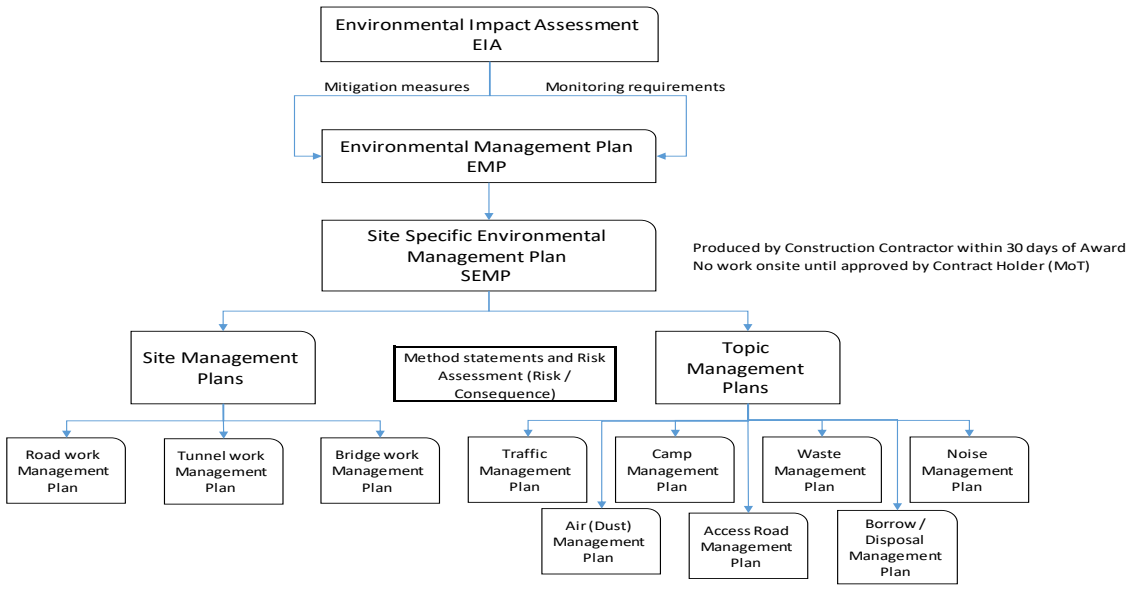


Figure 34: How a Contractor CEMP evolves from the EIA and EMP

Table 7: Environmental Impact Mitigation, Management and Monitoring Plan – Pre Construction

IMPACT MITIGATION				IMPACT MONITORING			
Project Activities	**Environmental Impacts**	**Mitigation Measures**	**Mitigation Responsibility**	**Mitigation Costs (US$)**	**Parameter to be monitored**	**Frequency and means of Verification**	**Monitoring Responsibility**
PRE-CONSTRUCTION PHASE							
Surveying and demarcation of wharf site.	Some minor loss of vegetation during demarcation on waterfront	Minimize vegetation removal to immediate corridor of works.	Contractor	Included in contract.	Area of vegetation; Number of trees removed.	During survey and activities - visual inspection before, during and after works.	Contractor CPIU
Site clearance, digging, and excavations.	Restriction on use of land.	▪ Consultation with owners/users; ▪ Compensation for vegetation and or building cleared/removed.	Contractor	Included in contract.	Grievances from communities and MOA signed.	Before and after works.	CPIU Contractor
	Erosion and contamination of nearby water bodies due to clearing and excavation works.	Installation of mitigation measures (e.g. silt traps, tarpaulins, correct stockpiling of material), management control of wastes prevented entering streams and waterways.	Contractor	Included in contract.	Area of project, usage of mitigation fixtures (e.g. slit traps), water turbidity checks	Before, during and after works	Contractor CPIU
Mobilization of Contractor, presence of construction workers' association with local people.	Social Disruption	▪ Community protocols discussed and workers' awareness provided (All site workers to sign a site specific "Code of Conduct" that sets out acceptable and unacceptable behaviour including disciplinary system; ▪ Contractor to ensure workers actions outside work camps/sites are controlled and community rules and code of conduct observed;	Contractor, MOH, MID and local NGO's and other civil society groups.	Construction cost.	Grievances protocols; registering complaints of incidents between workers and communities, Number of children entering camp, and	During works program – monitoring records for complaints, consultation with workers about protocols, issues raised with CDS	CPIU

IMPACT MITIGATION				IMPACT MONITORING			
Project Activities	**Environmental Impacts**	**Mitigation Measures**	**Mitigation Responsibility**	**Mitigation Costs (US$)**	**Parameter to be monitored**	**Frequency and means of Verification**	**Monitoring Responsibility**
		▪ Signage and security at work site and camp – i.e. prohibition on unauthorized people (especially children) entering worksite and camps.			Number and effectiveness of signage.		
	Spread of STIs and HIV- AIDS.	▪ Implementation of awareness and prevention program – Contractor. ▪ Implementation of HIV/AIDS awareness and prevention program – Community.	Contractor, MOH, MID and local NGO's and other civil society groups.	Construction cost.	STI/HIV/AIDS prevalence, Increased awareness about transmission and prevention.	Prior to construction – Check contractor records, consultation with staff and discussions with NGO/civil society agencies.	CPIU
Climate Change Adaptation	Impact of Climate Change.	▪ Ensure climate proofing incorporated into design to ensure flooding effects and erosion not locally increased. ▪ Design modified to accommodate extreme whether events – increased rainfall, run off and coastal erosion.	MID and Contractor	Construction Costs	Tidal stream/river heights and discharge velocities rates, flooding frequency, Localized erosional issues.	Visual; rainfall and localized flooding data.	Contractor CPIU

Table 8: Environmental Impact Mitigation, Management and Monitoring Plan –Construction Phase

IMPACT MITIGATION				IMPACT MONITORING			
Project Activities	**Environmental Impacts**	**Mitigation Measures**	**Mitigation Responsibility**	**Mitigation Costs (US$)**	**Parameter to be monitored**	**Frequency and means of Verification**	**Monitoring Responsibility**
CONSTRUCTION PHASE							
Operation of construction plant and vehicles generating emissions – Dust and Pollution	▪ Impact on air quality ▪ Emissions of exhaust from vehicles and machinery; ▪ Dust from exposed stockpiles; ▪ Possible contamination of nearby water bodies.	▪ Inform nearby business/residents about the duration of dust generating operations; ▪ Maintain construction equipment; ▪ Prohibit use of equipment that causes excessive pollution (e.g. generates smoke emissions); ▪ Material stockpiles covered and located in sheltered areas; ▪	Contractor	Construction Costs	Air quality, emissions, dust, Particulate matter; Use of tarpaulins	Monthly or after complaint – periodic visual inspection; Any particulate matter and smoke managed as per EMMP	Contractor; CPIU
Site clearance, digging and excavations.	Removal of some trees on coastal fringe	▪ Minimize vegetation removal to immediate corridor of works; ▪ Compensation for trees removed if required.	Contractor;	Construction Costs	No of trees removed, compensation payments;	During all work activities - stop work order issued; Site/resources dealt with appropriately	Contractor; CPIU
	Accidental discovery of archaeological assets, sites or resources.	Archaeological Discovery: ▪ Cease activities immediately; ▪ Inform National Museum (Tambu register), Ministry of Culture, MCEM; and ▪ Undertake all actions required by above.	Contractor; National Museum (Tambu Register) and MECDM.	Construction Costs	Sites and/or resources discovered and protected.	During all work activities - stop work order issued; Site/resources dealt with appropriately	Contractor; CPIU; National Museum archaeologists/ MECDM,

IMPACT MITIGATION				IMPACT MONITORING			
Project Activities	**Environmental Impacts**	**Mitigation Measures**	**Mitigation Responsibility**	**Mitigation Costs (US$)**	**Parameter to be monitored**	**Frequency and means of Verification**	**Monitoring Responsibility**
Aggregate Extraction If required – only small quantities of material envisaged)	▪ Extraction of river gravels from beds or active channels of rivers changes hydrology altering channel and erosion.	▪ Extraction from ecologically sensitive areas (beach, intertidal, swamp, wet lands, mangrove areas) or productive land not permitted. ▪ Sites to be identified in consultation with MID, land owners and communities; ▪ Sources from rivers to be identified during the detailed design phase and existing permitting areas to be used where ever possible and appropriate (with permits); ▪ Preparation and implementation of extraction plan (with volume limits) in accordance with SIG guidelines; ▪ Approved machinery only to be used (dredges no permitted); ▪ Material not permitted to be extracted form river bends or other sensitive areas; ▪ All extraction sites are to be permitted from MECDM; ▪ All extraction sites to be rehabilitated after use.	Contractor MID; CPIU	Construction Costs	Materials only obtained from designated – permitted sites (locations and method) as per extraction plan; Rehabilitation is conducted as per extraction plan.	Monthly visual inspection; Review of extraction plan.	Contractor; CPIU
Land clearing, grubbing, cut and fill activities and construction of embankments.	▪ Soil erosion and silt generation; ▪ Increased runoff and/or erosion;	▪ Stockpile on un-used or non-agricultural land; ▪ Gabions, rip-rap or bio-engineering methods used to stabilize shoreline,	Contractor	Construction Costs	Reduce soil erosion and sedimentation; Damaged culverts and	Monthly visual inspection.	Contractor; CPIU

IMPACT MITIGATION				IMPACT MONITORING			
Project Activities	**Environmental Impacts**	**Mitigation Measures**	**Mitigation Responsibility**	**Mitigation Costs (US$)**	**Parameter to be monitored**	**Frequency and means of Verification**	**Monitoring Responsibility**
	▪ Sediment contamination and siltation of streams/rivers. ▪ Increased turbidity in streams, near shore coastal areas (including fringing reefs) downstream; ▪ Erosion derived from gravel extraction form rivers: ▪ Stockpiles and staging areas lead to loss of land uses	embankments and causeway/bridge abutments; ▪ Erosion monitored and rapid response stabilized undertaken as required for unexpected events (tropical rainfall event); ▪ Uncontrolled dumping of spoils not permitted;			drainage system replaced;		
Construction waste disposal and wastewater run-off, discharges and generation of liquid wastes.	▪ Construction material washed out of stream/rivers into coastal waters; ▪ Increased turbidity detrimental to coastal fringing coral reef systems; ▪ Soil contamination from petrochemicals (fuels, oils).	▪ Preparation and implementation of Waste Management Plan before start of work; ▪ No waste to be dumped within project or surrounding areas; ▪ All solid waste removed immediately from the project site to designated off site locations, including; ▪ Segregation of wastes shall be undertaken and provisions supplied (e.g. waste collection bins); ▪ Organic (bio-degradable) waste material collected and disposed of	Contractor	Construction Costs	Disposal and discharge of waste as per waste management plan; Occurrence of erosion.	Monthly – visual inspection of culverts, drainage systems, bridges and in stream work areas.	Contractor; CPIU

IMPACT MITIGATION				IMPACT MONITORING			
Project Activities	**Environmental Impacts**	**Mitigation Measures**	**Mitigation Responsibility**	**Mitigation Costs (US$)**	**Parameter to be monitored**	**Frequency and means of Verification**	**Monitoring Responsibility**
		off-site by composting (burning allowed in designated land fill site in accordance to local regulations); ▪ All non- hazardous wastes to be disposed of at the projects approved waste management site. ▪ Use of silt control devices (e.g. curtains, fences, nets); ▪ No discharge into stream/river, surface waters or coastal areas; ▪ Discharge into agreed settling ponds or discharge areas in consultation with landowners, communities. ▪ Natural water flows in rivers not to be changed; ▪ No liquid wastes to be dumped in water ways or on coast; ▪ Pollution of all water resources not permitted; ▪ Diversion ditches to be placed around stockpiles; ▪ Use of heavy machine in aquatic environments minimized; ▪ Spoil and stockpiles will not be located near the coast (50 m minimum), on slopes or within 15 m of river banks;				

IMPACT MITIGATION				IMPACT MONITORING			
Project Activities	**Environmental Impacts**	**Mitigation Measures**	**Mitigation Responsibility**	**Mitigation Costs (US$)**	**Parameter to be monitored**	**Frequency and means of Verification**	**Monitoring Responsibility**
		▪ Construction camps supplied with sanitary latrines - no direct discharge.					
Pollution from use, storage and accidental spills of hazardous substances and need for emergency response.	▪ Petrochemical (oil, fuel, bitumen) and other hazardous chemicals are spilled into the environment from road construction and/or associated facilities (camps, transport) resulting in pollution and environmental damage; ▪ Accidents placing people at risk.	▪ Detailed Emergency Response Plan (as part of the EMP) prepared by Contractor to cover hazardous materials/oil/fuel storage, spills and accidents; ▪ Locate storage areas for all petrochemical products including bitumen at least 500 m form coastline and 100 m form stream/rivers. ▪ Chemicals including fuel stored in secured (lockable), weather proofed area including an impervious flooring and bund/containment wall to container spillage; ▪ Used oil and other toxic (e.g. Bitumen) and hazardous materials shall be disposed of in an authorized facility off-site. ▪ Spill waste will be disposed at disposal sites approved by local authorities. ▪ Adequate precaution to be taken to prevent oil/lubricant/ hydrocarbon contamination of the drainage systems. Spillage, if any, will be	Contractor	Construction Costs	EMP and emergency response plan; Ensure storage sites are using existing concrete base; Spill areas cleaned and rehabilitated.	Monthly or after event or as required - review and approval of emergency response plan; Visual inspection of storage facilities.	Contractor; CPIU.

IMPACT MITIGATION				IMPACT MONITORING			
Project Activities	**Environmental Impacts**	**Mitigation Measures**	**Mitigation Responsibility**	**Mitigation Costs (US$)**	**Parameter to be monitored**	**Frequency and means of Verification**	**Monitoring Responsibility**
		immediately cleared with utmost caution to leave no traces. ▪ All spills cleaned as per emergency response plan, which shall include spill kits;					
Encroachment into precious ecology, disturbance of terrestrial, coastal and marine habitats.	▪ Impacts on flora and fauna (terrestrial, coastal) forest and agricultural habitats; ▪ Impacts on Flora and Fauna (marine) coral reefs, seagrass and mangrove habitats; ▪ Impacts on fisheries; ▪ Runoff and streams/rivers carrying increased sediments (increased turbidity) siltation into coastal and inshore marine areas; ▪ Fragmentation of terrestrial habitats; ▪ Endemic or other species affected;	▪ No *Tambu*, cultural, historical or preservation areas are located within the wharf development that will be adversely affected by the works; ▪ Any accidental discovery handled as; ▪ Cease activity immediately; ▪ Inform National Museum (Tambu Register), Ministry of Culture and MECDM; ▪ Undertake discussions with community – land owners if required; ▪ Worker education on unacceptable practices of trapping / poaching fauna and taking of seeds and plants	Contractor	Construction Costs	Check for unnecessary vegetation clearance; Progress of re-vegetation of work areas; Training of workers in Information; Adequate supply of cooking Oil in camp.	Spot inspections; monthly - visual inspection of camp and work sites; Re-vegetation activities as per EMP; Consultations with villagers and workers	Contractor; CPIU

IMPACT MITIGATION				IMPACT MONITORING			
Project Activities	**Environmental Impacts**	**Mitigation Measures**	**Mitigation Responsibility**	**Mitigation Costs (US$)**	**Parameter to be monitored**	**Frequency and means of Verification**	**Monitoring Responsibility**
	▪ Workers impacting flora and fauna; ▪ Protected areas affected.						
Encroachment into historical and/or cultural sites and resources	▪ Effects on cultural values; ▪ *Tambu* and preservation areas affected by the subproject;	▪ No Tambu, cultural, historical or preservation areas are in the wharf area that will be adversely affected by the works; ▪ Any accidental discovery handled as; ▪ Cease activity immediately; ▪ Inform National Museum (Tambu ▪ Register), Ministry of Culture and MECDM; ▪ Undertake discussions with community – land owners if required;	Contractor; National Museum (Tambu, Register and MECDM)	Construction Costs	Sites and/or resources discovered and their protection – management.	During activities - stop work order issued; Site/resources dealt with appropriately.	Contractor; National Museum archaeologists/ MECDM, CPIU.
Operation of construction plant and equipment creating noise and vibration.	▪ Noise and vibration in community (residential and commercial); ▪ Impact on construction workers.	▪ Limit construction to weekdays 07:00am to 5:00pm and no work at weekend or on public holidays or local festival days. ▪ Liaison with local schools and religious groups on sensitive times (e.g. exam periods) ▪ Inform residents about duration of noise and possible vibration generating operations;	Contractor	Construction Costs	Adherence to agreed schedule; Complaints (no. logged with resolution); Workers safety equipment.	Monthly or after complaint - review Schedule Consultation (ensure schedule being adhered to).	Contractor; CPIU

IMPACT MITIGATION				IMPACT MONITORING			
Project Activities	**Environmental Impacts**	**Mitigation Measures**	**Mitigation Responsibility**	**Mitigation Costs (US$)**	**Parameter to be monitored**	**Frequency and means of Verification**	**Monitoring Responsibility**
		▪ Construction vehicles and machinery to be fitted with mufflers and other noise abatement equipment to ensure minimal noise generated; ▪ Undertake baseline noise level recording and regular monitoring of noise levels ▪ Provide all workers with Personal Protective Equipment (PPE); ▪ Buffers to be established between work areas and nearby residential areas were practical; ▪ Complaints will be addressed by Contractor.					
Presence of construction workers	Various social impacts including: ▪ Social disruption; ▪ Possibility of conflict or antagonism between residents and workers (Note that local community has a high level of religious (Seventh day Adventist) adherence);	▪ Community protocols discussed and worker awareness as part of mobilization process; ▪ Contractor to ensure workers' actions and work site/camp are controlled and community rules and "worker code of conduct" is strictly observed; ▪ Signage and security i.e. prohibition on unauthorized people (especially children) entering site office, construction areas, works yard and camp;	Contractor	Construction Costs	HIV/STI's awareness campaign implemented; EMO recruited; Training implemented; Safety equipment provided; Signage and security to prevent unauthorized	As required; Monthly or after complaint – EMO recruited; training delivered; Staff records; Visual inspections; Consultations with villages; Checking of complaints; Consultations with workers – training.	Contractor; CPIU

IMPACT MITIGATION				IMPACT MONITORING			
Project Activities	**Environmental Impacts**	**Mitigation Measures**	**Mitigation Responsibility**	**Mitigation Costs (US$)**	**Parameter to be monitored**	**Frequency and means of Verification**	**Monitoring Responsibility**
	▪ Spread of communicable diseases including STIs and HIV/AIDS; ▪ Children are potentially exposed to exploitation; ▪ Impacts on general health and safety.	▪ Workers to respect landowner (business/resident) boundaries; ▪ STIs and HIV/AIDS awareness program through approved service provider for workers and communities (refer projects social safeguard documents); ▪ A communications and complaints plan will be used for liaison and correction among stakeholders; ▪ Contractor to appoint ESO; ▪ Contractor to provide health facilities and 1st Aid post in site office and if require mobile unit to provide safety equipment for workers; ▪ Contractor to provide adequate and safe drinking water access in all work areas; ▪ Protection for the public in vicinity of work sites and safe access across work sites provided for the public; ▪ No damage to property and resources; ▪ Contract documents will include provisions for ensuring poor, local and women encouraged to participate in workforce and will receive fair wages;			people entering camp.		

IMPACT MITIGATION				IMPACT MONITORING			
Project Activities	**Environmental Impacts**	**Mitigation Measures**	**Mitigation Responsibility**	**Mitigation Costs (US$)**	**Parameter to be monitored**	**Frequency and means of Verification**	**Monitoring Responsibility**
		▪ No child labor to be used.					
Workers' Occupational Health and Safety (OH&S)	Safety at work for all workers and associated contractors	▪ Workers shall be provided with appropriate personal protective equipment (PPE) such as safety shoes, hard hats, safety glasses, earplugs, gloves, etc. ▪ The contractor shall orient workers on health and safety issues related to their activities as well as on the proper use of PPE. ▪ Workers shall be provided with potable water supply. ▪ Provision of distinguishing clothing or reflective devices or otherwise conspicuously visible material when there is regular exposure of workers to danger from moving plant. ▪ Monitoring and control of the working environment and planning of safety and health precautions should be performed as prescribed by national laws and regulations. This includes; ▪ Workers who have received appropriate training in accordance with national laws and regulations shall operate construction equipment.	Contractor	Construction Costs	Provisions of PPE to all workers; Training delivered on safety and work protocols; Barriers erected managing worksite. Potable water (drinking) and lavatory service provided at all job sites; Frist aid kit provided; GRM processes understood and worker's obligations with communities.	During activities – visual inspection and spot checks; Record books and complaints; Job site inspections for OH&S requirements;	Contractor; CPIU

IMPACT MITIGATION				IMPACT MONITORING			
Project Activities	**Environmental Impacts**	**Mitigation Measures**	**Mitigation Responsibility**	**Mitigation Costs (US$)**	**Parameter to be monitored**	**Frequency and means of Verification**	**Monitoring Responsibility**
		▪ The drivers and operators of vehicles and materials handling equipment shall be medically fit, trained and tested and of a prescribed minimum age as required by the government rules and regulation. ▪ Safety provisions shall be brought to the notice of all concerned by displaying or notice board at a prominent place at the work locations. ▪ The contractor shall be responsible for observance, by his sub-contractors, of all health and safety provisions. ▪ The contractor should take adequate measures for the control of malaria and other mosquito vector diseases. ▪ All vehicles used in the construction yard should have reverse horns. ▪ There should be proper demarcation of work areas with signage boards showing the work areas. The signboards should be in English and Pidgin. ▪ Suitable warning should be displayed at all places where				

IMPACT MITIGATION				IMPACT MONITORING			
Project Activities	**Environmental Impacts**	**Mitigation Measures**	**Mitigation Responsibility**	**Mitigation Costs (US$)**	**Parameter to be monitored**	**Frequency and means of Verification**	**Monitoring Responsibility**
		contact with or proximity to electrical equipment can cause danger. ▪ Persons having to operate electrical equipment should be fully instructed as to any possible danger of the equipment concerned. All the electrical equipment should be inspected before it is taken into use to ensure that it is suitable for its purpose. ▪ Water transport tanks, storage tanks and dispensing container should be designed, used, cleaned and disinfected at suitable intervals in a manner approved by the competent authority. ▪ Water that is unfit to drink should be conspicuously indicated by notices prohibiting workers from drinking it. ▪ Secure storage areas should be provided for flammable liquids, solids and gases such as liquefied petroleum gas cylinder, paints and other such materials in order to deter trespassers. ▪ Smoking should be strictly prohibited and no smoking notices be predominantly displayed in all places containing readily combustible or flammable materials.				

IMPACT MITIGATION				IMPACT MONITORING			
Project Activities	**Environmental Impacts**	**Mitigation Measures**	**Mitigation Responsibility**	**Mitigation Costs (US$)**	**Parameter to be monitored**	**Frequency and means of Verification**	**Monitoring Responsibility**
		▪ Only suitably protected electrical installations and equipment, including portable lamps, should be used. ▪ Oil rags, waste and clothes or other substances liable to spontaneous ignition should be removed without delay to a safe place. ▪ Fire-extinguishing equipment should be provided at construction camps, asphalt plants, storage areas for combustible materials and other areas where fire hazards are found. Such equipment shall be properly maintained and inspected at suitable intervals					

Table 9: Environmental Impact Mitigation, Management and Monitoring Plan –Operation Phase

IMPACT MITIGATION				IMPACT MONITORING			
Project Activities	**Environmental Impacts**	**Mitigation Measures**	**Mitigation Responsibility**	**Mitigation Costs (US$)**	**Parameter to be monitored**	**Frequency and means of Verification**	**Monitoring Responsibility**
OPERATIONAL PHASE							
Spills	Increased frequency of use increases possibility of accidental spill during loading / unloading	▪ Provide simple spill kit to contain / absorb spills. Can be as simple as drum contacting sand or other sorbent material; ▪ No spills recorded in recent history. No bulk fuel transfers so booms not	MID-CPIU;	Included in contract.	Accidents on case by case basis Safety issues discussed operators;	Half yearly for 3 years, mid-term and post evaluation monitoring – visual assessments; Complaints;.	MID-CPIU; ADB

IMPACT MITIGATION				IMPACT MONITORING			
Project Activities	**Environmental Impacts**	**Mitigation Measures**	**Mitigation Responsibility**	**Mitigation Costs (US$)**	**Parameter to be monitored**	**Frequency and means of Verification**	**Monitoring Responsibility**
		considered appropriate at this location					
Spread of communicable diseases	Wharf creates an accessible pathway for the spread of communicable diseases such as STIs.	▪ Expected vessel movements will remain similar and as such increase spread of disease not expected, ▪ Ongoing community awareness.	MID-CPIU; Local Police	Included in contract.	Health status of people in the community; Number of new cases of STI etc.	Half yearly for 3 years, mid-term and post evaluation monitoring – consultation with villagers	MID-CPIU; ADB

15. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

15.1. Consultation and Activities Undertaken

There were two consultations undertaken at Viru for this application. The initial consultation was undertaken in May 2019 and a follow-up consultation was made in February 2020. This consultation was undertaken with the aim to make the communities surrounding the sub-project site to be aware of the proposed wharf and ramp construction and take note of their views towards the sub-project. Also landowners were identified, basic community data and information were gathered; information on climate change impacts as viewed by the community were identified. Significant environmental impacts which will likely occur during the project implementation were identified and community perspectives on the layout plan and location of the new structure were also taken into consideration.

Figure 35: Consultation at Viru

In summary, it was noted from the consultation that the community at Viru are very supportive of the proposed sub-project. Included that consultation and information sharing with them at the initial stage of the project has been undertaken.

15.2. Results of Consultation

During preparation of the PER consultations were held with the community people within the wharf sub-project area, the meetings were “open” in that anybody with an interest in the subproject was invited to participate. The meetings were well attended and some interesting information was provided, which has been incorporated into the description of the existing environment and assessment of impact sections of the PER.

15.3. Issues raised

The issues raised during the consultations are as follows:

- Landing crafts and passengers vessels often berth at Viru but not anymore due to the condition of the current log wharf and sedimentation from the rivers which resulted in the change in depth of the current wharf site;
- People who wants to travel to Honiara now boards ships at Noro or Seghe which is very expensive;
- Consider climate change impacts and natural hazards;
- Urge the Consultant and MID to include as part of the Contract for local community members to be recruited as non – skilled or casual labors;

- If women can also be part of the work force, as there are few widowed women in the community that need money to support their faimilies. Women participation will be very much appreciated;
- Design is okay except that it should be shifted out a bit at the location identified during the initial visit;
- Other facilities included in the concept design are very much needed by those travelling;
- If the hill or land will be excavated for the road access it will be dangerous for the houses on top of the hill as the soil is not stable and land slide is common. Reclamation would be better to avoid disturbance to the natural soil structure;
- SDA Monument on site must not be removed, consider Ablution Block and Waiting Area (on drawing) to be on the same side as the current Market Hut; and,
- Community is highly supportive of the project and is looking forward to support MID and the Contractor during construction.

15.4. Benefits of the Project

The probable benefits of the project are as follows:

- Increased number of ships to Viru;
- Reduced travelling costs; and,
- Safe and easier transportation of cargoes and passengers.

15.5. Negative Impacts

During the consultations possible negative impacts associated with project were also identified. These are listed below:

- Exposure to different culture and risks of increasing Sexually Transmitted Infections including HIV therefore contractor will undertake awareness on the health issues through the provincial health department;
- Increased Criminal activity and social issues including alcohol consumption; marijuana smoking; domestic violence and child abuse;
- Possibility of girls and women having relationships with construction workers;
- General environmental pollution which include water pollution from excavation activities and oil leaks; air pollution from heavy machinery plant; noise pollution and waste from work;
- Before construction, a pre-contractor mobilization awareness must be conducted inthe affected communities in the sub-project sites to be carried out by the contractor;
- Outsiders coming into the village with very knowledge of the culture and custom of the area; and,
- Issue with land for construction and improvement of structure may arise.

Other issues rectified during the consultations are:

- Negotiationswith landowning groups and community leaders for formalizing ease of access to sub-project site by signing of an MOU; and,
- A grievance redress mechanism to address issues will be in place.

15.6. Mitigation measures suggested during the Consulation

The mitigation measures suggested by the community to address the social issues during the consultation include:

i. restricting access of the workers to the immediate construction sites;

ii. the village committee creating additional village by-laws and rules(including bans)to try and mininimise the negative social impacts;

iii. making sure the construction workers know the village rules and codes of conduct and obey them;

iv. the project running a health(including STIs and HIV) awareness program in conjunction with responsible village authority;

v. project conducting an awareness based on gender, domestic violence, child abuse and other social related issues;

vi. banning children from going into construction area; and,

vii. imposition of fines on workers who break rules and insisting the contractor remove all machinery and plant, waste and re-instate lands to original condition at the completion of the project.

15.7. Information Disclosure

Further information disclosure will be done during the implementation through:

- The project's Consultation and Communication Plan and the CPIU Communications Plan;
- The preparation and dissemination of a brochure in English and Pidgin (and other languages as required), explaining the project, works required and anticipated timing of the works;
- MID and supervision consultant to inform the communities before contractor mobilization by undertaking consultations and awareness on site; and,
- Setting up a formal grievance redress committee with a representation from the affected people. The CPIU in association with the contractor will be responsible for managing the grievance redress program.

Information regarding the approved sub-project and the proposed environmental management measures will be posted at suitable locations at the project site. Disclosure will conform to the Public Communications Policy of the ADB: Disclosure and Exchange of Information (March 2005) which requires that environmental assessment reports for ADB projects be accessible to interested parties and the general public. The project's IEE as part of ADB project documents will be uploaded onto the ADB website while the PER will be available to the public upon request.

Further public consultation will be arranged prior to construction commencement to both alert the local communities to the possible threats and opportunities of the construction phase and to provide the opportunity for the people to emphasize their concerns, as expressed above, directly to the Contractor.

16. DIFFICULTIES ENCOUNTERED

This report has been prepared using available data and information gathered during the site visits to the subproject sites. However, it was found that there are difficulties encountered when collecting available documented data and information as there are some gaps between available data and current conditions. Like, data gaps that had been identiified in the National Census Survey Report of 2009, names and population record on the statistics record. This resulted in inconsistency with the national statistics data collected in 2009 or even village names are there but population is not recorded. Also hazard maps of the specific location are also needed to be inserted in the documentation of this report to identify location of the subproject sites and possible hazards associated with the location but these are not available. Hence, it was requested to the MECDM GIS Department with completed End User Agreement for their Approval which may take some time along with the preparation of the maps requested. Similarly, contacting key people is difficult as they live in the villages which the mobile network coverage is not always efficient and to send information regarding the proposed project and visiting teams or meeting with them including need for discussion of some issues usually depends on the mobile network coverage and travelling long hours to get to this location.

17. CONCLUSIONS AND RECOMMENDATIONS

17.1. Project Benefits

The proposed design and development of the wharf at Viru imposes minimal environmental impacts and will result in the substantial increase in the efficiency and safety of public access and trade in the area. This will result in increased inbound and outbound movement of freight, products and people. It demonstrates suitable and appropriate infrastructure to the communities and business operators.

17.2. Conclusions and Recommendations

The Wharf does not impact on any protected areas or areas of conservation value, including primary forests, terrestrial reserves, marine and coastal protected areas or community managed marine protected areas and as such no critical habitats are impacted. The project will not create any impacts on cultural or heritage (Tambu) sites nor will not create conflicts with natural resource allocation. No significant negative or adverse environmental impacts have been identified.

The PER concludes that there are no identifiable significant environmental impacts nor is the project deemed environmentally sensitive. The upgrading of the wooden wharf will result in a marked improvement to the environment and infrastructure services for the people and communities surrounding Viru. Impacts arising from the design, construction, operation and maintenance of the project are minor, localized, and are acceptable, providing that the set of mitigations measures set out in the EMP are incorporated in the design, implemented, and monitored properly.

The most significant impact will be the noise crated during piling operations. The steep scarp slop between the wharf construction site and Viru village removes direct line of site but there will be some residual disturbance. The Contractor will be limited to daytime work but the hours of work may have to be reduced to short working and defined “quiet” periods if the community considers the disturbance unacceptable.

An EMP has been prepared and will be implemented during all phases of project implementation. The EMP identifies potential environmental impacts arising from the project along with a corresponding schedule and monitoring of mitigation measures to ensure potential impacts are maintained at insignificant levels and that international best practice is applied. It also includes the institutional arrangements for implementing the EMP to ensure its effectiveness.

The Director of ECD will grant development consent in writing to MID after reviewing and accepting the PER, with a development consent application. Provision for a detailed Contractor’s Environmental Plan (CEMP) prepared by the Contractor will be included as a line item in the BOQ and the contractor will be required to provide this, based on the impacts set out in this evaluation, as a minimum. Monitoring the contractor’s compliance to their CEMP will be undertaken by the SC, CPIU and ECD. Monitoring reports will be submitted to MID, ECD and ADB.

When the CEMP is approved, it is considered sufficient to meet government’s environmental safeguard requirements. No further or additional impact assessment is considered necessary at this stage.

Therefore, the recommendations of this PER are: (i) the PER be accepted by MID and ECD as the statement of project’s environmental impacts and how they will be mitigated.

Future tasks related to this PER are for, (i) MID to use the PER, for submission and approval of an environmental permit by ECD; (ii) Contractor to prepare a CEMP based on EMP included in this PER; and (iii) the subproject’s impacts and mitigation thereof, be monitored as per the monitoring plan.

Bibliography

ADB,1993. Environmental Guidelines for Selected Infrastructure Projects.

ADB,1997. Environmental Impact Assessment for Developing Countries.

ADB,1998. Handbook on Resettlement: A Guide to Good Practice. Asian Development Bank.

ADB,2002. Environment Policy of the Asian Development Bank. 1-54, ADB.

ADB,2003a. Environmental Assessment Guidelines. 1-175, Asian Development Bank.

ADB,2003c. Operations Manual. Asian Development Bank.

ADB,2005a. HIV/AIDS in the Pacific. Rep October 2005, Asian Development Bank.

ADB,2006b. Environmental Assessment Guidelines in ADB Operations. 1-175, Asian Development Bank.

ADB,2006c. Report and Recommendations of the President: Proposed Asian Development Find Grant - Sc Islands: Road Improvement (Sector) Project. Rep Project No. 39581 (July 2006).

ADB, 2009. ADB's Safeguard Policy Statement (SPS). June 2009. Ret http://adb.org/sites/default/files/pub/2009/Safeguard-Policy-Statement-June2009.pdf

Bennett, G., Cohen, P., Schwarz, A.M., Albert, J., Lawless, S., Paul, C., Hilly, Z. (2014). Solomon Islands: W Province situation analysis. CGIAR Research Program on Aquatic Agricultural Systems. Penang, Malaysia. I Report: AAS-2014-15.

GLOSS data, 2017, http://www.gloss-sealevel.org/data

Jenkin, A.P, Allan, G.R and Boseto, D., 2008, *Lentipes solomonensis*, a new species of freshwater goby (Teleostei: Gobioidei: Sicydiinae) from the Solomon Islands, Aqua International Journal of Ichthyology, pp165-174, 14:4

MECDM, 2012, *National Climate Change Policy*, Ministry of Environment, Climate Change, Disaster Management and Meteorology

MID, 2015, MID (2015). Climate Change Adaptation in the Transport Sector-Guidance Manual (DRAFT). Ministry of Infrastructure Development

MID, 2015. *Public Environmental Report (PER)* for Transport Sector Flood Recovery Project (TSFRP). Ministry of Infrastructure Development, Honiara

Newman, A., Feng, L., Fritz, H. M., Lifton, Z. M., Kalligeris, N., and Wei, Y., 2011, *The energetic 2010. MW 7.1 Solomon Islands tsunami earthquake*. Geophysical Journal International, 186(2), 775-781

PACCSAP, 2014, *Climate Variability, Extremes and Change in the Western Tropical Pacific: New Science and Updated Country Reports 2014, Solomon Islands*

Pacific Island Forum, 2015, *2015 Pacific Regional Millennium Development Goals Tracking Report*

Polhemus, D.A; Englund, R.A., Allen, G.R., Baseto, D., and Polhemus, J.T, 2008, *Freshwater Biotas of the Solomon Islands – Analysis of Richness, Endemism and Threats*, Bishop Museum Technical Report 45

SIG, 2009, *National Biodiversity Strategy and Action Plan (NBSAP) for the Solomon Islands*, p 67.

SIG, 2010. Report on the 2009 Population and Housing Census Report – Basic Tables and Census Desc Statistics Office, Honiara

SIG, 2009, *Provincial Profile of the 2009 Population and Housing Census – Guadalcanal*, p 64

SIG, 2010, *National Transport Sector Plan 2011 -2030*

SIG, 2015, *Solomon Islands 2012/2013 Householder Income and Expenditure Survey Provincial Analytical Report,* Volume II, National Statistics Office

SIG, 2013. Solomon Islands National Infrastructure Investment plan (SINIIP), MDPAC, Honiara.

SIWA, 2013, The Solomon water development plan, 2013-2015. The “Two-Year Plan”, Solomon Islands Water Authority

SOPAC, 2007, *National integrated water resource management diagnostic report. Solomon Islands*, The Pacific Islands Applied Geoscience Commission

SPC, 2017, *SPC Fisheries Address Book*, SPC publication, p80

Sullivan, C.A. and Guglielmi, F., 2007, *Pacific Islands water resources: An overview of East Timor, Kiribati, Solomon Islands, Tuvalu and Vanuatu*, AWFR working paper, Pacific Water Resources: An overview

WACOP (2014). Wave Climate Report Honiara. Wave and Coast in the Pacific, http://wacop.gsd.spc.int/Atlas/Regional/Pdf/SO/Honiara.pdf

World Bank, 2017. *Country Profile – Solomon Islands World Development Indicators*, World Bank publication

Annexes

Annex A: Summary of International and Regional Treaties and Agreements that the Solomon Islands are a Party to

Name	Status	Purpose/Aim	Solomon Island Agency Responsible
International and Regional Agreements			
Pollution Protocol for Dumping at sea.	Ratified 10/9/98	Prevention of pollution of the South Pacific region by dumping	MFMR and ECD
Pollution Protocol for Emergencies.	Ratified 10/9/98	Cooperation in combating pollution emergencies in the South Pacific region.	MFMR and ECD
Natural Resources and Environment of South Pacific Region (South Pacific Regional Environment Program - SPREP Convention).	Ratified 10/9/98	Protection of natural resources and environment of the South Pacific Region in terms of management and development of the marine and coastal environment in the South Pacific Region.	ECD
Waigani Convention on Hazardous and Radioactive Wastes (1995).	Ratified 7/10/98	Bans the importation of hazardous and radioactive wastes into Forum Island countries and to control the trans-boundary movement and management of hazardous wastes within the South Pacific region.	ECD
Chemicals, Wastes and Pollution			
Liability for Oil Pollution Damage	Ratified	Strict liability of ship owner for pollution damage to a coastal state within a certain amount.	MFMR
Marine Pollution Convention (London)	Ratified	Prevention of marine pollution by dumping of wastes and other matter.	ECD and Foreign Affairs
Desertification (UN Convention to Combat Desertification)	Acceded 16/4/99	Agreement to combat desertification and mitigate the effects of drought in countries experiencing drought or desertification.	Agriculture Division
POP's Convention (Stockholm)	Acceded 28/7/04	Protection of human health and environment from persistent organic pollutants.	ECD and EHD
Biodiversity			
CITES	Ratification underway	Regulations and restriction of trade in wild animals and plants through a certification system of imports and exports.	ECD
World Heritage Convention	Ratified 10/6/92	Protection of sites of Outstanding Universal Values. Solomon Islands	ECD and National Museum

Name	Status	Purpose/Aim	Solomon Island Agency Responsible
		currently has East Rennelle Island as a World Heritage site.	
UN Convention on Biological Diversity	Acceded 3/10/95	Conserve biological diversity through the sustainable use of its components and the fair and equitable sharing of the benefits arising out of utilizing genetic resources.	ECD
Cartagena Protocol on Biosafety	Acceded 26/10/04	Protection of human health and the environment from possible adverse effects of the products of modern biotechnology, especially living modified organisms while maximizing its benefits.	ECD
Climate Change			
Montreal Protocol	Acceded 17/6/93	Allows phase out of substances that deplete the ozone layer according to a fixed implementation schedule.	ECD and Energy Division
Ozone Layer Convention	Acceded 17/6/93	Protection of the ozone layer through intergovernmental cooperation on research, systematic observation of the ozone layer and monitoring of chlorofluorocarbons production.	ECD and Energy Division
Climate Change (UN Framework Convention on Climate Change)	Ratified 28/12/94	Sets an overall framework for intergovernmental efforts to tackle the challenge posed by climate change.	Climate Change Division
Kyoto Protocol	Ratified 13/3/03	Reduce greenhouse gases especially CO2 for the 39 industrial/developed countries by an average of 5.2% by 2012.	Meteorology Division MECDM

MFMR = Ministry of Fisheries and Marine Resources

MECDM = Ministry of Environment, Climate Change, Disaster Management and Meteorology.

ECD = Environment and Conservation Division - MECDM

EHD = Environmental Health Division - MECDM

Annex B: Environmental Risk Matrix

	NAME	Viru Wharf / Boat Jetty and Ramp	The work	Demolition of existing wharf, relocation 100m south. Construction of new Wharf / boat jetty and LCT ramp. Reclamation, Precast deck on percussive driven piles	Physical	Closest residential development > 50M to West of construction zone shielded by scarp slope (No direct line of sight)

Risk Matrix REF	PRE-MITIGATION					MITIGATIONS / WARNINGS / REMEDIES	POST-MITIGATION			
	EIA REF (para)	RISK	RISK SEVERITY	RISK LIKELIHOOD	RISK RATING	OPTIONS AND APPROACHES	RISK SEVERITY	RISK LIKELIHOOD	RISK RATING	ACCEPTABLE TO PROCEED?
RMD1	5.2.1.1	Change in water movements due to wharf design: new areas of erosion / deposition	Major	Possible	**High**	The wharf design is on a piled structure with minimal potential to disturb water movements. Currents / water movement at this location low.	Minor	Improbable	**LOW**	**YES**
RMD2	5.2.1.2	Climate Change - Adaptation and Resilience of Project - material climate change related risks to the project	Major	Probable	**High**	Climate Resilience Built into the design of the project	Minor	Improbable	**LOW**	**YES**
RMD3	5.2.1.3	Natural Hazards - Seismic Conditions - located in region that is seismically active	Major	Improbable	**Medium**	Wharf designed in accordance with relevant Seismic Codes	Moderate	Improbable	**Medium**	**YES**
RMD4	5.2.1.4	Socio-economic Impacts - Resettlement, Land Acquisition and Economic Displacement - No project-induced resettlement.	Minor	Improbable	**Low**	No land aquisiton required. No Land Acquisition and Resettlement Plan needed	Minor	Improbable	**LOW**	**YES**
RMC1	5.3.1.1	Air Quality Dust - anticipated to be minor since structural sections will be precast offsite. Minor impacts from concrete batching	Minor	Improbable	**Low**	Dust-suppression measures and well maintained equipment	Minor	Improbable	**LOW**	**YES**
RMC2	5.3.1.2	Climate Change GHG Emissions (Construction) assessment of GHG emissions arising due to construction	Minor	Possible	**Low**	Maximise use of construction materials and products with recycled or secondary and low carbon content, from renewable sources. Use locally-sourced materials to minimise distance materials are transported from source to site.	Minor	Improbable	**LOW**	**YES**
RMC3	5.3.1.3	Impacts on historic-cultural and archaeological monuments - No archaeological or cultural resources are expected to be encountered during project implementation	Minor	Improbable	**Low**	No sites identified. Contractor develops chance find procedure	Minor	Improbable	**LOW**	**YES**
RMC4	5.3.1.4	Aggregate Extraction - potential adverse impacts on flooding, replenishment of river stream sources, impact on water abstraction	Major	POSSIBLE	**High**	Unlikely to be an issue as most aggregate requirements are for concrete that will be precast offsite and sourcd from licenced existing quarry operations	Minor	Improbable	**LOW**	**YES**
RMC5	5.3.1.5	Degradation of landscapes and soil erosion	Minor	Improbable	**Low**	Minimising large open areas, reseeding, drainage channels	Minor	Improbable	**LOW**	**YES**
RMC6		Soils Geology and Hydrogeology - Pollution of soils marine waters by construction runoff and accidental spills	Minor	Improbable	**Low**	good site practices implemented by the contractor and checked during periodic audit. Bunds to guide unpolluted water around works areas, silt traps and bunds downstream of site.Sumps for settlement before discharge good maintenance of construction plant	Minor	Improbable	**LOW**	**YES**
RMC7	5.3.1.6	Hydrology and Water Quality - Badly managed use and disposal, potential for depletion or pollution of resource	Minor	Possible	**Low**	The Contractor will prepare a Waste Water Management Plan	Minor	Improbable	**LOW**	**YES**
RMC8	5.3.2.1	Terrestrial Flora and FaunaImpacts on biodiversity low due to the wharf being developed "offshore". Some loss of existing modified habitat	Minor	Improbable	**Low**	Work is in heavily modified alignment, avoidance when encountered, worker eductaion	Minor	Improbable	**LOW**	**YES**

RMC9	5.3.2.2	Marine Flora and Fauna								
RMC10	5.3.3.1	Construction Noise - Piling. The structure will be formed on steel "I" beams perciussively driven into the seabed	Major	Probable	**High**	Only daytime work. No work in early morning evening or at weekends (or religeous days). Liason with schools to confirm examination times	Minor	Improbable	**Medium**	**YES**
RMC11	5.3.3.2	Construction Noise - Noise will be generated in the course of the works but limited to powered mechanical equipment lifting precast units, small scale concrete batching and electric powered hand tools (from petrol generator)	Minor	Improbable	**Low**	Well maintained equipment, working hours, quiet plant, physical screening. Liason with local community	Minor	Improbable	**Low**	**YES**
RMC12	5.3.3.3	Construction Vibration - Close to the wharf during piling	Major	Probable	**High**	Only daytime work. No work in early morning evening or at weekends (or religeous days). Liason with schools to confirm suitable times for piling. Contractor to conduct a pre-condition survey	Minor	Improbable	**Medium**	**YES**
RMC13		Generation of excavated materials and construction wastes.	Minor	Improbable	**Low**	The Contractor will prepare a Waste and Materials Management Plan. Reuse of material, segregation of waste, waste bins on site	Minor	Improbable	**LOW**	**YES**
RMC14	5.3.3.4	Worker Health and Safety and Influx - Labour Conditions, influx of construction workers (small dedicated workforce, local semi and unskilled labour)	Moderate	POSSIBLE	**Medium**	Contractors will be required to develop and implement labour management plans including Worker Code of Conduct	Minor	Improbable	**LOW**	**YES**
RMC15	5.3.3.5	Socio-economic Impacts - Workplace and Community Health and Safety - Construction activities are inherently hazardous	Major	POSSIBLE	**High**	Contractor Management Plans. Fencing of hazard areas,security at gates, interaction with local community, HSE officer	Minor	Improbable	**LOW**	**YES**
RMC16	n/a	Socio-economic Impacts - Utilities and Infrastructure. There is no utility provision in the works areas.	Moderate	POSSIBLE	**Medium**	Safe access to exisiting utilities should be provided throughout construction	Minor	Improbable	**LOW**	**YES**
RMC17	5.3.3.6	Socio-economic impacts - Other Impacts - anticipated to have a number of positive impacts on population and economic development providing job opportunities for local men and women	Minor	Improbable	**Low**	Contractor develops Stakeholder Engagement Plan and identifies a Community Liason Officer on site. Grievance redress mechanism in place	Minor	Improbable	**LOW**	**YES**
RMC18	6.3.3.7	Site Specific Impacts (1) Construction camps - Influx of labour (health risk, crime, cultural impact)	Moderate	POSSIBLE	**Medium**	Camp Management plan and Worker Code of Conduct to be developed in the SEMP. Only small non local workforce (Management)	Minor	Improbable	**LOW**	**YES**
RMC19	5.5.3.8	Site Specific Impacts (2) Pile driving - Noise and vibration from percussive piling	Major	Probable	**High**	Noise and Vibration Management plan developed in the SEMP. Avoid work at sensitive times: morning evening and weekend, times of worship	Minor	Improbable	**Medium**	**YES**
RMC20	5.3.3.9	Site Specific Impacts (3) Deck erection - Minor impact anticipated due to deck being precast off site. Only minor noise associated with lifting deck sections into place.	Minor	POSSIBLE	**Low**	Construction management plan developed in the SEMP	Minor	Improbable	**LOW**	**YES**
RMO1	5.4.1 & 5.6.1	Operation Phase Wharf Noise impacting on Village - Low use, wharf remote and shielded form direct line of sight	Minor	POSSIBLE	**Low**	Relatively low activity, mitigation options include liason with operators on specific areas of concern (e.g. excessive noise)	Minor	Improbable	**LOW**	**YES**

RMO2	5.4.2	Operation Phase Wharf Operation Air Quality - Goods are generally bagged rather than "loose loads". Site remote from village, good dispersion	Minor	POSSIBLE	**Low**	Relatively low activity, mitigation options include liason with operators on specific areas of concern (e.g. excessive dust if non bagged trading increases)	Minor	Improbable	**LOW**	**YES**
RMO3	5.4.3	Operation Phase Hydrology and Water Quality - Spills to Marine waters	Minor	Improbable	**Low**	No eveidence of this being an issue from existing operations and no new impact anticipated.	Minor	Improbable	**LOW**	**YES**
RMO4	5.4.4	Operation Phase Waste Management - periodic removal of waste accumulated from littering	Minor	POSSIBLE	**Low**	Operational Waste Management Plan. Waste bins, involveemnt of local community.	Minor	Improbable	**LOW**	**YES**
RMO5	5.5.1/2	Operation Phase impacts on flora and fauna: no rare or endangered flora and fauna associated with the wharf	Minor	Improbable	**Low**	No eveidence of this being an issue from existing operations and no new impact anticipated.	Minor	Improbable	**LOW**	
RMO6	n/a	Other Socio-economic impacts - Livelihood - The impacts on population and employment are anticipated to be generally positive, providing improved access to jobs and services	Major	POSSIBLE	High (Positive)	The wharf improvement is anticipated to result in a significant positive effect on local employment and livelihood	Major	POSSIBLE	High (Positive)	**YES**

Annex C: List of Marine Protected Areas within the Solomon Islands

MPA Site Names	International Designation	Designation Status	Date of Designation	Total Area (km^2)
Arnavon Islands	Marine Conservation Area	Designated	1995	82.70
Barasipo	Marine Protected Area	Informally designated	2004	3.533
Baraulu/Bule Lavata	Marine Protected Area	Informally designated	2002	1.032
Barivuto	Marine Protected Area	Informally designated	2004	1.622
Buni	Marine Protected Area	Informally designated	2004	1.428
Dunde	Marine Protected Area	Informally designated	2004	1.046
Ha'apai	Marine Protected Area	Informally designated	2003	1.231
Iriri Pasapasa	Marine Protected Area	Informally designated	2004	0.421
Kekehe	Marine Protected Area	Informally designated	2004	2.721
Kida	Marine Protected Area	Informally designated	2003	0.725
Kinamara	Marine Protected Area	Informally designated	2003	1.363
Kindu	Marine Protected Area	Informally designated	2003	0.764
Koqu Rua	Marine Protected Area	Informally designated	2005	0.359
Kozou	Marine Protected Area	Informally designated	2002	0.452
Lodu Hokata	Marine Protected Area	Informally designated	2005	0.335
Nazareti	Marine Protected Area	Informally designated	2003	2.120
Niumala	Marine Protected Area	Informally designated	2005	3.114
Nusa Hope Mangrove	Marine Protected Area	Informally designated	2005	0.884
Nusa Hope/Heloro	Marine Protected Area	Informally designated	2002	1.138
Nusa Roviana	Marine Protected Area	Informally designated	2003	2.017
Olive	Marine Protected Area	Informally designated	2003	1.567
Saika	Marine Protected Area	Informally designated	2003	1.602

Annex D: List of Terrestrial Protected Areas within the Solomon Islands

Province	Protected Area	Size	Flora Biodiversity	Fauna Biodiversity
Guadalcanal	Lauvi Lake	200 ha	▪ Floating meadows include three species of Cyperaceae. Extensive areas of pandanus, beach side dominated with fu'u Barringtonia asiatica. Other species are also common in the community e.g. Hibiscus tiliaceus. Thus, there are also many other species growing around the areas (Less, 1990).	Outstanding habitat for crocodiles. Wetland birds and the Australian dabchick which was a new record for the Solomon Islands. About 40 bird sp. are found, 9 are endemic to the Solomon islands(Less, 1990).
	Itina Popomanaseu	30,000 ha	▪ 6 species (sp) of pioneer trees located on gravel beds of braided river sites e.g. salu; Casuarina equisetifolia. On slightly higher ground, 5 sp. of trees are common e.g. Akwa. Evident at the ultra-basics are mudi; (Dillenia crennata). Common in montane forest are trees of non-flowering plant family, Podocarpaceae including 3 sp and 5 sp of the Myrtle family. The four epiphytic rhododendrons that are unqiue to Solomon islands are all found on peaks of the proposed protected area and the endemic mountain shrub, Vaccinium (Less, 1990)	Habitat for many animals including four bird species endemic to Gaudalcanal and the Gaudalcanal endemic giant rat (*Uromys imperator*). 1990 mammal survey of Mt Makarakomburu found a new sp. of bat along with nine other bat sp, four frog and eight reptile sp. Thirteen bird sp. were recorded including rare Guadalcanal honeyeater *Guadalcanaria inexpectata*. Mt Popomanaseu is only place in the Solomon Islands where terrestrial mollusc have generated endemic montane species. Restricted to these mountains include arboreal Placostyllus selleersi and undescribed sp. Helixarion and Trochomorpha. Birds of the Itina River proposal area recorded 44 bird sp., 13 are known to be endemic sp. in the Solomon islands (Less, 1990).
Western	Marovo Lagoon	70,000 ha	▪ 5 principle forest types. Lowland forest, small island and barrier island forest, mangrove forest, montane forest and heaths.	▪ 52 sp. of land and fresh water birds and 9 species are endemic to the lagoon. 10 species of Sea and shorebirds.
	Kolombangara	All forest above 460m (70,000 ha is the island	12 principle species of forest trees and moss covered montane forest caps (Less, 1990)	Richest avifauana with 80 species recoded. 2 species are confined to montane forest and are unique to the island. (Less, 1990).
	Rendova	The island 40,000 ha	▪ Common Montane forest trees species are Casuarina papuana, lower altitude forest predominance of Camnosperma revipetiolatum, Others include mosses, palms,	Support unique white eye species Zosterops rendova. Crocodiles are evident in lakes and lagoon. Two species of frogs have been recorded from Rendova (Less, 1990).

Province	Protected Area	Size	Flora Biodiversity	Fauna Biodiversity
			pometia pinnata, pterocarpus indicus. (Less, 1990).	
	Faroro Islands - Shortlands	?	▪ Dominated by *akwa Pometia pinnata*, *Vasa Vitex cofassus* and Canarium salomonense. Smaller trees include Myristica sp., laelae Celtis phillippnensis, Crytocarya Litsea sp (Less, 1990).	Best nesting sites for turtles. Presence of Skink Triblonotus ponceleti known from only tree specimen, two from Shorthlands and one from Bougainville (Less, 1990).
Choiseul	Mt. Maetambe	22,500 ha	▪ Dominate tree species akwa and Vasa. These two trees and Laelae are characteristics of valley bottoms, on ridge crest Eugenia sp., buni and kaumau Calophyllum sp. are common. (Less, 1990).	Seven sp. of frogs, one endemic sp., two rare butterfly sp. Presence of three giant rats, two of which are new record, 26 bird species with 6 are endemic (Less, 1990).
	South Choiseul	30,000 ha	▪ Different forest composition from Ysabel and Guadacanal growing on ultra-basic rock. Forest is species poor with an open canopy and straggling emergent trees over dense undergrowth of pandanus, gingers, ferns and climbers. Mangrove forest found Ologholata in the north of the proposed reserve (Less, 1990).	Crocodiles are evident. Has significant nesting beach for turtles. Forest growing on ultra-basic rock noticeably has low bird numbers. 35 bird sp., 11 are endemic (Less, 1990).
	Mt Televodo	?	▪ The features are closely similar to the description given for the limestone forest cover occurring in Mt Maetabe (Less, 1990).	The features are closely similar to the description given for the limestone forest cover occurring in Mt Maetabe (Less, 1990).
Isabel	North western Isabel	120,000 ha	▪ Peninsula dominated with kekete (Campnosperma brevipetiolata) indicating exposed to prevailing high winds and cyclones. Akwa, vasa, andoa, lu usi are also found on ridges that run through the peninsula. Where slopes are fa alo, bamboo, gingers and Macaranga sp. Akwa is common in lowland forest. Smaller trees include Agaia spp, ai aasila (Neoscortchhinia forbesii), laelae, Myristica sp, palms and pandanus. Patches of beach forest containing 5 species of trees (Less, 1990).	Crocodiles were evident. It contains 65% of nesting sites of green andhawksbill turtles. Sea eagles, Brahminy kite, osprey and terns are also evident. Migratory birds use the islands and tidal flats as resting and feeding area during November to January e.g., whimbrel Numenius phaeopus (Less, 1990).
	Mt Kubonitu	?	▪ Supports montane forest with ailumu Dacrydium	▪ Meeks Iory Charmomosyna meeki, white rumped swiftlet

Province	Protected Area	Size	Flora Biodiversity	Fauna Biodiversity
			xanthandrum, akiri Ochrosia sp, koadila pemphis acidula and Eugenia spp. (Less, 1990).	Collocalisa spodiopygia, pigmy parot Micorspitta finschii, Melanisian gray bird Coracina caledonica and the golden whistler Pachycephala pectoralis.(Less, 1990).
	Casuarina swamp	2,500 ha	▪ Dominated with hardy malasalu Casuarina papuana and Dacryduim xanthadrum. On swapy grounds Calophyllum vexans, bou Fagrea gracilipes and gwarogwaro ▪ Calophyllum vitiense. Ferns and Savanna (Less, 1990).	▪ Is designed for the forest.
Makira	Central – Bauro highlands	350,000 ha	▪ Akwa dominate lowland forest and lower hill slopes. 8 sp of trees are also common in this zone e.g Rosswood. Above the zone where akwa is predominant 6 sp of trees are common e.g. abalolo. Common small trees are Myritica sp. and aisubu Pimeliodendron amboinicum. ▪ Above 700 m 5 sp. of trees are common eg aitootoo (surukakahu) Weinmannia blumei, Cyathea tree ferns and palms are also common. At highest altitude montane forest is found with 8 different spp of trees. Forest floor is covered with moss (Less, 1990).	▪ Several of Makira's endemic sp are restricted to the mossy cloud forest of the highest ridges eg Keea (Makira mountain tail), waisure (Makira ground trash), ghoghoharighi (shade warbler) and the dusky fantail are found in these forest and nowhere else in the world. 49 Birds recorded, 5 endemic to Solomon and 5 endemic to Makira (Less, 1990).
	Western wetlands	2,50 ha	▪ A tall mixed swamp forest featuring dafa Terminalia brassii and rufa Eugenia tierneyana on wet land edges. In the wetted parts of the swamps pandanus, bamboo and ferns form a complete cover one to three meters high (Less, 1990).	▪ No information provided.
Malaita	Central Highlands	12,500 ha	▪ Common in the lowland forests are 4 sp. of trees eg akwa, rosswood and vasa. On lower riverine terraces 3 sp. are alsocommon e.g., lamilami, liki and akwa (Less, 1990).	57 bird sp are recorded, 9 endemic to Solomon islands, 13 endemic to Malaita (Less, 1990).

Province	Protected Area	Size	Flora Biodiversity	Fauna Biodiversity
	Maramasike Ar'are	150,000 ha	▪ Large figs and 11 tree sp e.g. akwa are common at the end of the maramasike passage. The hill forest behind both Maramasike and Are'are commonly features 7 of the species mention above together with 5 other sp e.g. Cryptocarya sp. (Less, 1990).	▪ Excellent habitat for crocodiles. About 60 bird sp. are recorded, 7 endemic to Solomon islands and 10 endemic to Malaita (Less, 1990).
Temotu	Kauir Reserve	200 ha	▪ Kauri Agathis macrophylla in the Solomon islands is found only in Temotu Province (Less, 1990).	

Annex E: Globally Threatened Avifauna in the Solomon Islands (Birdlife international www.bridlife.org).

Avifauna Common Name	Avifauna Species Name	IUCN Category
Becks Petrel	*Pseudobulweria becki*	CR
Makira Moorhen	*Gallinula silvestris*	CR
Santa Cruz Ground dove	*Gallicolumba sanctaecrucis*	EN
Santa Cruz Shrikebill	*Clytorhynchus sanctaecrucis*	EN
Splendid White eye	*Zosterops liteirostris*	EN
White-eyed Starling	*Aplonis brunneicapillus*	EN
Heinroth's Shearwater	*Puffinus heinrothi*	VU
Sanford's Sea eagle	*Haliaeetus sanfordi*	VU
Imitator Sparrow hawk	*Accipiter imitator*	VU
Bristle-thighed Curlew	*Numenius tahitiensis*	VU
Yellow-legged Pigeon	*Columba pallidiceps*	VU
Chestnut-bellied Imperial pigeon	*Ducula brenchleyi*	VU
Palm Lorikeet	*Charmosyna palmarum*	VU
Fearful Owl	*Nesasio solomonensis*	VU
Black Faced Pitta	*Pitta anerythra*	VU
Malaita Fantail	*Rhipidura malaitae*	VU
Sombre Leaf Warbler	*Phylloscopus amoenus*	VU
Ranonga White Eye	*Zosterops splendidus*	VU
Guadalcanal Thrush	*Zoothera turipavae*	VU

Annex F: Community Consultation

F(1): Attendance Register of 1st Consultation

SOLOMON ISLANDS GOVERNMENT
MINISTRY OF INFRASTRUCTURE DEVELOPMENT
CENTRAL PROJECT IMPLEMENTATION UNIT
TRANSPORT SECTOR PROJECT DEVELOPMENT FACILITY

Community Consultations Attendance Register
Group A 5: Domestic Wharves – Viru Wharf

Date:	28/05/2019	Start Time:	10am	Venue:	Tetemara Vge Community Hall
		End Time:			

No.	Name	Title/ Designation	Organization/Community	Contact Details (Phone/ Email)		Signature
				Mob#:	Email:	
1	Graham Tuoo		Tetemara Village	734 5425		
2	Dorothe Vuhia	Agriculturist	"	7137973		
3	Geoffrey Rusa	Villager	✓	7423774		
4	Shirley Ratu		Tombe	7208767		
5	Jeffrey Cameron		Tetemara	7623478		
6	Harold Elroy		Tetemara			
7	Malevia Sinoga		Tetemara	7144903		
8	Petrina Bobo		Tetemara			
9	Gordon Sele		Tetemara			
10	Donation D		Tetemara			
11	Vaeiba A		"			
12	Shem B		Tombe			
13	Isidro Kini		Tetemara	7813888		
14	Voidy F		Tetemara	7842154		
15	Vaolyn T		Tetemara	7821287		
16	Dani		Tetemara			
17	Dachi A		Tetemara			
18	Marilla Rusa		Tetemara			
19	Negri Nago		Tombe	7160456		
20	Chris D. Vola		Tetemara	7861507		
21	Elroy - Amos	Villager	Tetemara	7702005		
22	Ronald Jacob		"	7932230		
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F(2): Attendance Register of 2nd Consultation

SOLOMON ISLANDS GOVERNMENT
MINISTRY OF INFRASTRUCTURE DEVELOPMENT
CENTRAL PROJECT IMPLEMENTATION UNIT
TRANSPORT SECTOR PROJECT DEVELOPMENT FACILITY

ATTENDANCE REGISTER

Community Consultations: [redacted] (Western Province) – Viru Wharf

Date:	25th Feb 2020	Start Time:	11:40 am	Venue:	Tetemara, Community Hall
		End Time:			

No.	Name	Gender [F = Female; M = Male]	Title/ Designation	Organization/Community	Contact Details (Phone/ Email) Mobil:	Email:	Signature
1	Woody Jimmy	F	House wife	Tetemara Com	7842184		
2	Rosa Donsta	F	House wife	Tetemara com			
3	Janet Enallo	F	"	"			
4	Jenifer Ilo	F	"	Tetemara	7269936		
5	Linda Seulu	F	"	Tetemara			
6	Petrina Beva	F	House wife	Tetemara	7723402		
7	Stacey Tutuo	F	"	Tetemara	7967055		
8	Natalyn Naba	F	"	Tetemara	7713130		
9	Hamalyn Gennie	F	"	Tetemara	7964456		
10	TRISEN Killie	F	"	TETEMARA			
11	Peter ILO	M	Storekeeper	Tetemara	7735876		
12	KAVE	M	"	TETEMARA	7723790		

No.	Name	Gender [F = Female; M = Male]	Title/ Designation	Organization/Community	Contact Details (Phone/ Email) Mobil:	Email:	Signature
13	Bobby Hare	M	House boy	Tetemara	7660940		
14	Young Dion	M	Carpenter	Tetemara	7435867		
15	Tulo Peterson	M	Pastor	Tetemara	7896103		
16	Ata Paga	M	Health Director	Tetemara	7615980		
17	Sonni Raidoke	M	—	Tetemara	—		
18	Warwick Manuel	M	Mechanic	Hora	7149200		
19	Dachi	M	—	Tetemara	—		
20	Emily Petania	F	House wife	Tetemara	—		
21	Chiavee Bobby	F	House wife	Tetemara	7032568		
22	MAENETH ALBAN	F	House wife	Tetemara	7870478		
23	Alvian Murphy	F	House wife	"	7318007		
24	JUNNE Alos	F	House wife	"	—		
25	SHIRLEY SETH	F	House wife	"	—		
26	Gwanese Bobby	F	House wife	"	—		
27	Shirley Aaron	F	House wife	"	—		
28	VENLYN PATRICK	F	House wife	"	—		
29	MARIANS Roddy	F	House wife	"	7948781		
30	Lyan Alick	F	House wife	"	—		
31	KEROLY ABEL	F	House wife	"	7658500		
32	Olisi Donkan	F	House wife	—			
33	Rebecca Horokana	F	House wife	"	7693856		
34	Marie Rusa	F	House wife	"	7423774		
35	Lilyan Nemos	F	House wife	"	7658917		
36	CURAT NEMOS	M	elder	"	7902005		
37	Meglyn Elwin	F	House wife	"			

38	Moira Pond	F	House wife	Temora ~~7615939~~	7615984		
39	Cheralyn Frank	F	House wife	Tetemara	7243304		
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Annex H: Memorandum of Understanding for Viru Wharf

SOLOMON ISLANDS GOVERNMENT
MINISTRY OF INFRASTRUCTURE DEVELOPMENT
TRANSPORT SECTOR PROJECT DEVELOPMENT FACILITY

SUBPROJECT: CONSTRUCTION OF VIRU WHARF

MEMORANDUM OF UNDERSTANDING (MOU)

Between the Government of Solomon Islands

Represented by the

Ministry of Lands, Housing and Survey (MLHS)

Together with the

Ministry of Infrastructure Development

And the

Customary Land Owners of the Proposed

Wharf Site

This **Memorandum of Understanding (hereinafter referred to as the "Understanding")** made on this the 28th day of May 2019;

—BETWEEN—

The Government of Solomon Islands (SIG) Represented in this Understanding by:

Ministry of Lands, Housing and Survey, (hereinafter referred to as MLHS) with office at Honiara, a government agency which administers all alienated and registered lands, and facilitates customary land (land under the ownership of the original inhabitants of Solomon Islands) issues at the discretion of the registered landowners, for social and economic sustainability represented in this Act by the Commissioner of Lands Mr. Alan Mwaki; acting on behalf of the Ministry of Infrastructure Development (hereinafter referred to as MID) with office at Honiara, a government agency responsible for all transport infrastructure development in Solomon Islands and represented in this Act by the Permanent Secretary (PS), Mr. Stephen Mangaoka;

—AND—

The **Customary landowners** (hereinafter referred to as the Landowners) of the customary land for the construction of the proposed **Viru Wharf** represented by the tribal elders and representatives, the names of which are enumerated at the end of this document.

WITNESSETH:

WHEREAS, the Ministry of Infrastructure Development is preparing, implementing, and/or managing the Transport Sector Project Development Facility (TSPDF), an ADB funded *Project Grant No. 51214* for the Feasibility Study and Detailed Engineering Design for the Upgrading and Rehabilitation of Roads in Honiara and Guadalcanal and Reconstruction of seven (7) Domestic Wharves.

WHEREAS, the landowners, realizing the short term and long term economic and social benefits that the Project will bring into their lives, hereby express their full support to the said Project.

WHEREAS, the Customary Land Owners fully support the Project for the benefit of the people for easy and reliable access to socioeconomic services and the Province as a whole.

NOW THEREFORE, the above is considered, the Parties hereby commit themselves to perform their respective obligations under this Understanding; however, this MOU is not a legally binding document and is based on the understanding of the parties to allow the proposed works to be carried out at the proposed site.

ARTICLE 1: Obligations of MID

1. MID must ensure and shall comply with the donor agency and the MID social safeguards policies and the country's environmental regulations and acts as stipulated in the ADB SPS and MID SPM.
2. The MID will minimize as far as possible additional land requirements for the construction of a new wharf at **Viru** based on existing standards to ensure the safety of the local community. However, there may be instances that reconstruction of the wharf may result in using more lands than expected which are unavoidable but necessary to improve the existing road carriage;
3. MID will conduct a detailed measurement survey to determine the additional land required to reconstruct the above mentioned wharf based on the detailed engineering design and will list all the affected persons (APs) and their affected assets such as annual crops, perennial plants and trees, fences, structures, and graves and these will all be compensated based on the most recent Valuer General's Compensation Schedule (hereinafter referred to as the Schedule);
4. The Property Owners will ensure that after the detailed measurement survey, there will be no new structures built or crops, plants, trees planted within the construction limits. Structures built and crops planted or improvements made after the detailed measurement survey (cut-off date) will not be compensated.
5. *Temporary Use of Land* – The road contractor will negotiate with registered land owners for the temporary use of the registered land for the construction camps, motor pools, stockpile areas for aggregates, etc. The wharf contractors will be responsible for the restoration of the area after the completion of the road as part of their contract.
6. *Compensation for Loss of Annual Crops* – Affected Persons (APs) will be encouraged to harvest in case of annual crops, in this case, no compensation will be paid; however, If the annual crop is not yet harvestable upon land taking, compensation will be based on Schedule;
7. *Compensation for Loss of Perennial Plants and Trees* -- Compensation for lost plants and/or trees will be paid based on the Schedule. An additional grant equal to the lost income for the period of time until new perennial plants or fruit trees produce a yield similar to the lost plants and trees. For timber trees, APs will be required to cut the trees prior to clearance of the additional land; in lieu of compensation, they will be permitted to harvest the trees and sell the timber.
8. *Compensation for Loss of Fences* -- Fences constructed of wood or metal will have a compensation rate equal to the current market price (per meter) for similar fencing materials, as determined in the subproject area. For vegetation fences, the compensation will be based on Schedule for the type of plant material used.
9. *Compensation for Loss of Semi-Permanent or Temporary Structures* – Semi-permanent or temporary structures may be located close to the road and it may be necessary to shift these buildings back in order to upgrade the road. In this instance, APs will be provided with a one-time shifting allowance to cover the costs of this activity. If such structures cannot be moved, APs are entitled to compensation at replacement cost for the materials and labor to repair or reconstruct a similar structure.

10. *Compensation for Loss of Graves* -- Compensation will be paid for the affected graves based on the Schedule. In addition, TSPDF will pay an additional grant to ensure that compensation received is equal to the costs for reburial and construction of new grave.
11. *Construction Employment* -- People affected by permanent or temporary loss of land or by damage or loss of crops, trees or structures will be given priority for employment by contractors for civil works and/or maintenance works on the road, preferably on road sections where they own the customary land, provided that these applicants are qualified to perform the work required.
12. *Shifting Allowance* --The value of the shifting allowance will be calculated based on the *national/provincial minimum wage* as established by the *Minimum Wage Board* for a maximum period of two weeks. At the time that the shifting allowance is paid, the landowner will sign an agreement with MID and/or *District Land Officer (DLO)* regarding the date by which the structure will be removed from the land required for the construction of the Wharf.
13. *Business Disruption Allowance* -- APs that own a temporary or semi-permanent structure that is used as a trade store or for other business purposes that must be shifted a short distance to a location outside the area designated for the road are entitled to an allowance to cover the loss of business income while the structure is being shifted, calculated based on the *national/provincial minimum wage* as established by the *Minimum Wage Board* for a period equal to number of days of disrupted business.
14. *Time for Valuation of Assets* -- The valuation of assets will be made at the time of the detailed measurement survey *(DMS)* conducted following completion of detailed engineering design calculated based on the *Valuer General's Compensation Schedule* and assessing the requirement for additional grants and the grant amount based on existing conditions in the subproject area.
15. *Delayed Payment* -- If payment of compensation is delayed, compensation rates will be updated regularly based on inflation rates to ensure that APs receive compensation at replacement cost at the time of compensation payment. Changes to compensation amounts will be verified and approved by the office of the *Valuer General*.
16. *Full Payment of Compensation* -- APs are entitled to payment of all compensation based on the DMS prior to clearance of land and start of civil works. MID will ensure that all procedures are followed to facilitate payment of APs prior to the start of civil works. In the case of affected crops, trees and structures, the compensation owed will be paid directly to the person who owns these assets. In the case, that payments are not facilitated in a timely manner due to unresolved issues MID shall have the compensation deposited into an escrow account until such time the issue is resolved then the AP can be fully paid.
17. All land acquisition activities will be coordinated with the civil works schedule. Civil works contractors will not be issued a notice of possession of the site until (i) compensation and relocation of APs have been satisfactorily completed; (ii) agreed rehabilitation assistance is in place; and, (iii) the site is free of all encumbrances.

Article II: Obligations of the Land Owners

1. The Land Owners hereby expresses its full understanding and support that the project shall be executed by the MID.
2. The Land Owners allows free and unimpeded access for the Project to proceed.
3. The Land Owners in co-ordination with MID shall conduct regular meetings in the case of land disputes that may arise during the project implementation.

In consideration of the economic and social benefits, the Customary Landowners, including the communities and the people of **the communities close to Viru**, shall gain from the successful completion of the Project. The landowners, hereby grants MID and its representatives including civil works contractors full and unrestricted access to and use of the designated construction site and its perimeters until the successful completion of the Project.

Those of the second part, on behalf of the property and landowner of the Customary Land Agree:

1. To provide free and unimpeded access for both MID, its representatives, and the civil works contractor to the proposed wharf site for the reconstruction of the wharf on the condition that such activity is undertaken in accordance with the agreed Environmental Management Plans.
2. That there are no land disputes or compensation claims in relation to the use of the land in question and that the compensation claims will be dealt with by MID and its authorized representatives.
3. To resolve all internal, tribal, group or family disputes relating to the proposed road site so as not to cause any delay to the Project and allow for smooth and timely completion of the Project.
4. To bring any dissatisfaction and complaint in relation to the use of the Proposed site through the formal Grievance Redress Mechanism that will be established by MID while at the same time ensuring the ongoing process of the Project.

IN WITNESS WHEREOF, we have hereunto affixed our signatures this 28TH day of May 2019.

MINISTRY OF LANDS, HOUSING AND SURVEY (MLHS)

Represented by (Name): ALAN MEIGA

Signature:

Designation: COMMISSIONER OF LANDS (Ag)

MINISTRY OF INFRASTRUCTURE DEVELOPMENT (MID)

Represented by (Name): STEPHEN W MA[illegible]

Signature:

Designation: PS

HEADQUARTER 17 JUN 2019

CUSTOMARY LAND OWNING GROUPS REPRESENTATIVES

i. *Represented by (Name):* Dikeaty Viula

Signature: X

Designation: Chief, Tebenare Community

Tribal Group: Kaluvaraua

ii. *Represented by (Name):*

Signature:

Designation:

Tribal Group:

iii. *Represented by (Name):*

Signature:

Designation:

Third Party Verification Letter

I provide the independent verification of the MOU signed on 28/05/2019 (date) between the SIG represented by the MLHS and MID, and the customary landowners of the Viru Wharf Site, represented by the elders and leaders of the tribal group(s) who owned the land at Viru, in North New Georgia, Marovo, Western Province (address of landowner) on the use of the customary land for the construction of a new wharf under the TSPDF (the Project) that (i) the Customary Land Owners support the Project and its activities and have agreed to provide affected land through voluntary land lease; (ii) consultations and negotiations with the Land Owners have been undertaken meaningfully, freely and in good faith and the Customary Land Owners have made informed decisions on use of land, and (iii) terms and conditions of the voluntary land lease have been explained to and understood and agreed by the Customary Land Owners. The verification is based on our independent:

- Review of the documentation on the identification of the affected customary landowners;
- Validation that consultations with the landowner, have been undertaken and that they were provided with relevant information as per the project;
- Validation that the Letter of Consent is voluntary (free of coercion) and that the landowner have fully understood and agreed to the agreements' terms and conditions;
- Validation that the landowner representatives signing the agreement duly represent the landowners;
- Validation that the landowner or any other users/occupants will not experience major adverse impacts from land use by the project;
- Validation that any minor impacts have been identified and documented by the project;
- Validation that compensation (if required) will represent a fair and reasonable replacement cost based on market prices; and,
- Validation that the agreement is in compliance with applicable laws of Solomon Islands as well as safeguard requirements stipulated in ADB SPS (2009).

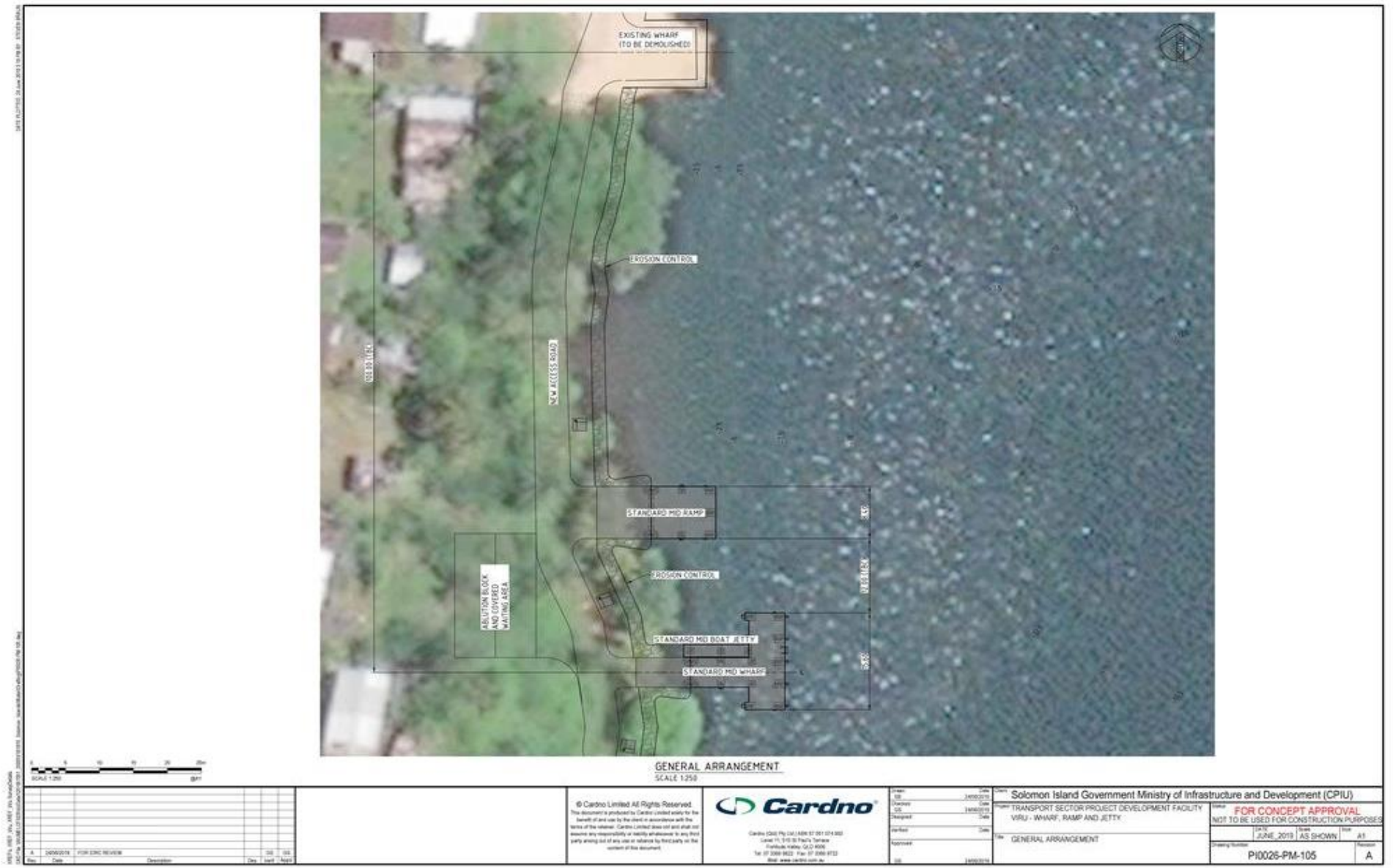
Signature: .....

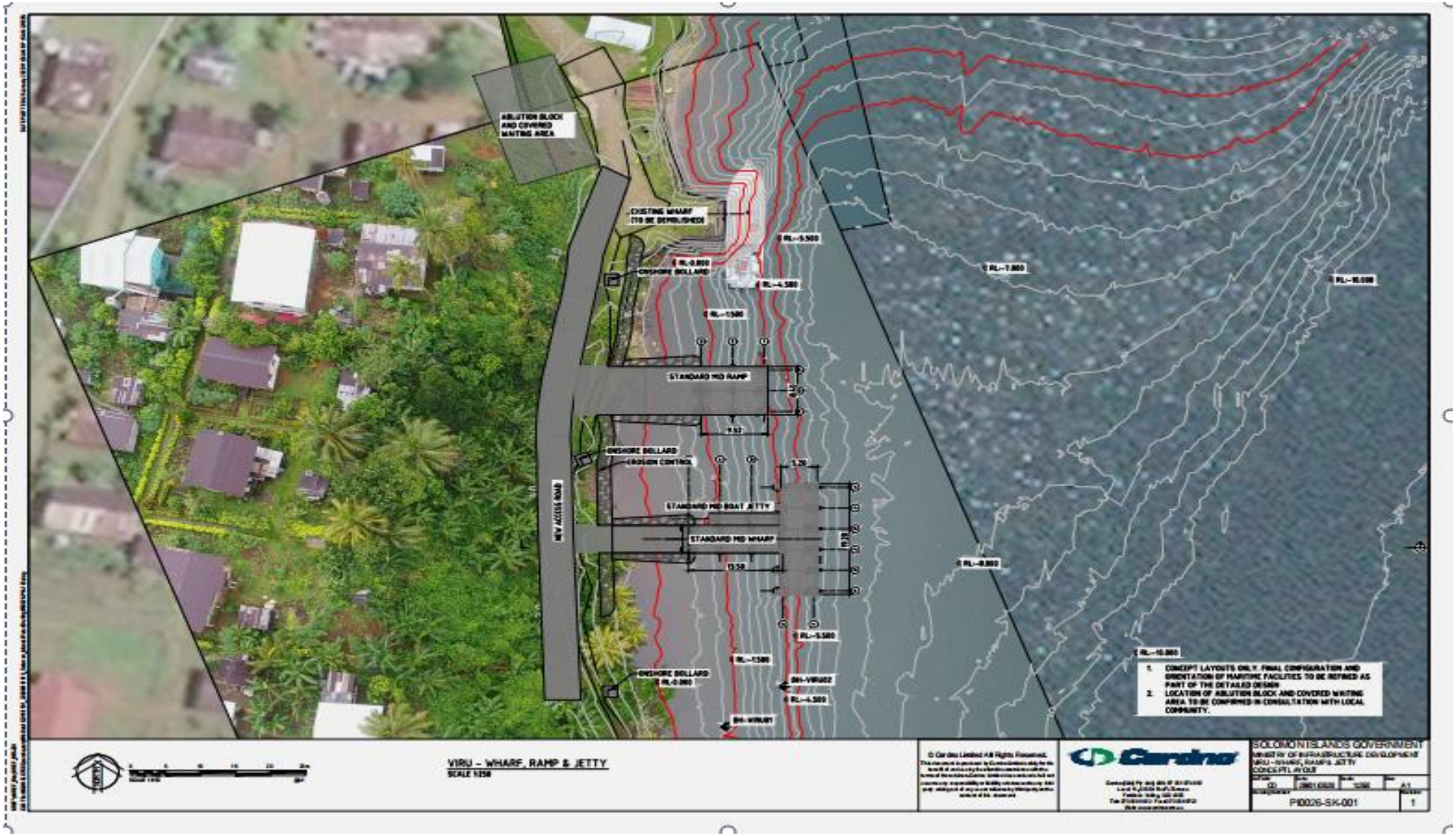
Date: 28 MAY 2019

Name of Verifier: PR DALO PETENGU

Official Stamp (if applicable): .....

Annex G: Design and Layout Plan of the Proposed Wharf and Ramp




ABLUTION BLOCK AND COVERED WAITING AREA
EXISTING WHARF (TO BE DEMOLISHED)
ONSHORE BOLLARD
STANDARD MID RAMP
ONSHORE BOLLARD
EROSION CONTROL
STANDARD MID BOAT JETTY
STANDARD MID WHARF
NEW ACCESS ROAD
ONSHORE BOLLARD
BH-VIRU02
BH-VIRU01
1. CONCEPT LAYOUTS ONLY. FINAL CONFIGURATION AND ORIENTATION OF MARITIME FACILITIES TO BE REFINED AS PART OF THE DETAILED DESIGN
2. LOCATION OF ABLUTION BLOCK AND COVERED WAITING AREA TO BE CONFIRMED IN CONSULTATION WITH LOCAL COMMUNITY.
VIRU - WHARF, RAMP & JETTY
SCALE 1:250
SOLOMON ISLANDS GOVERNMENT
MINISTRY OF INFRASTRUCTURE DEVELOPMENT
PI0026-SK-001