Environment Social Management Plan (ESMP)/Public Environment Report (PER)

Visale Solar Hybrid Subproject

December 2020

Table of Contents

Figures

Tables

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ACRONYMS

AP	Affected Person
BMP	Building Materials Permit
BOQ	Bill of Quantities (BOQ)
CESMP	Construction Environment Social Management Plan
CITES	Convention on International Trade in Endangered Species
DMI	Daughters of Mary Immaculate
ECD	Environment Conservation Division
EIA	Environment Impact Assessment
EIS	Environment Impact Statement
EMP	Environment Management Plan
EPC	Engineering Procurement Construction Contract
ERW	Explosive Remnants of War
ESIA	Environment Social Impact Assessment
ESMP	Environment Social Management Plan
ESO	Environment Safety Officer
GEF	Global Environment Facility
GPG	Guadalcanal Provincial Government
GPPOL	Guadalcanal Palm Oil Limited
GRM	Grievances Redress Mechanism
GRML	Gold Ridge Mine Limited
HH	Household
IDA	International Development Association
MECDM	Ministry of Environment, Climate Change, Disaster Management and Meteorology
MID	Ministry of Infrastructure Development
MMERE	Ministry of Mines Energy Rural Electrification
NAPA	National Adaptation Plan of Action
NEMS	National Environment Management Strategy
PER	Public Environment Report
RSIPF	Royal Solomon Islands Police Force
SICA	Solomon Islands Christian Association
SIDS DOCK	Strategic Climate Fund and Small Islands Development State Initiative Multi-Donor Trust Fund
SIEA	Solomon Islands Electricity Authority
SIEAREEP	Solomon Islands Electricity Access and Renewal Energy Expansion Project
SIG	Solomon Islands Government
SINDS	Solomon Islands National Development Strategy 2011-2020
SINEP	Solomon Islands National Energy Policy 2014-2024
SOP	Standard Operating Procedures
SP	Solomon Power
TCPB	Town Country Planning Board
UAE	United Arab Emirates
UXO	Unexploded Ordnance
WB	World Bank

EXECUTIVE SUMMARY

Solomon Islands Electricity Authority (SIEA) trading as Solomon Power (SP) established under the Electricity Act 1969 is the sole provider of grid electricity throughout Solomon Islands. Within Honiara itself, it has two power stations (where more than 95% of the energy is from diesel generators) located at Lungga and Honiara producing a combined capacity of 32MW. Development partners over the last 10 years have provided financial assistance to Solomon Power (SP) to support its efforts to meet obligations under the Solomon Islands National Energy Policy 2014-2024 (SINEP).

Recently, World Bank (WB), Global Environment Facility (GEF), Strategic Climate Fund and Small Islands Development State Initiative Multi-Donor Trust Fund (SIDS DOCK) have agreed to finance capital works under the Solomon Islands Electricity Access and Renewal Energy Expansion Project (SIEAREEP). The SIEAREEP comprises of International Development Association (IDA) Credit US$5.55m, IDA Grant US$4.75m), and trust funds (Strategic Climate Fund US$7.1m, GEF Grant US$0.9m and SIDS DOCK grant US$1.6m). The project development objective is to increase access to grid-supplied electricity and increase renewable energy generation in Solomon Islands. SP will therefore utilize this funding to increase its footprint throughout Solomon Islands through service connection subsidies and the expansion of solar farms at Henderson and Roof top of SP building together with Solar Hybrid systems and to increase the share of renewable energy from its current and proposed power stations. The project is divided into three (3) components:

Component 1: Involves installation of new hybrid mini-grids in key locations within Solomon Islands.

Component 2: involves new electricity service connections and subsidies for household wiring for low-income households accessing electricity services connecting to the mini-grids to be built under Component 1, and others across SP's grid network.

Component 3: involves installation of 0.22MW and 2MW of solar (PV) generation to be connected to the existing grid on Guadalcanal.

Planning and designs of the subprojects are underway by SP Engineers. The completion of the SIEAREEP project in the next five (5) years will go a long way in promoting the use of clean energy with minimal adverse effects on the environment.

The Visale Solar Hybrid system is a subproject under Component 1. Construction activities for the Solar Hybrid system will be restricted to creating a driveway onto the site, removal of vegetation from the site, installing foundations for the solar arrays, erection of a secure building to house storage batteries, a diesel generator for generation backup and other ancillary equipment, installing the solar arrays and controllers, and installing of security fencing. Construction of the distribution grid will involve excavating holes for placement of power poles alongside existing roads and tracks, erecting the poles, stringing the power wires, and establishing the electrical connections to existing buildings.

The WB Safeguard Policy 4.01 Environmental Assessment has been triggered for this subproject[1], resulting in the formulation of this Environment Social Management Plan (ESMP) or Public Environment Report (PER). The ESMF outlines the procedures and requirements for environmental and social safeguards. In addition, the subproject is classified under Public Works Sector in the Solomon Islands Environment Act 1998. In order to comply with the Solomon Islands development consent process, a proposal application was submitted to ECD for screening.

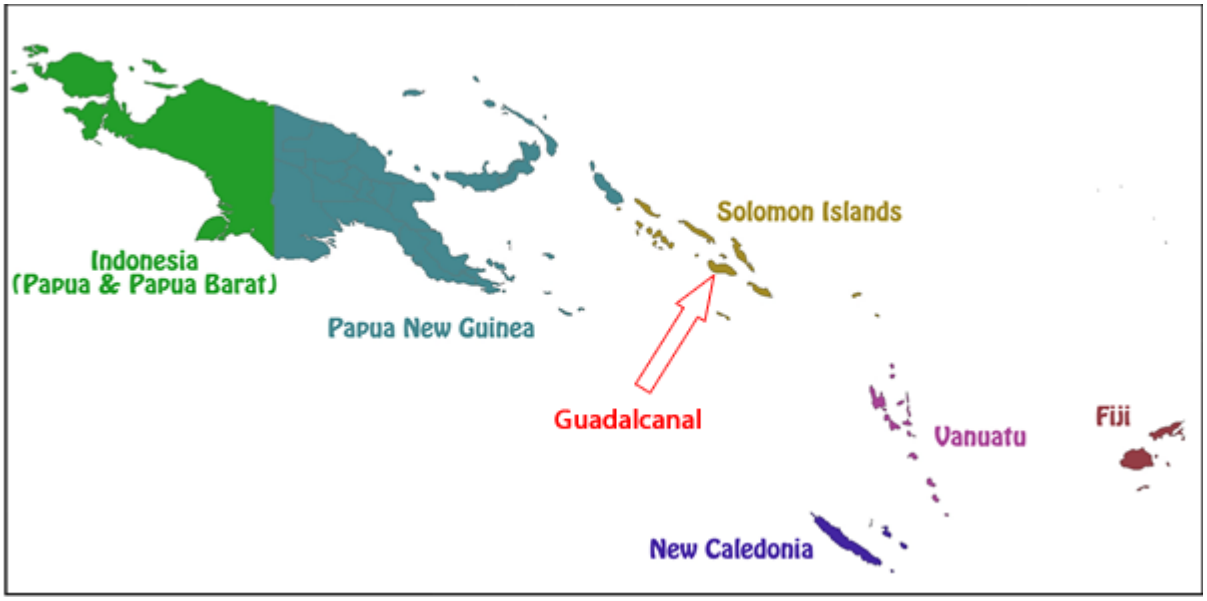
[1] SIEAREEP is the project, subprojects are referred to as individual sites where specific works are to be delivered.

A Grievances Redress Mechanism (GRM) was developed for the project in the ESMF to address any concerns that may arise regarding the overall project's environmental social performance and the implementation of the Construction Environment Social Management Plan (CESMP). Common complaints that could arise during construction are expected to be minor concerning dust, noise pollution and health and safety issues e.g. COVID-19 that should be promptly addressed and resolved.

The ESMP/PER concludes that the subproject has few impacts, none of which are catastrophic. All of the impacts can be satisfactorily mitigated and minimized to minor levels.

1.0 INTRODUCTION

1.1. Subproject Background



1. The growing need for electrification in the Solomon Islands has increased significantly both in urban, semi urban and rural communities. Following this need, the government through the Ministry of Mines, Energy and Rural Electrification (MMERE) developed a National Energy Policy 2014-2024 (NEP) to guide the country in its efforts to provide electrification for the growing population by exploring opportunities for the use of renewable energy sources.

2. SP as the agency responsible for generation, transmission and distribution of electricity is a key figure in the realization of this strategic area of development. The company is embarking on Solar Hybrid projects to support its current supply grids and has taken steps to expand the initiative to semi-urban and rural communities. Recently, WB, GEF, Strategic Climate Fund and SIDS DOCK have agreed to finance capital works under the SIEAREEP. The SIEAREEP funding comprises of IDA Credit US$5.55m, IDA Grant US$4.75m), and trust funds (Strategic Climate Fund US$7.1m, Global Environment Facility Grant US$0.9m and Small Islands Developing States Initiative SIDS DOCK grant US$1.6m).

3. The Visale Solar Hybrid subproject falls under Component 1 of the SIEAREEP. WB Safeguards Policies and Solomon Islands Legislation for Environment were triggered for this subproject. As a result, SP is required to prepare a ESMP/PER to comply with these policy and legislative requirements. The ESMP/PER will be submitted to both the WB and the Solomon Islands Government (SIG) for approval. Based on high-level conceptual design the system will be comprised of PV capacity of 232kWp, battery storage of 420kWh, and a 53kW back-up diesel generator.

4. Visale is located 40km west of Honiara, the capital of Solomon Islands. It is approximately one half hours' drive by land transport and an hour by sea transport. Visale is a catholic station. The catholic mission operates the area health center, primary and

secondary schools, the Daughters of Mary Immaculate and a training college. The proposed solar site is located on The Daughters of Mary Immaculate (DMI) registered land in Visale.

5. In Solomon Islands, solar hybrid installation is a prescribed development under public works, 2nd schedule of the Environment Act. SP is required to produce PERs and management plans for the subproject. PER's are undertaken for activities that are likely to have an impact on the environment and are subject to the decision of the national authority, the Environment Conservation Division (ECD) under the Ministry of Environment, Climate Change, Disaster Management and Meteorology (MECDM). The ESMP/PER will be approved by the Director ECD who will then issue a development consent for the subproject.

1.2. Subproject scope and Objectives of the study

6. The main objective of this assessment is to identify potential environmental and social impacts and risks of the subproject throughout the subproject life cycle, and formulate recommendations to ensure that the environmental and social impacts and risks of the subproject are avoided, minimized, reduced or mitigated.

7. The assessment was undertaken in full compliance with the WB 4.01, ESMF and the Solomon Islands environment impact assessment guideline. In addition, appropriate sectorial legal provisions relevant to the subproject have also been referred to for the necessary considerations during the subproject life cycle.

8. Specific objectives of the study include the following:

- Establish the environmental and social baseline conditions of the subproject area and review available information and data related to the subproject;
- Identify environmental and social risks and impacts in the subproject's area of influence and outline the process of mitigating and managing adverse environmental and social impacts throughout subproject implementation;
- Examine subproject alternatives and identify ways of improving subproject selection, siting, planning, design and implementation by preventing, minimizing, mitigating or compensating for adverse environmental impacts and enhancing positive impacts;
- Establish a comprehensive environmental and social management plan (ESMP) covering the subproject life cycle; and
- Preparation of an ESMP/PER and submission to WB and ECD for approval.

1.3. Report Structure

9. The ESMP/PER consists of ten chapters: (Chapter 1) Introduction; (Chapter 2) Legal and Policy Framework; (Chapter 3) Description of Subproject; (Chapter 4) Description of Environment; (Chapter 5) Potential Impacts and Mitigation Measures; (Chapter 6) Analysis of Alternatives; (Chapter 7) Environment and Social Management Plan; (Chapter 8) Public Consultation and Participation and (Chapter 9) Grievance Redress Mechanism (10) Conclusion and Recommendations.

1.4. ESMP/PER Methodology

10. The ESMP/PER assesses the potential negative impacts of the subproject on the biophysical, ecological and social environments. It suggests measures for addressing any

potential impacts that may have been identified. A site visit to investigate the environmental and social parameters and associated impacts was undertaken in December 2018.

11. The approach taken to develop this ESMP/PER include:

(i) A review of existing baseline data (climate, geology, soil, physiography and biological resources);

(ii) consultation with stakeholders including Guadalcanal Provincial Government (GPG), MEMRE, MECDM and Affected Person (AP);

(iii) Identification of potential impacts based on the design and scope of work;

(iv) Consideration of potential subproject alternatives;

(v) Identification of mitigation measures for potential impacts; and

(vi) Preparation of ESMP matrix as part of the ESMP/PER.

2.0 LEGAL AND POLICY FRAMEWORK

2.1. Solomon Islands Legislations and Regulations

12. Environmental impact assessment in the Solomon Islands is provided for under the Environment Act of 1998 and the accompanying regulatory instrument, the Environment Regulation, 2008and administered by the MECDM. Refer to annex 2 for relevant Acts.

2.1.1. Environment Act 1998

13. The Environment Act covers all the environmental issues in Solomon Islands and makes provisions for conservation and protection of the environment and establishes the ECD. The Act provides for an integrated system of development control, environmental impact assessment (EIA) and pollution control. The Environment Act has considerable power by virtue of Article 4 (1) which states that in the event of a conflict between the Act and other Acts, the provisions of the Environment Act shall prevail.

14. As required in Part III of the Act, all developers who intend to carry out or are carrying out a 'prescribed development' activity must make an application for development consent together with the relevant EIA report and any other relevant information as may be required by the Director. The Director with responsible staff and government agency then reviews the application with the relevant EIA report and make a decision on whether to grant or not to grant development consent. The developer shall not commence operation or continue to carry out any prescribed development unless it has complied with relevant provisions of the Act, been issued a 'development consent' or the Director has exempted the development from relevant approval requirements.

2.1.2. Environment Regulation 2008

15. The Environment Regulations 2008 covers detailed requirements for EIA. The Act has a schedule which lists all "prescribed' developments' that need to undergo the EIA process. All prescribed developments require a simple assessment through "screening" or "scoping" process to see what form of additional assessment is required. Most development projects require a PER, while many major projects will also need a second stage of appraisal which include technical, economic, environmental and social investigations presented in an EIA or environmental impact statement (EIS) report. Forms 1 and 3 are relevant forms in the second schedule of the environmental regulation that provides guidelines to assist in the preparation and drafting of the EIS and PER. This ESMP/PER report is a fulfilment of the environmental regulation and Act.

2.1.3 Electricity Act 1996

16. Under the Electricity Act 1969, SIEA trading as SP is an autonomous, government-owned entity, endowed with the necessary powers to carry out its functions as the responsible authority for the generation, transmission, distribution and sale of electrical energy throughout the Solomon Islands. The Authority falls under the portfolio of the MMERE, and in accordance with the Electricity Act, SP is answerable to the Minister for MMERE.

2.1.4. Land and Titles Act 1996

17. The Land and Titles Act is the major legislation that deals with land tenure in the Solomon Islands. Three main categories of land are recognized under the Act, and that includes:

(1) Customary Land;
(2) Fixed Term Leases;
(3) Perpetual Estates

18. The Lands and Titles Act has a system of registration of different types of leases which allows individuals and groups to acquire titles to land and own land, but one must develop the land that has been acquired or registered or else lose the title to the land. SP obtained rights to use the land at Visale for the solar power plant by way of a voluntary lease agreement with the Daughters of Mary Immaculate (DMI). Discussions with the DMI is in progress and SP expect to secure the land after all the topographic, cadastral and valuation surveys including relevant acquisition processes under the Lands Tittle Act are completed.

2.1.5. Town and Country Planning Board Act 1996

19. The Town Country Planning Board (TCPB) Act was enacted to administer, control and regulate all land developments other than those under customary land. TCPB was duly established in order to administer and implement the Act. Section 6 provides for the duty of the Board to prepare local planning schemes in consultation with the provincial assembly or the city council in the case of Honiara city. Then, submissions will be made for approval by the Minister so the schemes are gazette. Under the local planning scheme, the Board may under section 7, declare an area as “a local planning area”.

20. The subproject is located in Guadalcanal Province; therefore, a permit or consent is required from the RPG TCPB. In the Act “Development” is strictly defined and means; the carrying out of the building, engineering, mining or other operations in, on, over or under land, or the making of any material change in the use of any buildings or other land’. It, however, does not cover issues relating to agriculture, fishing and forestry developments.

2.1.6. Mines and Minerals Act (Amendment) Act 2008

21. Provide management for mining and mineral prospecting by regulating controls in all mining and prospecting associate activities, including alluvial mining. Part II of the Act regulates the mandate of the Minister to designate any area as a reserved area and prohibit the carrying out of reconnaissance, prospecting or mining thereon. The same section regulate reconnaissance, prospecting, and mining are prohibited in or any village, place of burial, tambu or other sites of traditional significance, inhabited house or building, any cultivated land or land rendered fit for planting and habitually used for the planting of crops, any land designated as town land, under the Lands and Titles Act, any state forest or controlled forest within the meaning of the Forest Resources and Timber Utilization Act unless some kind of arrangement authorized by the Minister in consultation with landowners and commissioner of forestry are established.

22. Section 65 outlines the format of the Building Materials Permit (BMP) application that will be made to the Director of Mines with a prescribed fee that is usually paid at the Inland Revenue Division (IRD) and a receipt attached to the application. Section 66 outlines the forms and content of the Building Materials Permit (BMP) application, and Sections 67 and 68 have provisions regarding the rights and obligations of the BMP holder, respectively. While Section 69 provides for exemptions for the national government or provincial government to mine building materials on any land that is owned by a government department or a provincial government.

2.1.7. Environmental Health Act [Cap 99]

23. The Environmental Health Act (Public Health Act), enacted on 1st August 1980, provides for the management and control of community health in the Solomon Islands. Mainly administered by the Minister, the provisions also identify Enforcement Authorities for purposes of preventing the occurrence or for checking the spread of any noticeable diseases, provision and protection of water supplies and management of drainage and sanitation practices.

24. The Public Health Act serves as the Health Impact Assessment reference in identifying the necessary practicable measures for preventing all conditions liable to injurious or dangerous to health arising from the erection, or occupation of the subproject.

2.1.8. Safety at Work Act

25. This Act consists of four parts. The key applicable sections of the ACT include:

Part II:

- Article 4 states that it is the duty of every employer to ensure the health and safety at work of his employees.
- Article 6: states that it is the duty of the employer to provide a safe workplace for persons other than his employees.
- Articles 7 and 8: requires manufacturers, suppliers of tools and equipment and suppliers of chemicals and other hazardous substances to ensure that these are safe and without health risks.
- Article 12: states that any employee who operates unsafe machinery or substances and is injured will be the employers responsible.

Part III:

- Article 15 requires the employer to protect people from dust, fumes, etc.
- Article 16 provides for limits of exposure to dust and fumes.
- Articles 17, 18, 19 and 20 require employers to comply with the operating requirements for: (i) pressure and vacuum systems; (ii) machinery; (iii) dangerous machinery; and (iv) electrical installations.
- Articles 21 and 22 require workplaces to have fire protection and to take precautions against explosions.

2.1.9. Wildlife Protection and Management Act 2010

26. The Wildlife Protection and Management Act 2010 provides for the conservation, management and protection of wild flora and fauna in the country. It regulates the export and import of wildlife ensuring compliance to obligations set under the Convention on International Trade in Endangered Species (CITES). The Solomon Islands is a refuge for many species of wildlife (that includes rare and endemic). Their need for protection and sound management of these species. The act prohibits the poaching of wild fauna and flora as well as harvesting of protected species.

2.2.10. Custom Recognition Act 2000

27. The Custom Recognition Act 2000 provides recognition to the existence of any customary law and the nature of such customary law in relation to a matter, and its application in or relevance to any particular circumstances shall be ascertained as though they were matters of fact. However, the existence shall be provided in proof as required under section 5 of the act.

2.1.11. Unexploded Ordnance (UXO)

28. Technically WWII ordnance found in the Pacific Islands can be defined as either unexploded (UXO) or abandoned (AXO). Unexploded ordnance is defined as explosive ordnance that has been primed, fused, armed or otherwise prepared for use in armed conflict but has failed to explode. Abandoned explosive ordnance is defined as explosive ordnance unused during an armed conflict and subsequently abandoned or left behind. UXO and AXO are defined collectively as Explosive Remnants of War (ERW)[2].

29. Solomon Islands was the scene of bitter fighting during World War II. While this was over 60 years ago, unexploded (UXO) may still be found around Guadalcanal. Should UXO be discovered, the contractor is to immediately cordon off the area, arrange the evacuation of nearby residences and inform the police of the find. Currently all UXO finds are reported to the police who arrange the pickup, transport, storage and ultimate disposal of the finds. While construction sites are expected to be swept for and cleared of UXOs, a chance find procedure for handling the UXOs during the construction is included in the ESMF. This will be the responsibility of the contractor. Ultimately, the SP will be responsible for the supervision and monitoring of the contractor.

2.2. World Bank Safeguard Policies

2.2.1 OP4.01 - Environmental Assessment

30. World Bank financed projects or subprojects requires Environment Social Assessment to ensure that it is environmentally sound and sustainable. OP4.01 (Environmental Assessment) sets out the general policies and principles for environmental protection and the requirements for assessment of impacts and implementation of plans and measures to mitigate or manage impacts. The OP4.01 has been used to classify projects or subprojects. In the case of SP the Visale Solar Hybrid is called the subproject.

31. The four categories defined in the OP4.01 are:

- **Category A.** The subproject is likely to have significant adverse impact on sensitive and valuable ecosystems (protected areas, wetlands, wild lands, coral reefs, and habitats of endangered species), cultural heritage sites (archaeological, historical sites or existing cultural sites), densely populated areas where resettlement is required or pollution may be significant, heavy development areas and conflict in natural resource allocation, water bodies and land or water containing valuable resources. Since the impacts are adverse, the level of assessment is an Environment Impact Assessment (EIA) or EIS as for the Solomon Islands.
- **Category B.** Potential adverse impacts on human population and environmentally important areas (e.g. wetlands, forest, grasslands and natural habitats) are less adverse, temporary, reversible and can be mitigated more readily than those of category A subprojects. The level of assessment required is equivalent to the SIG PER.
- **Category C.** The subprojects are likely to have minimal or no adverse environmental impacts. Category C subprojects do not require an EIA/EIS or PER. The subprojects require ESMPs.
- **Category FI.** Subprojects involve credit line or an equity investment in a financial intermediary. Involves subprojects that will have insignificant environment social impacts and do not require ESMP.

[2]Francis S, L and Alama L, 2011. *World War II Unexploded Ordnance,* Retrieved at URL on 29thof October 2013 at URL: http://www.forumsec.org/resources/uploads/attachments/documents/UXO%20final.pdf.

32. The Environmental and Social Management Framework (ESMF) was prepared to guide SP's social and environment safeguards requirements for the SIEAREEP. Following the screening exercise, the subproject was classified as Category C because it is expected to have less adverse environmental social impacts. These impacts are expected to be temporary and can be readily mitigated.

2.2.2 Other WB policies

Table 1: Other WB policies

Policy	Policy Triggered	Reasons
OP4.04 (Natural Habitats)	No	Subject to gardening overtime and area of conflict during WW2.
OP4.36 (Forests)	No	The area does not have natural forests. Some minor clearance to vegetation mainly mango trees, Glyricidia, gardens and grass
OP4.09 (Pest Management)	No	Subproject does not involve use of pesticides
OP4.11 (Physical Cultural Resources)	Yes	Earth movement/excavation/digging can unearth cultural resources
OP4.10 (Indigenous People)	No	Solar PV site located on DMI's registered land. Transmission and distribution line easement will be covered under a negotiated agreement (MOU/MOA).
OP4.12 (Involuntary Resettlement)	No	SP will obtain rights to use the land at Visale for the solar power plant by way of a voluntary lease agreement with the DMI. The DMI had tendered consent in writing for SP to commence survey of the site. Discussions with the DMI is in progress and SP will soon secure the land after all the topographic, cadastral and valuation surveys including relevant acquisition processes under the Lands Tittle Act are completed. No need for involuntary resettlement.
OP4.37 (Safety of Dams)	No	No dams will be affected by the subproject activities
OP 7.50 Projects on International Waterways	No	No subproject activities in international waters

2.3. Solomon Islands Environmental Assessment Process

33. The Environment Impact Assessment guideline is designed to administer Schedule 16 of the Environment Act 1998. The guideline comprises of EIA procedural descriptions, stakeholders in the EIA process and fees required for development type. "The guideline was prepared by the 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" (MECM, 2010). The EIA guideline was reviewed by Technical Assistance under Asian Development Bank in 2015.

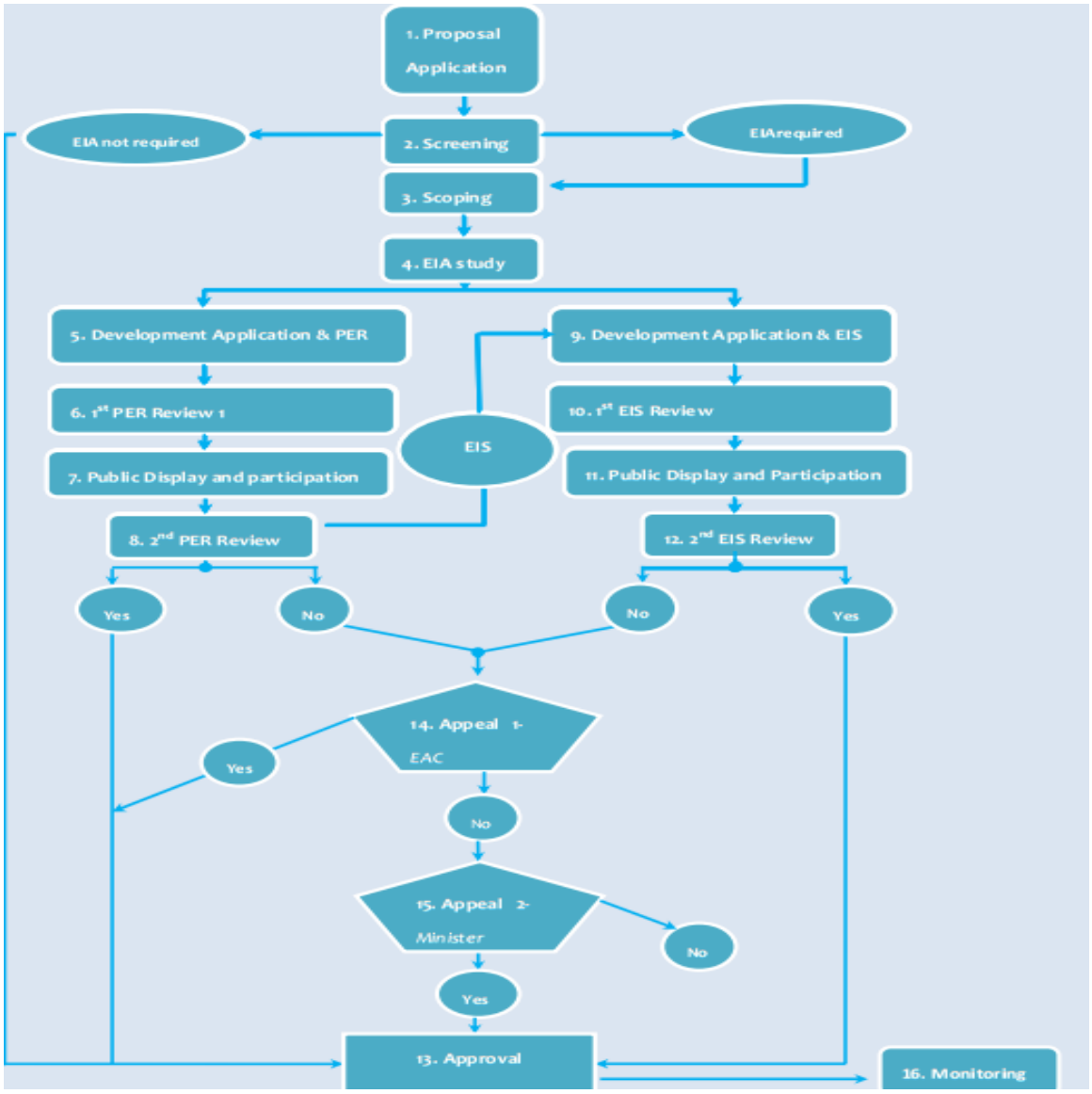


Figure 1: Procedural steps of an EIA[3]

2.4. Solomon Islands National Policies

2.4.1. National Development Strategy (NDS)

34. The National Development Strategy is a very comprehensive policy that strategizes ways in order to achieve the development aspirations of the country. Using the 17 United Nations Sustainable Development Goals (SDGs), "Transforming our World: the 2030 Agenda for Sustainable Development" as a reference, the NDS highlights five important long-term development goals and two of them; 1. NDS Objective One: Sustained and inclusive economic growth, and 2. NDS Objective Six: Develop Physical Infrastructure and Utilities to Ensure all Solomon Islanders have Access to Essential Services and Markets, are relevant to this subproject.

[3] MECM,2010, EIA Guideline

35. In order to achieve all the NDS objectives; it must be realized that access to electricity is crucial to all sectors. The subproject objective is in line with the NDS and promotes economic empowerment and sustainable development.

2.4.2. National Energy Policy 2014-2024

36. The NEP recognizes the importance of reducing dependency on imported fossil fuel. The Solomon Islands have renewable energy sources such as solar, hydropower, geothermal and biomass and wind energy. NEP was developed to guide the country in its efforts to provide electrification for the growing population by exploring opportunities in renewable energy sources. SP is a key player and is embarking on solar hybrid systems (off grid and on grid) to meet obligations under this policy.

2.4.3. National Energy Policy Framework 2007-2009

37. The National Energy Policy Framework sets out the Government's policies for planning and management of the energy sector over the next 10 years. The framework defines strategies the government is taking to ensure the objectives of this policy are fully realized. Twelve strategic areas covered in the policy include 1. Energy Sector Planning; Coordination and Management; 2. Petroleum Sector; 3. Transport Sector; 4. Electricity Sector – Urban; 5. Electricity Sector – Rural; 6. Renewable Energy; 7. Environment; 8. Energy Conservation and Efficiency; 9 Capacity Building and Information; and 10. Legislation and Regulations. The subproject is a fulfillment of the fourth strategic area (Electricity urban).

2.4.4. Climate Change Policy

38. The Solomon Islands Government launched the Climate Change Policy through the MECDM, highlighting steps the government would take in aiding the country and its people to exist and adapt to present imminent climate change and its impact. The Policy aims to integrate climate considerations within the framework of national policies to guide the government and its partners to ensure the people, natural environment and economy of the country are resilient and able to adapt to the predicted impacts of climate change. The SIEAREEP is partially funded by Strategic Climate Fund and SIDS DOCK. Hence, the commitment to greenhouse gas reduction by reducing reliance on diesel generators by SP is aligned to global efforts on climate change.

2.4.5. National Environment Management Strategy

39. The primary document for environmental policy in the country is the 1993 National Environment Management Strategy (NEMS), although outdated; it is an import document at the present time in the absence of an environment policy.

2.4.6. National Waste Management and Pollution Control Strategy

40. The formulation of the National Waste Management and Pollution Control Strategy (NWMPCS) 2016-2024 is part of the ongoing efforts in the country to address the issue of waste and pollution as the country enters a period of rapid social and economic change. The objectives are:

1. The development of natural resources does not compromise the wellbeing of natural environment, ecosystems and wellbeing.
2. Ensure that existing legislations, strategies and guidelines on waste management and pollution control are effectively implemented and enforced.

3. Support and encourage the 4Rs (Recycle, Reuse, Refuse and reduction) and where relevant regulate waste minimization for solid wastes noting that organic waste form a large component of wastes produced in the country.
4. Develop institutional capacity and train waste and pollution experts for the country.
5. The government through MECDM, provincial government and Ministry of Infrastructure Development (MID) ensure that all provincial centres have in place proper landfills or waste disposal sites and a functioning waste collection system.
6. All Solomon Islanders are aware of the issue of waste and pollution and are taking appropriate actions address it.
7. Waste management and pollution control activities are undertaken based on accurate data and research, updated information, new innovation and technology
8. Encourage public-private partnership and investment in waste management and pollution control.
9. There is a long-term financial mechanism at the national level to manage waste and address pollution issues.
10. International guests and tourists are able to enjoy the natural beauty and aesthetic value of the country.
11. Waste management and pollution control are fully addressed in responding to climate change and natural disasters.

41. One of the highlights of the strategy is the management of e-wastes such as solar batteries. It is important all waste collection and disposal associated with the subproject during construction, operation and decommissioning are in line with the strategy.

2.5. International Conventions and Agreements

42. Solomon Islands is a party to some of the international treaties and conventions. The agreements are in Annex 1.

3.0 SUBPROJECT DESCRIPTION

3.1. Subproject Proponent

Name of Company: Solomon Power

Address: Solomon Power, P.O. Box 6, Ranadi, Honiara

Contact Person: Jeremy Maneipuri

Official Designation: General Manager Capital Works (Ag)

Tel: + 677 42463,

Email: Jeremy.Maneipuri@solomonpower.com.sb

3.2. Subproject Objectives

43. The subproject development objective is to increase access to solar grid-supplied electricity and increase renewable energy generation in Solomon Islands. This will in turn:

- Promote clean renewable energy;
- Assist in reducing green-house gas emission;
- Promote environmental benefits by reducing fossil fuel and oil usage including disposal;
- Support the realization of the NEP renewable energy target; and
- Reduce reliance on diesel-generated electricity.

3.3. Subproject Category

44. The subproject is triggered as category B under the WB safeguards policy and SP ESMF. This is equivalent to the PER under the Solomon Islands Environment Act 1998.

3.4. Subproject Justification/Need

45. The obligation of SP is to support SIG commitment to the SINDS goals and targets. The Solar Hybrid subproject is aligned to efforts to improve energy access in rural communities and is in line with the SINDS goals. Visale is situated on the mainland of Guadalcanal. Visale has now become a major station providing health, education and commercial services to name a few. The informal sector plays an important role in Visale as it provides opportunity for self-employment. The institutions, religious organizations, schools, businesses and communities consulted confirmed that access to electricity is important to their operations, programs and creates an opportunity for income generation. The private sector enterprises, especially business people, reiterate, that electricity is crucial and that expansion plans can depend entirely on access to consistent and reliable electricity.

3.5. Subproject Location

46. The subproject site is located on Daughters of Mary Immaculate (DMI) registered land, Visale, West Guadalcanal. Solomon Power has now acquired the solar site. See figure below.

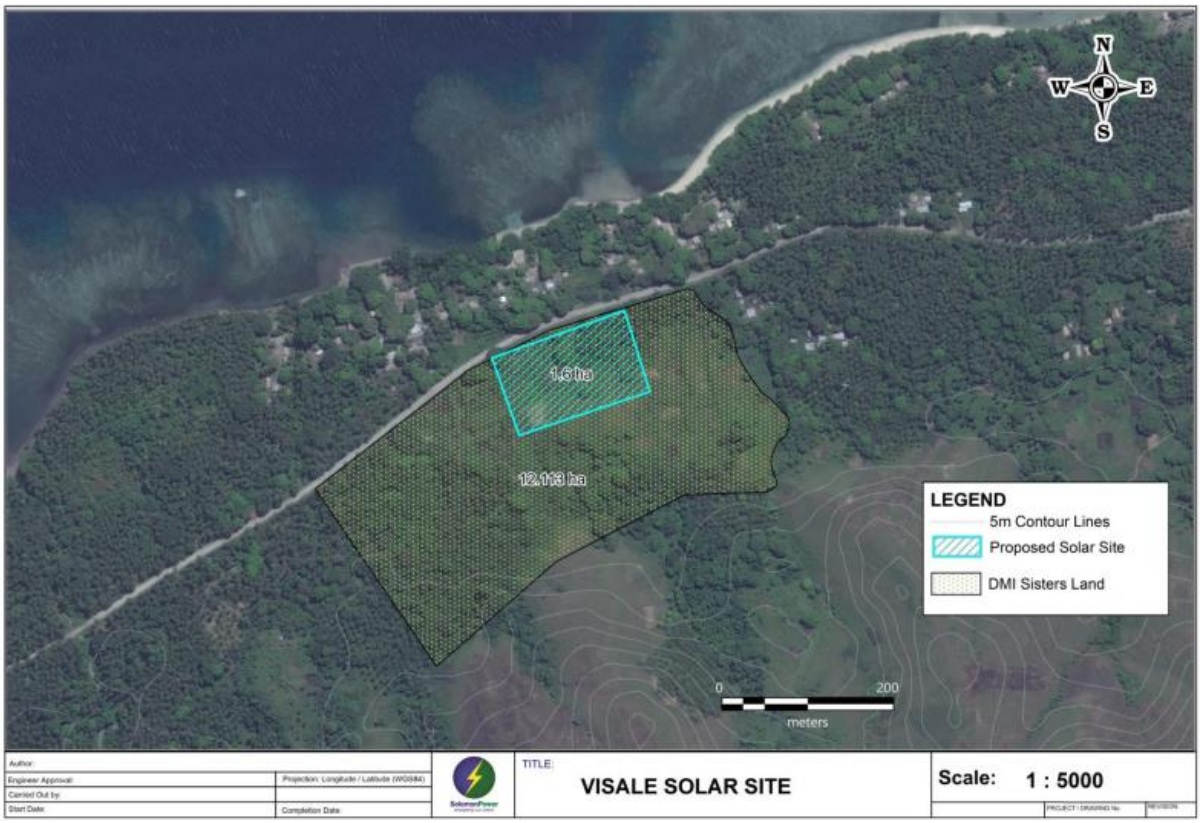


Figure 2: Subproject site, Visale.

3.6. Subproject Scope of Work

3.6.1 Vegetation Removal during Surveying and Demarcation

47. Minor impacts upon terrestrial habitats and flora at the subproject site are expected as a result of the surveying, demarcation and vegetation clearance/trimming for the distribution lines. The majority of the area had been subjected to clearance in the past and as a result colonized by weeds, scrub, and ground cover, and in some cases planted with garden crops. An inventory of crop and trees was completed by an extension officer from the Ministry of Agriculture and Livestock (MAL) and report integrated in the Abbreviated Resettlement Action Plan (ARAP) Report. Surveying and demarcation would cause minor degradation of local ecology through the clearance of small areas of this vegetation. There are no vegetation species that have conservation significance nor is the area representative of the original vegetative cover.

48. All material, slash and debris resulting from clearing works would be disposed at a provincial designated site on the approval of the Project Manager (PM). Materials may be buried or disposed of outside the subproject site and at a designated approved by the nearby communities and the Provincial Government.

49. Vegetation that will be cleared for the distribution network is discussed in Section 3.6.10.

3.6.2 Road around/within the Solar Hybrid location

50. Provisions shall be made for a 4m wide road around the solar panels. The design details will be part of the EPC contract.

3.6.3 Fencing and security

51. The remoteness of the subproject site substantiates the need for fencing and a twenty-four hours security service. A chain link fence is recommended and three layers of barb wire. According the Specification[4], the contractor will provide secure perimeter fencing to prevent ingress of unauthorized personnel, general populace and small animals such as cats. Fencing for the system shall attach to and expand the area boundary of the existing system. SP preference is galvanized fence type with sufficient galvanizing layer to resist corrosion in the environment. Fencing should not shade the solar Photovoltaic (PV) panels during prime generation periods. Sufficiently heavy padlocks resistant to corrosion are to be provided by the contractor to secure access gates provided. It is standard practice for Solomon Power to fence areas acquired for all Solar Farm sites. This would not only provide public safety during construction but long term safety measures for resident near the subproject site and public at large. Signage and public notices about safety and description of the subproject will be installed at designated locations for public to read and view. There are no impacts associated with restrictions on local community access since there are roads inside the acquired site. The solar farm site does connect to the main seal road. A traffic management plan will be submitted as part of the CESMP to manage traffic during construction. An indicative design would include:

- A heavy mesh fence of 2.5 m overall height with the upper section barbed. Steel posts shall be “hockey stick” design, heavy-duty galvanized, in concrete foundations.

- A continuous concrete strip approximately 200x150mm reinforced with 2x 12mm rebar with an upper surface at ground level is proposed. The lower section of mesh shall be secured to the strip using galvanized rebar or stainless steel loops set in the concrete and secured to the fence by stainless steel fixings at intervals not exceeding 600mm.

- At access gates, the strip shall be further reinforced for heavy traffic to 300mmx300mm and necessary reinforcement.

3.6.4 Installation and mounting of solar

52. One of the main components of the Solar Hybrid system is the array of solar panels mounted above ground level. Based on high-level concept design the system will be comprised of PV capacity of 232kWp. The solar panels will be mounted on reinforced concrete platform. There will be walkway between the solar rows or columns to enable maintenance and regular inspection. See below design layout.

53. The mounting structures (also referred to the mounting system), which includes its footings or piles, shall be appropriate for the site. The modules shall be positioned in such a way as to maximize the annual electrical energy output and avoid shading from adjacent structures (including PV arrays) and trees. The PV mounting structure should be from at least a Tier-1 manufacturer with a strong technical, service and warranty capability and with the following minimum requirements:

- Structure requirements apply to all items required to accommodate the modules and associated electrical equipment including rails, module clamps, fasteners, cable trunking / purlins, cable clamps etc.;
- Structures shall be fixed, metallic and having appropriate design and adequate strength which can withstand the load of the modules, snow loads (not likely to be

[4] Employer’s Requirements of the Tender Documents for construction of the Solar Hybrid Systems

encountered in the applicable climate), seismic loads, cyclonic and high wind velocities as specified in this document;

- The mounting structure including fastenings shall be constructed of non-corrosive, UV-stable materials to meet the durability requirements for tropical marine environments;
- Use of dissimilar metals in contact with each other shall be avoided where practically possible in order to prevent galvanic corrosion. Where dissimilar metals must be used, suitable measures shall be employed in order to prevent galvanic corrosion (e.g. insulating material between dissimilar metallic materials);
- The structures shall be designed for simple mechanical on-site installation with no requirement for welding, cutting, drilling or painting of metal structures onsite;
- The mounting structure shall avoid the accumulation of water or moisture within the structure and shall accommodate an adequate flow of water off the structure;
- The design of the array mounting structures should ensure that all parts are pre-cut, pre-drilled and prepared before delivery to the Site and should not require the need to be cut in the field. This is to avoid damage to corrosion-resistant coatings. All sharp edges are to be removed at the factory;
- Modules shall be secured in line with the module manufacturer recommendations;
- Each PV module shall be fastened securely at least at four points or completely along two opposite sides, but under all circumstances adhere to the minimum fixing requirements as required by the PV module manufacturer;
- The structure shall be suitable for the module type to be installed with due consideration given to Module weight (inclusive of any micro inverters);
- Module manufacturer requirements with regards to mounting locations and cable management;
- Ability to expand / add additional modules without modifying the existing structure;
- Air ventilation to the back of the panel to prevent power de-rating due to thermal buildup;
- The structure shall provide facilities for earthing of all metallic parts (inclusive of the modules);
- The mounting structure design shall be in accordance with the standard requirements and certification by the manufacturer to this extent would be required;
- Provision shall be made for cable management with no sharp edges that could result in damage to cables or persons during installation, maintenance or decommissioning (e.g. through the implementation of rounded edges or end covers/clamps on rails);
- Structures shall have a design life of at least 25 years.
- Solar PV modules mounted on the array frame structures shall be situated above the expected flood level and be at least consistent with the existing system design in terms of installed height.[5]

3.6.5. PV Modules

54. Only PV modules with the following minimum requirements should be considered:

[5] James, J (2019), *Solomon Power Visale and Tingoa Solar Farm specs.*

- Poly or Mono crystalline cells including bifacial, back contact or other silicon cell design arrangement (thin film or amorphous is not preferred);
- Power tolerance shall be a positive power tolerance (+0 to +3Wp or better);
- The PV module shall withstand the wind loadings present at the Site;
- The PV module shall include drain, earth and mounting holes in its frame. No holes shall be drilled on-site;
- The PV module frame shall be made from marine-grade anodised aluminium or stainless steel with appropriate seals to prevent water ingress and damage to the active components;
- No specific colour (frame, back foil) requirements are requested;
- The front glass of the PV module shall be tempered glass with a minimum thickness of 3.2mm;
- The PV module shall comply with International Electro-technical Commission (IEC) 61215, IEC61730, IEC61701 ED2 and IEC 62716;
- Potential-Induced Degradation-free PV cells and modules, unless the PV system is appropriately designed to reverse PIE-effects;
- Bypass diodes are required on each module. No reverse blocking diodes for the system are required;
- Standard locking connectors (e.g. MC-4 or equivalent) certified to EN 50521 are acceptable for panel connections. Corrosion of terminations causes increased voltage drops therefore the number of connections shall be limited. A wiring layout diagram defining the PV panel interconnections will form part of the documentation to be provided by the Detailed Design;
- The terminals must be clearly marked with + and – for the corresponding connections;
- The minimum Performance Warranty shall be as specified in Section 4.6.2 of the specification;
- Test certificates must be available;
- The minimum warranty shall be equal or greater than requirements stated in Section 4.6.2 of the Specification;
- The manufacturer cannot be insolvent or going through (partial) bankruptcy at the time of design or installation of the PV System; and
- The modules shall be under the manufacturer's active production and shall not be superseded stock.

55. Manufacturer documentation with the following information about the PV modules must be available:

- Temperature coefficients for current, voltage, and power;
- I-V curves under different temperature and radiation conditions;
- Physical dimensions and weight;
- Details of the materials used in the module's frame;
- Type and number of cells per module;
- Cell efficiency and/or module efficiency;
- Details of the connectors used and the length of the connecting wires;
- The warranty statement and testing certificate;
- Proof of manufacturer financial stability;
- Solar Modules supplied must have individual flash test data available in soft copy; and

- Pallets and packaging PV modules are supplied within must list modules serial numbers contained within the pallet on the outside of the pallet in a collectable print out.

56. Note that the Contractor shall illustrate that the design allows for system flexibility to accept more than just one type of PV panel by providing a ranked list of two or more other OEM PV panel types suitable for conjoint use. It is expected that the concept design presented shall be able to have PV modules changed to the next highest power class if needed due to manufacturing improvements. Total installed panels at commissioning should guarantee the required plant sizing and output at 10 years.[6]

3.6.6. String and Central Inverters

57. By definition, a String or Central Inverter (or a grid-tie inverter) is connected directly to the PV panels and contains an embedded Maximum Power Point Tracker (MPPT) which enables the Inverter to optimize energy production from the PV panels. The Contractor is required to specify the appropriate inverters for the site with respect to the capacity and suitability for the designed PV System. The minimum requirements for both types of inverters include:

- String inverters are connected to the PV panels and shall provide a balanced three-phase power output to the AC bus;
- The string inverters shall be located near the PV panels unless larger central inverter types are used, have a protection rating of IP 65 (according to IEC 60529) and be protected from sea spray. For Sites where the inverters are located in an indoor dry space, this requirement may change to IP55;
- The string inverters shall have as a minimum one maximum power point tracker (MPPT) and only PV panels mounted on the same horizontal angle and orientations should be grouped together and connected to the same MPPT. It is however encouraged to use the same inverter but a separate MPPT to convert power from two strings mounted at different horizontal angles but with the same orientation because this will increase the conversion efficiency;
- Grid-tied inverters shall be sized appropriately for the maximum module peak power rating under all weather conditions of the Site;
- The Contractor shall ensure and confirm that the DC operating voltage window and current limits of the inverters are not exceeded under all environmental conditions.
- The inverter shall be designed to operate from -20 to +60 degrees centigrade and from 5% to 95% relative humidity;
- It is of paramount importance that the output voltage capability of the inverter is matched with the supply voltage from the utility;
- The Contractor shall ensure that the ventilation and air requirements are appropriately specified so that the cooling requirements of the inverter can be met;
- The Contractor shall specify suitable mounting positions for the inverter (and enclosure, if applicable), in accordance with the manufacturer's specification;
- Electronic components will be sealed from contact with salt air, and all cooling will be through external heat sinks and not through ambient or forced air flowing across the electronic components;

[6] IBID 4

- The inverters shall not be placed in direct sunlight;
- The location and installation of the inverter shall comply with site restrictions for appropriate and safe access during operation of the inverter;
- The Total Harmonic Distortion injected onto the grid by the inverter shall be less than 3%, and the output of the inverter shall be a true sine wave;
- The Contractor shall endeavour to minimize the number of different types of string inverters by standardizing on a typical inverter size to reduce the number of spares. SP prefers the use of 3-phase string inverters with a minimum unit rating of 20 kW. On this basis sizing of any plant can be increased or decreased by this as a multiple and that any section of 20kW (or greater) may be taken out of service for maintenance with minimal overall Plant impact;
- The power conversion efficiency of the DC>AC string inverter shall exceed 97% and that of the bi-directional inverters >94% while operated above 20% of PV array rated power. Cable length and cable diameter shall be carefully considered to optimize system efficiency;
- Terminations between PV panels and string inverters shall be in accordance with the manufacturer specifications, and no installation practices or terminations shall be used that may void manufacturer warranties;
- Inverters shall comply with AS/NZS 4777.1, 2 & 3 and shall have an option or setting to respond to grid voltage to curtail the power fed from the PV panels to the local grid. This is possible in the case of a high ratio of on-grid generation to load;
- Inverters shall have a valid Certificate of Suitability, numbered and dated to testify on its testing, which was conducted within the last five years;
- The inverters shall have passive and active anti-islanding protection as per AS 4777.
- The string inverters shall detect islanding mode when the grid fails and automatically shut down the power from the PV system as per the requirements of AS 4777.3;
- The inverters shall detect normal main grid supply and automatically start supplying power from the PV system as per the requirements of AS 4777.3;
- Open protocol standard such as Modbus for seamless integration to third party systems is required. Closed or proprietary protocols are not acceptable unless approved by the Employer. It is anticipated that a separate energy meter for the system with MODBUS communications available as a minimum is installed on the main Solar PV feeder to facilitate future monitoring from the future SCADA system installation;
- A separate, external manual isolation switch shall be installed to provide isolation of the inverters from the LV network;
- Inverters are to be installed in order to not interfere with the onsite backup generation or transfer switching arrangements;
- The inverters shall be from a Tier 1 original equipment manufacturer (OEM) of inverters with a strong regional technical and service capability for Central and String inverters; and

- The minimum standard warranty shall be 5 years[7].

3.6.7 Solar System Integration and Electrical Interconnections

[7] IBID4

58. For all electrical cables or interconnecting wiring used in the PV System, the Contractor shall ensure that the design allows for the following:

- Installation, protection, termination and jointing of cables in accordance with relevant Australian standards and particularly Australia/New Zealand Standards (AS/NZS) 3000, AS/NZS 3008 and manufacturers' recommendations;
- All PV System wiring is designed in accordance with all relevant standards including AS/NZS 5033 and AS/NZS 3000 and AS/NZS 3008.1;
- The DC cabling from the PV modules to the inverters is sized such that the installed voltage drop for each circuit remains below 2% at all times;
- The AC cabling from the inverters to the connection point meter is sized so that the installed voltage drop of each circuit remains below 1% at all times;
- DC Cables are double insulated and sheathed. Cable sheathing is UV stabilized to ensure that no degradation throughout its working life occurs;
- DC cables are neatly secured behind modules and between sub-arrays. Also, DC cables are sheltered from direct rainfall;
- All cables are protected from the effects of climatic conditions and in particular UV radiation;
- No cabling is exposed to direct sunlight, even if sheathing is labelled as UV stabilized. All cabling that may be exposed must be routed through UV stabilized conduit;
- All cables are protected from mechanical damage in accordance with AS/NZS 3000;
- Cables shall be clamped in order to relieve tension and prevent conductors coming loose. Plastic cable ties must be protected from both direct and reflected UV radiation. Cable ties exposed to UV must be stainless steel;
- DC cabling shall achieve type test in accordance with EN50521 for 1500V.
- DC cables are rated to operate at the open-circuit voltage (Voc) generated by the longest string of modules in the facility at the lowest expected temperature at the site;
- Cables are secured and mechanically protected over their entire length. Steel wire armour shall only be used for large sub-array DC voltages and multi-core cabled for AC voltages;
- Energy losses due to cabling shall not exceed 2% of generated power (considered from the main LV circuit breaker at the connection transformer);
- Cables shall occupy less than 66% of the available conduit space;
- All conduit installed within reach of the PV rays shall be UV resistant or protected from UV using an appropriate method;
- Cables are provided with protection against vermin, where required by site conditions;
- DC cables are installed in a manner which minimizes induction loops between positive and negative cables. In particular, for string cables, large loops of excess DC cabling shall be avoided;
- All underground cable routes (if applicable) are clearly marked with suitable above-ground cable markers to prevent accidental damage to the underground cables;
- Cable joints are limited by planning continuous cable runs along entire cable route lengths;
- Marking of all electrical equipment (including conduits and ducts) are compliant with the Standards and Regulations (or as otherwise agreed upon with the Employer) for marking. All signs and signage are clearly visible, located visibly on the equipment, constructed and installed to remain legible for the design life;

- Markings distinguish between operable control devices, equipment, wiring, indicators, isolation switches, outlets and enclosures to provide instant and ready identification to aid operability and maintainability. The terminology of the marking and labelling matches the documentation provided;
- The numbering system is applied to all DC wiring, AC wiring, PV strings, combiner boxes and inverters. Also that isolating devices such as switches, fuses, isolators and push buttons are numbered and labelled in accordance with the local regulations and good industry practice. Where appropriate, that each label includes the unique number and a description of the device;
- If 1500VDC rated arrays are designed, cabling insulation must be rated to 1500/1500 VDC to achieve 1500V DC conductor to ground rating. The sheath thickness shall be in accordance with AS5000.1 with Nylon 12 extruded jacket or double brass tape to prevent insect attack; and
- Detailed calculations of cable rating covering maximum anticipated load and fault currents shall be provided together with the construction drawings prior to the procurement of the cable. The calculation shall show all factors applied to the cable and shall consider all methods of cable installation used (e.g. direct buried, conduits, etc.)[8].

3.6.8 Secure storage shed for spares and control room

59. All buildings shall have raised floor and concrete basement. They may have all the necessary appliances for running the solar PV including batteries, transmitters, and transformers. Relevant buildings will have the necessary components of standard building codes such as store rooms, toilets facilities, and sewage system to the agreed standard.

60. The shed shall be at least of large enough size that the amount of spare PV modules required by this document shall fit securely within with enough space left for storage of sundry maintenance tools for vegetation management including trimmers and a ride on mower. The shed shall have secure roller-shutter door, personnel door access and adequate ventilation from whirly-birds or similar arrangements, if windows are included then they are to be of a type that is secure or resistant to forced entry. All entry points are to be lockable. The shed shall be constructed of weatherproof sheeting and design shall consider the climatic conditions outlined in Section 4 of the Specifications.

3.6.9. Diesel generator

61. Based on the high level concept design, a 53kW diesel generator shall be installed as standby and automatically starts whenever there is a voltage drop in the batteries. The generator shall be fitted with associated auxiliary equipment, switchgear, radiators for cooling of the generator and appropriate fuel storage and supply system. The site will have a concrete basement and will be sheltered from extreme weather events. The site and drainages will incorporate an oil separator to remove oil from surface run-offs and bund walls to protect the oil from spillage. The oil shall be pumped back to drums and stored at a secure storage. The storage areas will be bunded to avoid movement of oil into the environment.

3.6.10 Distribution network

[8] IBID 4

62. Necessary electrical infrastructure to connect power from the Solar Hybrid Generation System to the surrounding community in Visale is also part of the subproject. These include the installation of poles, lines and cables. Installation of these infrastructures will require removal of road side vegetation. It is standard practice to compensate for non-land assets based on SIG MAL rates.

3.6.11 Telecommunication

63. The sole supplier of telecommunication services in the Solomon Islands is “Our Telekom”. All connections to the main telecommunications system and the various services such as phone and internet will be arranged through “Our Telekom”.

3.6.12 Water Supply

64. The current plan is to connect to the existing water supply network and to support these with harvested rain-water. These will be stored in 400L water tanks and will be used for domestic purposes and on-site water for fire incidents.

3.6.13 Material requirements

65. The subproject requires gravel for concrete production. Gravel for concrete production will be sourced from Honiara. Cables, solar panels, poles, cement, solar installation parks, to name a few will be sourced from Honiara and Overseas. All materials including gravel, timber etc. will need to be cleared and certified by the MAL quarantine office before it is transported to site. It is an Engineering Procurement Construction (EPC) contract which means the contractor is responsible for detail design, procurement of relevant materials, construction and commissioning.

3.6.14 Construction Force and Equipment

66. Construction force of approximately 20 personals comprising of solar engineers, civil engineers, operators, securities and managers will be based at the subproject site for the duration of the construction. Workers will be engaged at different stages during construction when the need arises, so the approximate number will be 10 personals per day. Majority of the workers will be based in Visale station and travel to subproject site during the day-time periods. Contractors will rent local houses or construction of an onsite campsite which will have all the necessary facilities including provision for sanitation and occupation. All Subproject worker (including construction workforce) will be required to undertake COVID-19, HIV, GBV and SEA prevention training and sign the associated Code of Conduct prior to commencement of works.

4.0 DESCRIPTION OF THE ENVIRONMENT

4.1. Physical Environment

4.1.1 Climate

67. The Solomon Islands is often subject to the south-easterly trade winds from May to October and the north-westerly trade monsoon winds from December to March. Due to proximity to the equator, the air temperature has very little variation. The average annual rainfall ranges from 3,000 to 4,000mm. The daily average rainfall is averaged at 190mm, and 330mm November to January as being the wettest months.

68. The climate in Guadalcanal is tropical with distinct wet and dry seasons. Generally, the weather between March and November is dry and humid, followed by a wet season from December to April. Being a large and mountainous island attribute to the island as being less dry and colder than the smaller islands in the archipelago. The wet season also coincides with the cyclone season. Maximum average temperatures range from 29.8 to 32.3 degrees Celsius with a mean of 31.0 degrees Celsius while minimum temperatures average between 21.3 and 23.3 degrees Celsius with a mean of 22.5 degrees centigrade.

69. Cyclones occurring within 100km of the subproject site over the last 40 years are: IDA, ISA, CARLOTTA, NAMU, IRIS, LINDA, JOY and CYRIL. See figure 3.

70. Like other Pacific nations, the Solomon Islands are exposed to climate variation. The National Adaptation Program of Action (NAPA) shows that surface air temperatures for Auki (1962-2007) and Henderson Field (1975-2006) have increased by about 1^0C during these periods. Accordingly, adopting the Intergovernmental Panel on Climate Change (IPCC) global assessment, the following changes are expected:

- Global temperatures may rise between 1.1^0C and 6.4^0C during the 21st century with the best estimate for temperatures to rise by between 1.8^0C and 4^0C;
- Sea levels will rise by 18 cm to 59 cm by 2100 mostly from thermal expansion of the oceans;
- There is a greater than 66% confidence level that there will be more frequent warm spells, heat waves and heavy rainfall; and
- There is a greater than 66% confidence level that there will be an increase in droughts, tropical cyclones, extreme high tides and storm surges.

71. 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.

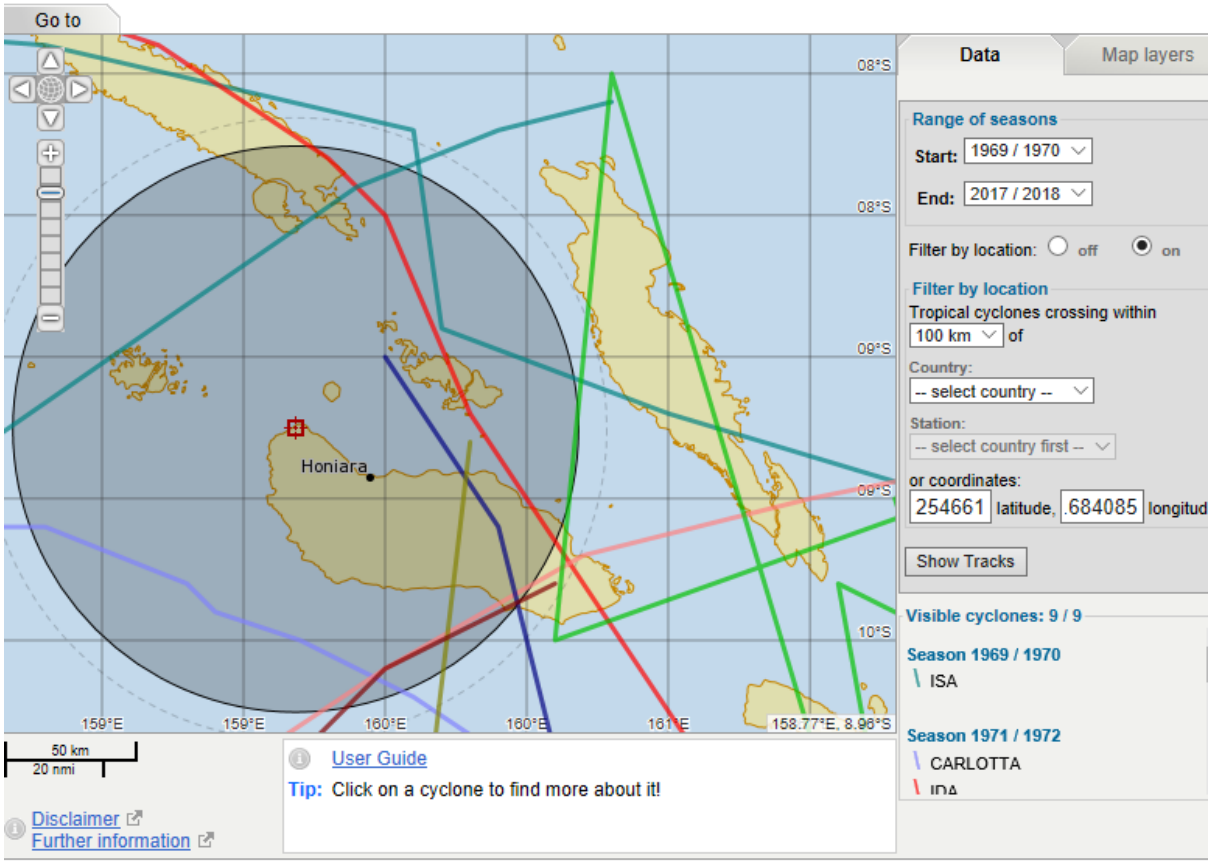


Figure 3: Cyclone track within 100km from Visale

Source: http://reg.bom.gov.au/cyclone/history/tracks/index.shtml, 2019[9]

4.1.2 Topography

72. Guadalcanal is approximately 6,000 km^2 in area and is about 150 km long and at its broadest is about 45 km wide. It consists of a north-west to south-east trending, asymmetrically located mountainous spine that lies close to and parallel with the southern coast and flanked successively northwards by dissected high hills, terraces and a coastal plain. The central range contains several high peaks including Mt. Popomanaseu (2,310 m) the highest peak in Guadalcanal and Mt. Tanareirei (2,061 m). Drainage is mainly towards the north with smaller drainage systems to the south[10]. The high hills flanking the volcanic basement have developed over mixed sediments and contain ridged areas, karst cuestas plateaux. These merged northwards into low terraced landscapes and wide plains of recent alluvium fed by shallow, braided rivers.

73. The subproject site comprises of undulating hills forming 100-600 meters from the coastline. These hills resemble the geological characteristic of Honiara terraces. The terraces (100-200asl, 3-400m asl and 5-800m asl) are mainly grassland cover and pockets of vegetation on valleys. The low-lying areas along the coast are occupied by settlements and the Visale Station.

[9] BOM (2019), Cyclone tracks - Southern Hemisphere [beta], Retrieved URL on the 8th April 2019 at URL: http://reg.bom.gov.au/cyclone/history/tracks/index.shtml

[10] Hansel and Wall 1974.

Figure 4: Subproject site and environment.

4.1.3 Geology

74. Solomon Islands is a double chain archipelago of islands formed by fertile volcanic rock through tectonic activity also known as the Pacific Rim of Fire. The Solomon Islands (excluding the Santa Cruz group) are divided into three geological provinces: a pacific province, a central province and a volcanic province. Islands with recent extinct volcano which included the northwestern tip of Guadalcanal, the Russell Islands, Shorthand's and Savo are found in this province. The volcanic geological province is much younger and consists of Late Miocene to Holocene volcanics, which are five to six million years old.

75. The geology of the subproject site comprises of igneous rocks generated by volcanism during the Oligocene to Pleistocene periods. These mostly comprise basaltic and andesitic lavas and ash deposits with the Tiaro tuff breccia and Gallego andesite, the most common rocks. The area also has significant alluvial deposits along the coast and along the valleys.

76. Solomon Islands lies at the boundary of three major plates which form part of the Solomon Islands Subduction Zone, the Pacific, Australian and Woodlark plates. In this area the pacific plate is the upper or overriding plate with the others sub-ducting under it. The volcanoes in the Solomon Islands are associated with the Solomon Sea Plate as it is sub-ducted beneath the Pacific Plate. A short spreading center at the southeast margin of the Solomon Sea Plate influences volcanism at Kavachi (Western Province submarine volcano). The uplift of the plates along with intermittent volcanic and seismic activity has contributed to the island masses which 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.

77. The Solomon Islands is prone to natural hazards including cyclones, landslides, earthquakes and tsunamis. There is only one active volcano in the country, Tinakula at Santa Cruz. Due to the location of Solomon Islands at the junction of tectonic plates, there are constant seismic activities including earthquakes and uplifting of land and reef areas. In the 1970"s an earthquake affected the populations of Guadalcanal resulted in three new villages, New Duidui, New Gorabau and Vatuloki, constructed at Aruligo in the North West in 1977 after people's original homes on the weather coast were completely destroyed by the earthquake.

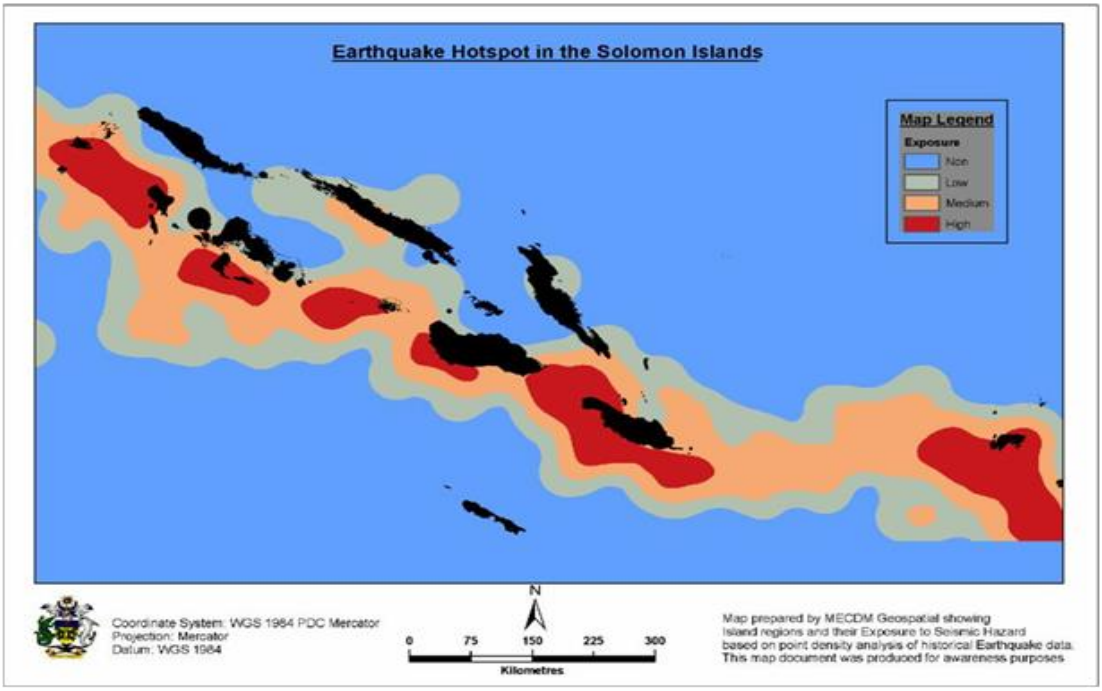


Figure 5: Earthquake hazard map (Source MECDM)

78. As far as the geological risk assessment by MECDM is concerned, the exposure to earthquake is medium for Visale. However, that cannot be overstated due to the villages being located in the foothills and that several of these hills have loose volcanic boulders that are can cause severe damage to buildings during earthquakes.

4.1.5. Soils

79. There are 27 soil groups 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 most fertile and agriculturally important of all soils found in Solomon Islands are the recent alluvial soils located on the northern Guadalcanal alluvial plains[11]. Soil in Visale comprise of reddish and brownish clays and are widely cultivated. The composition is a mixture of volcanic, sedimentary, calcareous and limestone.

4.1.6. Water Resources

80. There are no rivers in this part of the district except for a few streams and seasonal streams. The streams are short with small catchment areas and have high velocities after high

[11] IBID 9

rainfall events (which at times occur over approximately 1-3hrs). The mouth of the streams is often characterized by the presence of a beach bar which ponds up the streams and may limit the flow or divert exiting water to one side. During peak flow periods, they may break through and be subsequently built up by long-shore and beach building processes during the intervening periods.

81. The coastline at Visale station is relatively stable or in a neutral state. There are pockets of tree loss from the shorelines, particularly in the area near the Visale eco-lodge. On the western part of Visale Bay are areas of apparent accretion. The direction of long-shore drift recorded was westward. These patterns are likely to be seasonal and may reverse during the drier season in mid-year.

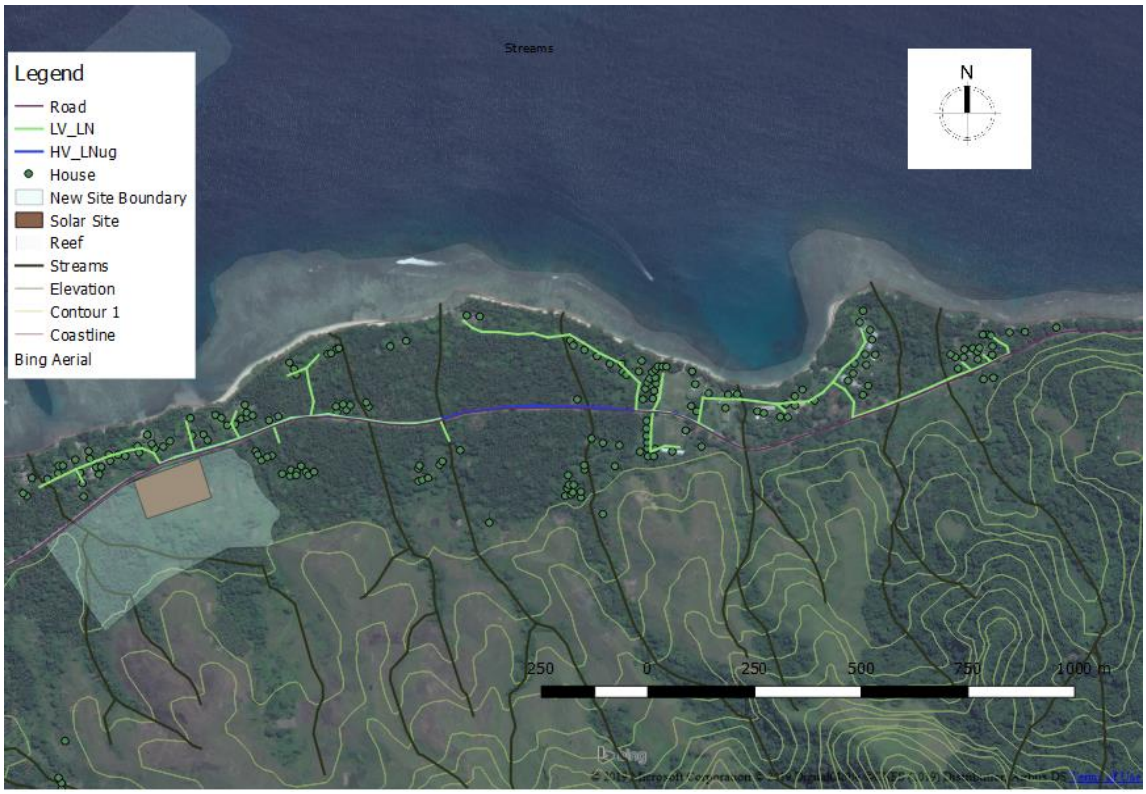


Figure 6: Water resources

4.2. Biological Environment

4.2.1. Forest

82. Despite the geographical spread of islands and relative varied flora in the Solomon Islands, the climax vegetation in the Solomon Islands archipelago shows similarity of appearance between islands. The five major vegetation types that have been identified in the Solomon Islands include:

1. Grassland
2. Swamps
3. Lowland Rainforest
4. Montane Forests

5. Secondary Vegetation

83. Further classification of these basic forest or vegetation types takes the sub types of the basic types to several more unique forest types recognized so far. The vegetation type for the area is grassland and pockets of fragmented lowland forest. The grasslands on the north and northwest of Guadalcanal appear to be the result of repeated burning preventing the re-establishment of secondary forest; however, they have been present since the time of Mendana (Jansen *et al*., 2005).

4.2.2. Terrestrial Flora

84. The vegetation is now largely degraded coastal lowland forest vegetated with cocoa plantations, and interspersed with subsistence gardens and regenerating scrubland. Where there are no gardens or plantations, the coastal forest usually comprises *Callophyllum sp*, *Barringtonia asiatica*, *Macaranga sp*, *Morinda citrifolia*, *Pometia Ficus* and Terminalia species. The subsistence gardens usually comprise stands of bananas (Musa sp), cassava (*Manihot esculenta*), pawpaw (*Carica papaya*), pineapple, species of sweet potato (*Ipomea batatas*) and melon plots. The immediate subproject site is mostly dominated by smaller plants or herbs including *Wolstonia biflora*, *Macaranga tanarius*, Guinea Grass (*Sorghum haplense*), and creeping legumes *Pueraria phaseloides*. Other species include Sensitive Mimosa (Mimosa pudica) and non-tree ferns. Typical vegetation along the subproject site are shown in figure 7.

85. Field observation established that none of these terrestrial floras are of any significant conservation value.

Figure 7: Typical vegetation

4.2.3. Terrestrial Fauna

86. The forests of Guadalcanal are known to support very high levels of bird and vertebrate endemism. Terrestrial fauna includes a large number of birds (about 50 species) including the yellow-legged pigeon (*Columba pallidiceps*), thick-billed ground dove (*Gallicolumba salamonis*), white-headed fruit dove (*Ptilinopus eugeniae*), crested cuckoo dove (*Reinwardtiana crassirostris*), chestnut-bellied imperial pigeon (*Ducula brenchleyi*), as well as the abundant forest kingfishers. Reptiles include the large *Discodeles* frog which is common in the grasslands and lowlands.

87. In the vicinity of the subproject site, human settlements and many other development activities have disturbed the area and have thus rendered the area devoid of any significant wildlife to be of much concern. Most of the original vegetation that is critical in accommodating much of the original wildlife have all disappeared.

4.2.2. Marine Flora

88. 76 percent of sea grass meadows in the province are found to be of continuous cover and restricted to the calmer bays and fringing reefs along the north western shores and the extensive reef complexes at the islands most easterly extent[12]. In these locations the sea grass meadows were generally continuous in structure and predominately (57% of total sea grass area) *T. hemprichii* dominated communities. Most notable are sea grass habitats in Northwest Guadalcanal that provide a foraging habitat for dugongs.

89. Around the subproject area, the dominant marine ecosystems are fringing coral reefs, landward of which are developed back-reef and sea-grass areas. Patches of sandy habitats occurs along the bays.

4.2.3. Marine Fauna

90. Solomon Islands is part of the Bismarck Solomon seas and the coral triangle ecoregion with high species diversity of fish and corals. The largest and most recent marine assessment carried out by The Nature Conservancy for the whole country have recorded 485 coral species, 19 species of sea cucumber, 4 main species of crayfish, 6 giant clams, 3 species of pearl oyster, trochus and green snails. So far, a total of 1019 coral reef species are being identified. For mammals, 9 species of dolphins, 8 species of whales and one dugong species have been identified.

91. In the reef and near-shore areas of Visale are common species of hard corals. The dominant corals were massive Porites, with *digitate Porites* (e.g. P. rus) and *Monitpora spp*. Soft corals and several species of urchins were also recorded. Marine resources are important to the livelihood of any rural Solomon Islander. The well protected bay with a fringing reef has resulted in a very diverse marine environment. The presence of indicator species such as anemone fish, blue banded goby, and blue aquarium fish in a sandy, foreshore and bottom proves the richness of the surrounding water. Katukatu (bait fish), yellow fin tuna, turtles, bonito, snapper, baraccuda and other reef fishes were also noted around the coastline. The bay area is the villages main fishing ground. During storms and cyclones, fish tend to find shelter in the bay area.

[12] Green *et a*l, 2004

Figure 8: Visale bay

4.2.6. Rare and Endangered Species

92. Solomon Islands is home to rare and endangered species. The island of Guadalcanal has some of the rarest and endangered species in the world. The Guadalcanal Mustached Kingfisher is indeed a species of hot debate by scientist today. Some thought that it is rare but not endangered. However, the IUCN have listed it as an endangered species. The other endangered bird species on Guadalcanal is the Meliphagidae Guadalcanal honeyeater (*Guadalcanaria inexpectata*). There are several rare and endangered mammals on the island including the *Molossidae Chaerephon solomonis* but are continuously threatened since the introduction of feral cats. The subproject site and the surrounding area however, are sites of heavy disturbances from past to recent past anthropogenic activities, and are therefore devoid of rare and endangered species that are of any conservation values.

93. Guadalcanal is habitat to many animals including four endemic bird species and Guadalcanal endemic giant rats. 1990 Australian Museum mammal survey of Mt. Makarakomburu found a new species of bat along with nine other bat species, four frogs and eight reptile spp. Thirteen bird species were recorded including rare Guadalcanal honeyeater *Guadalcanaria inexpectata*. Mt Popomanaseu is only place in the Solomon where terrestrial mollusc have generated endemic montane spp. Restricted to these mountains include the arboreal *Placostyllus selleersi* and undescribed spp *Helixario*n and *Trochomorpha*. Birds of the Irina River proposal area recorded 44 bird species, 13 are known to be endemic species in the Solomon Islands.[13]No rare or endangered or rare species were encountered during the SP site visit.

4.2.7. Protected Areas

[13] Lees, A. 1990. A Protected Forests System for the Solomon Islands, Canberra: Australian National Park and Wild Life service.

94. Protected areas are defined as geographical spaces, recognized, dedicated and managed, through legal or other effective means, to achieve the long term conservation of nature with associated ecosystem services and cultural values. There are about 42 protected around the country. They are managed by NGOs and the local communities, with most are managed through 'community-based resource management' approach as the resources are owned by traditional communities. The government also supported the management of a few of those protected areas. The subproject site has no areas declared as protected under the Protected Areas Act 2010.

95. In Guadalcanal province, protected areas include the Papai Island, Simeruka, Waimamauru, Wahere, Niuhoua, and Kerehira. Initially these areas are MPAs or individual Village Tabu sites manage by communities or tribal groups in collaboration with the Foundation for the People of the South Pacific Islands (FSPI), Solomon Island Development Trust (SIDT) and Ministry of Fisheries and Marine Resources (MFMR). Most of the sites are situated in Marau sound, further east of subproject site. Naro MPA located approximately 8.5km southwest of the subproject site was formally established in 2011 and managed by the Naro community. On land, Mount Popomanaseu and Lake Lauvi have been identified as a potential site worthy of protection but both are 80km and 100km east of the sub-project area.

4.3. Socio-Economic Environment

4.3.1 Wider Subproject area

96. The beneficiaries to the subproject are communities in Visale. Visale is located on the North West tip of Guadalcanal in Saghalu ward in Guadalcanal with a population of 6429. Visale is a district comprising of more than ten coastal communities. The initial subproject network will only cover one hundred fifty-three households of approximately 1000 people. The majority of the locals here are customary landowners and do have access to social services but a large number still lack the basic services.

4.3.2 Sub-Project Neighbour Hood

97. The subproject site is located on DMI's registered land and adjacent to Saghalu community in Visale. The subproject neighborhood are households located within the 100m from the subproject location.

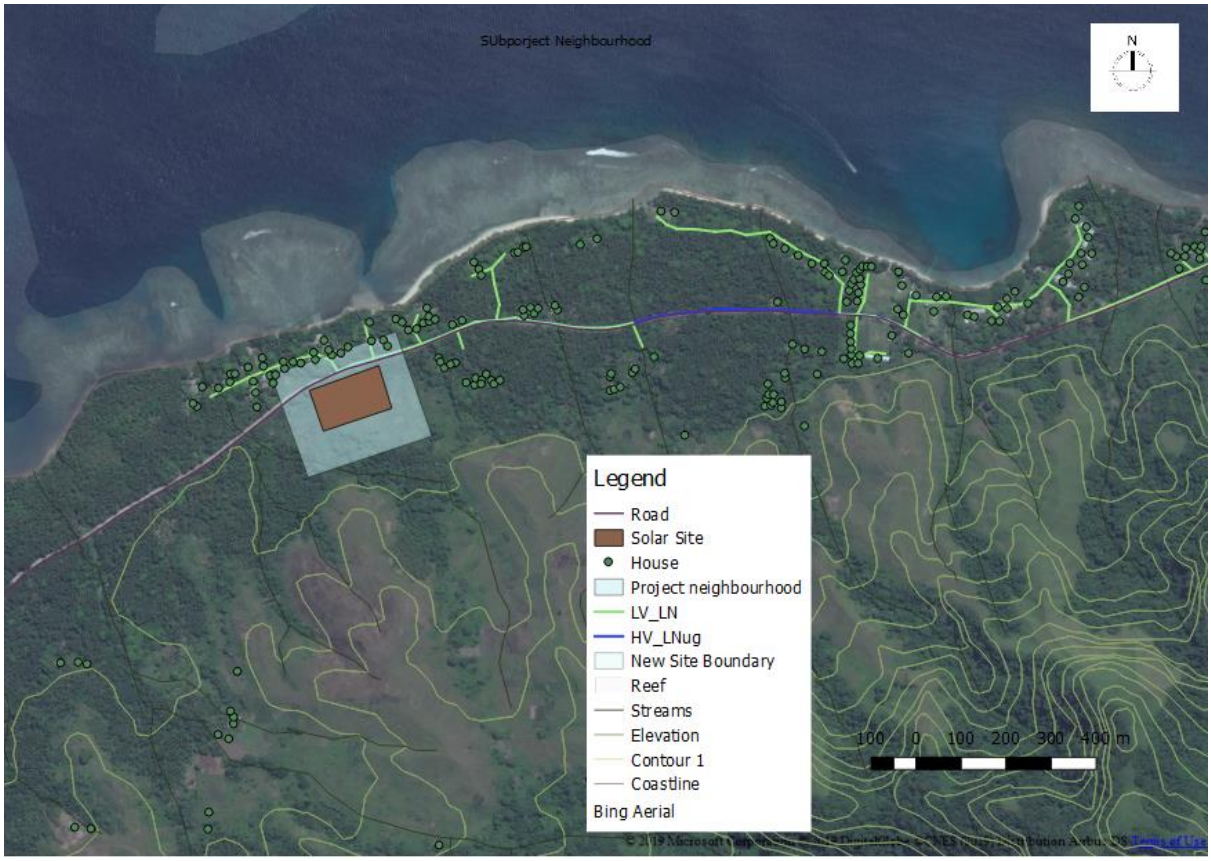


Figure 9: Subproject neighborhood boundary

4.3.3 Household and standard of living

98. **Dwellings:** The majority of the people in the wider area are residing in permanent, semi-permanent and a few in leaf buildings. The station area including the parish priest area, DMI, school and clinic consist of all permanent structures. According to the SP planning survey in 2017, there were 91 permanent buildings, 8 semi-permanent and 54 leaf houses. Population growth and access to economic services are expected to enhance development in the area. Consultation with the DMIs, school deputy principal, parish priest and locals revealed the entire area are planning to build permanent structures including staff houses, classrooms, computer labs, eco lodge and homestays.

Building Type	Total
Permanent house	56
Semi – Permanent house	8
Leaf house	54
School buildings	22
Mini Hospital buildings	1
Shops or Canteen buildings	4
Church buildings	2
Rest Houses buildings	6
TOTAL PROPOSED CUSTOMERS	**153**

Figure 10: Building type, SP planning team 2017.

99. **Water and Sanitation:** The communities here are connected to a water supply system. The source is further inland, approximately 5km from the subproject site. Stand pipes are shared between 2-3 houses. The majority of the homes surveyed do not have sanitation, people either use the bush or beach. Very few people owned flash, bucket and pit toilets.

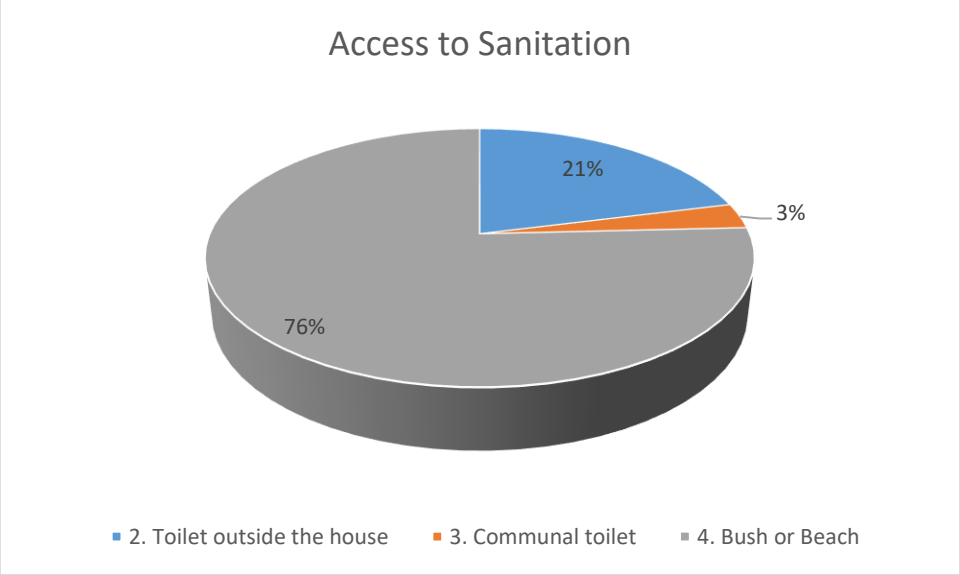


Figure 11: Access to water, the entire area

100. **Energy:** The majority of the people use home solar with limited energy output and very few use diesel/petrol generators. According to the survey, majority use 20-40W solar panels and batteries. People revealed the solar systems (Panels and batteries) are low quality, low capacity and life span 1-3 years.

4.3.3. Community Consultation

101. SP team conducted a public consultation on Thursday 28th of March 2019. At the same time, a social survey was conducted to understand the social baseline in the area. Consultation outcomes are detailed in chapter 8.

4.3.4 Social Services

102. **Health and Education:** People in the area have access to basic health care and education. People travel to Visale Clinic for medical attention. Emergency cases are being referred to the Honiara Central Hospital. Health challenges for the local population are malaria, respiratory conditions (pneumonia, colds & flu) and gastrointestinal infections. Furthermore, the infrastructure and services are limited due to increase population. The clinic and schools have access to water supply network and tanks including solar panels. The solar panels and batteries however, do not enough capacity to power all the clinic equipment.

Figure 12: Visale clinic

103. The closest schools are Visale Community High School (VCHS) and Visale Primary School (VPS). Both are 1.3km east of the subproject site. VCHS is day school with classes from new entrants to form five. According to the deputy principal, the VCHS comprise of over 200 students. Students normally walk or cycled to the school. School facilities include 16 classroom/admin buildings and 14 staff houses. The school is planning to build additional classrooms for forms 6, science labs, computer lab, library, school hall and staff houses. The VPS population is approaching 150 students. The primary school have 12 staff houses and 15 school buildings (classrooms and admin office).

104. **Communication:** The subproject area does not have access to communication services. Recently, a telecom tower with 3G coverage was constructed. Visale will soon have Telecom coverage and access to internet and data services.

105. **Transport:** Access to Visale is by land and sea transport. Transportation of people and goods are primarily by bus, three-ton vehicles and private vehicles. A taxi can cost up to SBD300 from Honiara to Visale via the seal road. Transportation to other communities or islands (Savo, Russel and communities in weather coast) are by Out Boat Motor (OBM) engines and ferries.

4.3.5 Income Generation

106. **Employment:** Majority of the locals here are farmers and fishermen. Public servants are mainly teachers and nurses. See figure below.

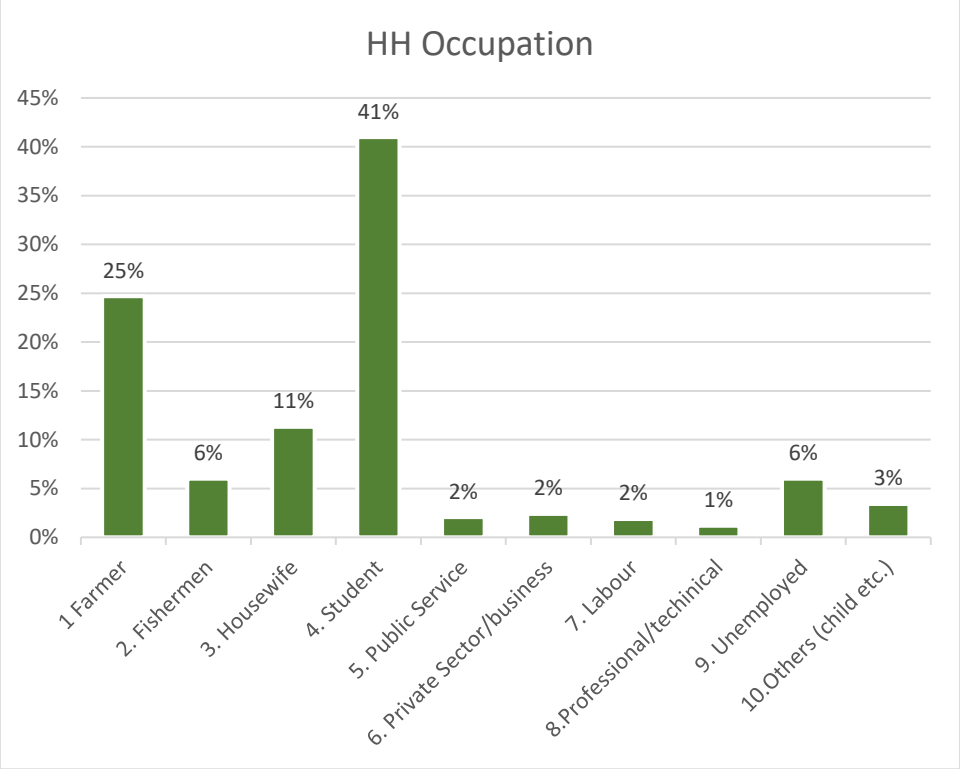


Figure 13: Occupational status.

107. **Betel Nut:** Betel Nut is increasingly becoming an important source of income for people in the area. Generally, the price producers get is SBD300-500 dollars for a 20 kg bag. Betel nut is generally collected and bagged for market by women and children. Normally, the beetle-nut stalls earn up to SBD80 per day on average. This source of cash income is controlled by women who use the income to meet the food and basic needs of the family.

108. **Selling of cooked food:** At the subproject neighborhood, selling of bun, ring cakes, cooked and baked food are common among women. Women confirmed, they earn an average of SBD200-SBD300 per week from selling cooked food.

109. **Retail Shops (canteen):** SP planning survey in 2017 indicated there were at least 4 shops and canteens in the subproject area. The number of canteens have increased recently according to 2019 SP social survey to 11 shops and canteens. These canteens are typically family-run convenience shops ranging in size from small canteens selling essential items to shops operating more as general stores. Two have refrigerators powered by generators. The average weekly income ranges from SBD5000 to SBD10000.

110. **Farming:** The main form of livestock farming are piggery and chicken. Pig is part of every marriage, cultural feast and gathering. A pig can cost SBD2000-SBD5000 depending on the sizes and weight. Small holder farmers have approximately 2-3 pigs. Few households do have local chickens. There are some farmers who have fences but the majority of the pigs and chicken are left to hover around. Basic agriculture crops include, cassava, potatoes, cabbage, and tomatoes in which farmers earned an average of SBD300 per week. Locals

earned more from farming melon and selling mango. According to the social survey, annual income from melon alone for one of the household was SBD40, 000.

4.3.6 Livelihood and Economic Development

111. **Livelihoods:** The livelihoods of the households and communities of the Visale subproject area are based on small-scale agricultural production and artisanal fishing, with the priority being food production for home consumption. Agriculture is based on shifting horticulture, the staples being root crops, vegetables and fruits. Most households attempt to produce a surplus for sale. The SP social survey found that 46% of households were growing food for both home consumption and for sale. Fishery is very important, with 10% of the households fish for subsistence and sale. No commercial fishing was reported in the Visale subproject area.

112. The main source of cash income for local households is the sale of fish, sale of fruits (melon, mango and cucumber), cake, crops, livestock and betel nut (71%), wages and salaries (9%), copra and cocoa (12%) remittance royalties and allowances (2%) and accommodation, transport services, shop/canteen, transport (bus and boat), tailoring, rental, bottle shop (12%).

113. Analysis of household income indicated (25%) earned between SBD 0-200 dollars per week, 23% Households SBD 201-500 per week, 14% Households SBD 501-800 per week, 15% Households SBD 800-1300 per week, 10% Households SBD1301-2000 per week and 12% Households more than SBD2001 per week.

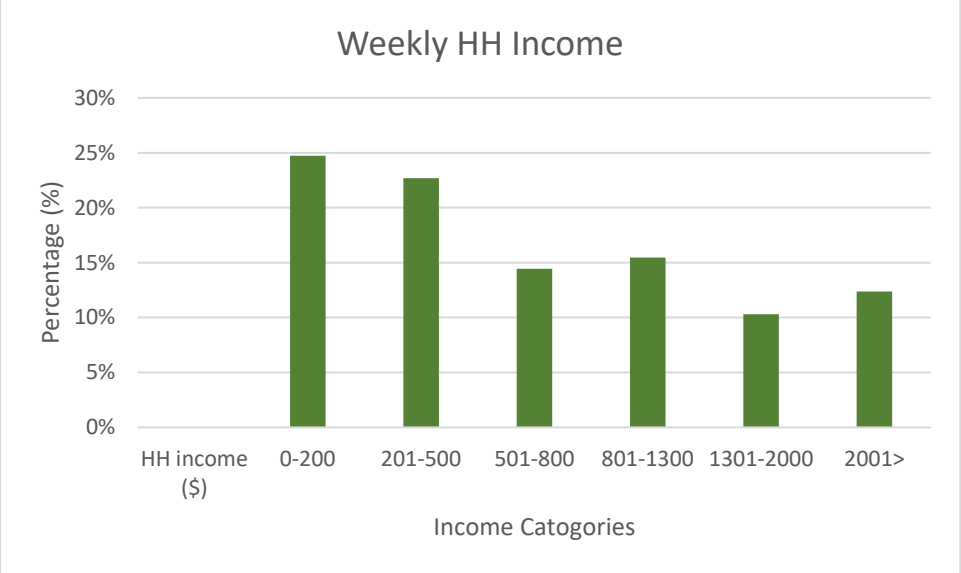


Figure 14: HH income, Visale

114. **Economic development:** According to the social survey, 10% of the HH surveyed were engaged in fishing as source of their income. There is a fishery center at Tambea approximately 2km from the subproject site but is yet to fully operate. It is funded by the SIG through the Member of Parliament for Northwest Guadalcanal Constituency. The Centre was designed to provide shared marketing, cool store and ice making facilities for participating fishermen.

115. Visale is located in the iron bottom sound area where Japanese and American ships sank during WWII. There are diving and fishing hot spots in the area, a great opportunity for tourism. Two families have started operating bungalows and homestays. According to the

operators, Japanese, American and Australian tourists had visited the site for diving and fishing. Few locals share the same interest and are planning to develop their areas into tourism destinations.

116. There are also a number of copra driers at Visale, all fueled by wood. The recent fall in copra prices has affected copra production in the entire area.

117. The major sources of income for almost all household in the area are from the sale of melon and mango. A family can earn up to SBD40, 000 annually from the sale of melon and SBD10, 000 from mango fruits. Villagers revealed that during the mango season, people from Visale would travel to as far as the Western and Malaita Provincial centers to sell melon and mango fruits. People indicated that mango sold in the Honiara markets mainly comes from Visale area.

4.3.7. Social Organization

118. **Tribal Affiliation:** The entire subproject site is comprised of Guadalcanal people with tribal affiliations and customary ownership. Visale also houses other cultural groups including those from the catholic station, secondary and primary schools and DMI's resident. Originally, the area of the subproject site belongs to the tribal units in Visale. It was recently that DMI acquired land from tribal groups to establish schools and the catholic station.

119. **Leadership:** Communal affiliation at the subproject neighborhood is evident. Just like any Melanesian society, the area would have big men, chiefs and elders who were charismatic leaders or focal points able to use their personal abilities and enterprise to organize community activities. All tribal units do have chiefs who are responsible for tribal affairs including dealing with land matters and tribal issues. Visale is a catholic station and a parish priest manages its affairs. According to the parish priest, John T who is from Makira, Visale parishioners is approaching five thousand people. The DMI establishment at Visale include the DIVIT School, Sister's Formation and elderly home for old age sisters. The principal of the DIVIT School is Sister Anna Ngosana, head of the Sister's formation, Sister Constance Vutulaka and head of the elderly is Sister Nellie.

120. **Religion:** The entire area population are Catholics except for a small community of five households who are Anglicans.

121. **Women and Youth**: In Visale and adjacent villages, women's groups are church based organizations. The Roman Catholics do have sisters (nuns) and a few organized grouping based on village by village. The women's groups focus on religious commitment but also on "empowering and equipping women with the skills and knowledge to make better decisions on issues that affect their lives and those of their families and communities"[14], and promote self-reliance and rural economic empowerment. These groups provide training in cooking, sewing, making baskets and dying clothes. They also organize cooperative activities to improve food security for women and their families. Most youth groups are associated with local churches and majority promote religious activities.

[14] https://www.spc.int/sdp/70-inspiring-pacific-women/dr-alice-pollard. Retrieved 28 August 2018. See also https://iwda.org.au/case-study-west-areare-rokotanikeni-association-solomon-islands/

5.0 ANTICIPATED ENVIRONMENTAL SOCIAL IMPACTS AND MITIGATION MEASURES

5.1. Significance of Impacts

122. The potential environment and social impacts for the subproject have been identified, and their significance assessed. The duration of the impacts is assessed with reference to the scope of work and the bio-physical and social environment in the subproject site. Mitigation measures are designed in order to avoid and/or minimize each of the potential environmental and social impacts. Impacts may be minor, moderate, major or negligible based on the scale of impact itself and whether it be mitigated or not.

5.2. Potential preconstruction impacts and mitigations

5.2.1 UXO

123. During WWII, the subproject site was subjected to intense battles and while this occurred over 60 years ago, it is possible that a chance discovery of a UXO may occur. Provision in the contract BOQ will ensure the contractor to carry out a UXO survey prior to any construction and during construction. Should UXO be discovered, the contractor is to immediately cordon off the area, arrange the evacuation of nearby residences and inform the RSIPF of the find.

5.2.2 Preliminary designs and design specification

124. Preliminary designs and design specification will need to be approved by SP and the GPG TCPB. The board will issue a building permit or consent for the development to proceed. This process is a legal requirement under the Town Country Planning Act, which means consent has to be acquired prior to any civil works onsite. The designs avoid resettlement and unnecessary clearance to vegetation.

5.2.3 Land restrictions

SP acquired the land for the Visale solar farm as a Fixed Term Estate leaseholder for a lease period of 10 years. See Annex 8 for land title. SP is aware of the years left and will ensure it is renewed two years prior to the expiry date.

5.3. Potential construction impacts and mitigations

5.3.1 Impact on Flora and Fauna

125. During the construction phase, flora and fauna can be affected but any potential impacts are considered to be minimal as the construction will be performed at previously developed site. Measures to be included in the subproject to ensure protection of flora and fauna within the site include:

- At the induction meeting, the contractor and SP will provide guidance on felling and clearing of vegetation;
- Contractor will be responsible for providing adequate knowledge to construction workers in respect of fauna. The poaching of fauna will be prohibited. Anyone behaving in such manner will be reported to the management and disciplined and

- Construction workers will be informed about general environmental protection and the need to avoid un-necessary felling of trees whenever possible.

5.3.2 Impacts on Air Quality

126. The quality of air within the subproject site is typical of a rural setting in the Solomon Island. The construction works will have a minor and temporary impact on local air quality through emission of exhaust from construction machineries, as well as through dust generation from vehicles transporting materials and from exposed stock-piles. There are no air quality or emission standards in Solomon Islands, and as the subproject is not a green-field development nor is it highly polluting, preparing a baseline for subsequent monitoring is not considered warranted. Total Suspended Solids (TSS), SO_2 and NO_2 gases are expected because of the diesel and petrol fueled equipment as well as dust from exposed ground or stockpiles. There are a number of good engineering practices that can be employed to ensure that any air quality impacts generated during construction are mitigated. These 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 SP as part of environmental monitoring;
- Prohibition of the use of equipment and machinery that causes excessive pollution (i.e. visible smoke) at the subproject sites;
- Provide workers with protective safety equipment including masks;
- Ensuring that all vehicles transporting potentially dust-producing material are not overloaded, are provided with adequate tail-boards and side-boards, and are adequately covered with a tarpaulin (covering the entire load and secured at the sides and tail of the vehicle) during transportation;
- Wetting material (for example prior to transport or when stockpiled) when conditions are such that there is a high risk of dust generation. This is particularly important when climatic conditions expose sensitive receptors to potentially damaging levels of suspended particulates.
- Material stockpiles being located in sheltered areas and covered with tarpaulins or other such suitable covering to prevent material becoming airborne;
- Contractor to develop a trigger action response plan (TARP) that details what the construction workers should do for different dust levels and wind directions and
- Periodic qualitative air quality monitoring (by observation rather than testing).

5.3.3 Impacts on Water Quality

127. Water quality can be affected during construction when soils, wastewater, oils and lubricants, sewage and other materials are discharged to the environment. Construction activities that may exacerbate the movement of these materials into the water environments will be examined and mitigation measures developed. Mitigation measures include:

- The implementation of erosion and sediment control measures such as silt fences and sedimentation ponds during clearing and construction. The direction in which water will flow across the subproject area should be determined prior to the commencement of works and mitigation controls put in place to prevent turbid water from being discharged offsite.
- Minimizing interference with natural water flow within or adjacent to subproject site;
- Solid wastes, debris, spent oil or fuel from construction machinery or plant, construction material, or waste vegetation removed from subproject site will be disposed at a designated site approved by communities and the provincial authority;

- Hydro-carbons, fuel, and other chemicals as required for the works, will be stored in secure containers or tanks that are bunded and located away from the surface waters, or streams and shoreline. Any spills will be contained and immediately cleaned up as per the requirements of the emergency response plan prepared by the contractor; and
- All water, waste-water and other liquids used or generated by subproject works and activities will be collected and disposed of in an approved manner and in an approved location. Such disposal will not be permitted to cause either pollution or nuisance. All sanitary and kitchen waste water will be piped into soak hole and soak way.

5.3.4 Impacts on Soils and Erosion

128. There will be minor excavation work during construction. Measures will be taken to avoid the movement of eroded soil from the site onto adjoining areas including the worksite. At the completion of work, all disturbed areas will be stabilized by national re-vegetation. Existing patterns of erosion, soil characteristics and topographic conditions were taken into consideration in the concept design of the subproject. Certain types of earth works, e.g. vegetation clearing and excavation can result in sedimentation.

129. The potential impacts on soil, or from erosion, during construction are from (i) turbidity impact on the receiving water bodies; (ii) soil erosion and loss of protective vegetation; and (iii) soil contamination from fuel, chemicals and/or construction material spillage. Material stockpiles will be susceptible to erosion, creating sediment laden run-off, particularly during rains and re-suspension of dust during the dry season. Stockpiles will not be permitted near water bodies and should have an associated erosion and control plan to prevent sediment from leaving the site through rainwater run-off. Potential soil impacts and erosion will be mitigated by:

- In the event that the contractor causes damage to agricultural land, productive land or gardens, contractor is solely responsible for repairing the damage (It is expected all works carried out on SP registered land);
- Designs used that protect soils in order to reduce erosion; and
- Random and uncontrolled tipping of spoil, or any material, will not be permitted.
- How would hydrocarbon contaminated soil be disposed of?
- Ensuring bunding of areas at construction lay down areas for storage of fuels and other potential hazardous substances,
- Developing a spill response plan (emergency response plan) and provide training to contract workers on how to implement the same, etc.

5.3.5 Impacts on Noise Levels

130. There are no noise standards in Solomon Islands, and as any noise generated by the subproject will be temporary (i.e. during construction) and intermittent, preparing a baseline of ambient noise levels for subsequent monitoring is not considered warranted.

131. Construction noise is generally intermittent, attenuates quickly with distance, and depends on the type of operation, location and function of equipment. During construction, there will be a temporary impact due to the noise of the construction equipment, especially heavy machinery when construction activities are carried out close to residents.

132. The most sensitive receptors are mainly residential buildings. It is the responsibility of the contractor to arrange meetings between affected residents on feasible work schedules (hours of equipment operation etc.). WB standard noise levels can be used as a guide[15].

Table 1.7.1- Noise Level Guidelines[54]		
	One Hour L_{Aeq} (dBA)	
Receptor	Daytime 07:00 - 22:00	Nighttime 22:00 - 07:00
Residential; institutional; educational[55]	55	45
Industrial; commercial	70	70

Table 2: WB Noise guide

133. Measures to be included in the subproject to mitigate the effects of noise include:

- Requirements in the ESMP and contract documents that all vehicle exhaust systems and noise generating equipment be maintained in good working order and that regular equipment maintenance will be undertaken;
- Prohibition of any construction activities between 9pm and 6am in, or close to, residential sites;
- The contractor will prepare a schedule of operations that will be approved by affected stakeholders. The schedule will establish the days, including identifying days on which there should be no work, and hours of work for each construction activity and identify the types of equipment to be used;
- Workers will be provided with noise abatement equipment; and
- Any complaints regarding noise and other potential or perceived impacts will be dealt with by the Contractor in the first instance through the redress grievances mechanism.

5.3.6 Impacts on Access

134. The subproject will cause temporary impacts, including inconvenience, minor disruptions to traffic using the local access during the construction period. Where applicable, the contractor will develop a traffic management plan as part of CESMP. Mitigation of impacts on access will include:

- Care must be taken during the construction period to ensure disruptions to access and traffic are minimized;
- Signage and other appropriate safety features will be used to indicate construction works are being undertaken; and
- The contractor will ensure that access roads to privately owned land are not disturbed.

5.3.7 Impacts on Health and Safety

[15] https://www.ifc.org/wps/wcm/connect/4a4db1c5-ee97-43ba-99dd-8b120b22ea32/1-7%2BNoise.pdf?MOD=AJPERES&CVID=ls4XYBw

135. The subproject's activities can cause a range of health and safety impacts. The main impacts on health and safety are associated with (i) risk of accidents, (ii) traffic safety issues and (iii) chemical spills. The risk of the spread of communicable disease is considered to be negligible.

136. Observing general health and safety requirements, including the provision of safety and protective gear and equipment to workers, will reduce the risk of accidents at the subproject site. Air pollution and noise, which also have a health and safety aspect, have already been discussed.

137. The contractor will need to observe general health and safety requirements and, as a minimum, must be compliant with the Labor Act of 1978, the Safety at Work Act of 1996 and where application the WB/IFC EHS Guidelines. SP Project Engineers will undertake inspection and spot checks weekly to ensure the contractor is complied with the health and safety requirements. The SIG declared a state of public emergency in 2020 to protect the country against the risk of COVID-19 pandemic. All government agencies, including provinces, SOEs, the private sector and communities were required to comply with the SIG COVID-19 protection measures persuaded by the Ministry of Health and Medical Services (MHMS) and SIG COVID-19 task force committee. In order to comply with the country's management system, SP contractors have been advised to provide a COVID-19 management plan. This will also be required in all SP future contracts.

138. Mitigation measures for reducing and avoiding impacts on health and safety include:

- SP and the contractor to provide workers health and safety induction, and on the specific hazards of their work;
- Provide workers with personal protection equipment, such as safety boots, safety glasses, reflector vests, helmets, gloves, and protective clothing and ensure workers adhere to OH&S policy at all times;
- Garbage receptacles will be setup at subproject sites, which will be regularly cleared. The garbage will be dumped only at designated site approved by the communities and the provincial government;
- 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 and signage or marking of the work areas; and
- SP/Contractor will issue general and hot work permits at every stage of the work outlining the scope and precautionary and protection measures for example working at height, confined spaces, isolation of electrical equipment/ power-lines.

5.3.8 Fire

139. Smoking near fuel storage areas causing fire and loss to construction resources are expected to be minor. At this stage it is uncertain the amount of fuel likely to be onsite but it expected to be less than 100 gallons per month for the construction. Mitigations measures include:

- Prohibit smoking close to fuel storage areas;
- Erect signage of no go smoking zones; and
- Provide extinguishers and fire hydrants including training workers on their use.

5.3.9 Accidental discovery of archaeological resources

140. Any site clearance, digging and excavation activities undertaken during construction can 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.

- Activities shall not re-commence until the authorities have signed-off that the site/resources have been dealt with appropriately and that work may continue. The contractor will be responsible for complying with the requirements of authorities, and the SP shall monitor the same.

5.3.10 Emergency Response Plan

141. The contractor will be responsible for preparation of an emergency response plan in consultation with the relevant organization that will cover containment of hazardous materials, oil spills, and work-site accidents. The plan will detail the process for handling, and subsequently reporting, emergencies, and specify the organizational structure (including responsibilities of nominated personnel). The plan will also consider elements such as access to emergency services and medical treatment and the availability of emergency response resources on site such as medical equipment, fire extinguishers and spill kits etc. including ensuring that the contractor is able to effectively use them.

5.3.11 Climate Change and Adaptation

142. As for the subproject, the main climate change risk would be related to occurrences of extreme rainfall events and tropical cyclones. Extreme weather events have had the potential to cause damage the solar hybrid. Fumes from construction machineries used for the work will contribute to emission of greenhouse gases; however, can be considered very minimal and negligible. Therefore, the subproject will not have any significant impact on climate change. Risks of impacts on the solar hybrid and associated structures from climate change will be addressed through routine inspections. In addition to repairing solar hybrid components, one of the responsibilities of the contractor will be to report on cases where onsite drainages are failing and to recommend upgrades or additions as required.

5.3.12 Generation of waste during construction

143. Construction waste comes in solid and liquid form from different construction components. The ECD regulates the discharge of any substances on the environment. All construction materials whether liquid or solid will be disposed at designated site approved by the Project Engineer with prior approval from Guadalcanal Province, Landowning Units or ECD.

144. **Segregation of Solid Wastes**: Solid is generally understood as solid or semisolid, non-soluble material (including gases and liquids in containers). All other forms of waste except for anything non-solid can be categorized as solid waste. Solid waste represents a majority of the waste produced during the construction. Construction waste will include drums, cables, timber and metal off cuts and kitchen waste to name a few. The contractor will sort or segregate all solid waste before disposal. Willy Bins will be labeled with different waste categories for example “cans, plastic and organic” waste and be installed at designated sites especially at the entrance, campsite and construction area. The contractor’s obligation is to remind construction workers to adhere and comply with the segregation methods and penalize workers who defied the rules established.

145. **Liquid waste management:** Liquid waste can be fluids of any form, dirty or clean, toxic or not, can be oil, grease, fats, sewage to name a few. All these are expected during the

construction period and will be managed at acceptable standards. Obviously waste oil is common during construction as a result will be stored in a safe location. There is provision for spate toilet at all construction sites.

146. Where fuel is being transferred from a vehicle, the tank truck must be certified to standard and that all trucks used to transport fuel tanks meet commercial vehicle inspection requirements. There should be signs, indicating that the ignition must be turned off and smoking is not permitted while the vehicle is being refueled and must be visible to every driver. Travelling along highway should be not more than 60km/hr. to avoid accidents. Maintain at least one 20-B:C portable fire extinguisher with the tank vehicle. Refueling equipment from a tank vehicle is permitted if the following conditions are met:

- the fuelling is conducted outdoors on commercial or industrial establishments;
- the fuelling is conducted using approved hose-reel and automatic closing nozzles; and
- appropriate training and equipment are supplied to deal with any incidental spillage.

147. All storage tanks for combustible and flammable liquids will be built and maintained regularly. There will be thorough inspection for possible leakages and faults. Whenever a problem occurs, a spill response kit capable of containing and absorbing fuel spills will be made available and maintained. Company will ensure spills are recovered and that contaminated soil is removed or treated. Post spill response procedures and maintain an emergency response plan with the fuel facility.

148. **Asbestos Removal and Disposal**: No demolition works required for this subproject. However, when contact with asbestos, herewith are the management measures. If asbestos fibres are present in the air and are inhaled, there is a risk that they may cause a variety of serious health problems. Asbestos cement products, will be handled with care and through the use of standard operating procedures (SOP) or Material Safety Data Sheets (MSDS). Release of asbestos fibres into the air comes from drilled or cut during construction, especially if broken in the process may release asbestos fibres. A number of good engineering practices will be carried to avoid such risk:

- Workers familiarise themselves with the type and condition of asbestos cement product that will require removal and disposal of at the site.
- Will obtain approval for an appropriate disposal site prior to demolition.
- Will remove asbestos cement demolition materials immediately from the site to the disposal site without storing it.
- All workers handling the materials are supplied with the appropriate protection clothing and equipment, which are:
  - White disposable overalls to wear during the operation;
  - Disposable dust mask suitable for work with asbestos; and
  - Disposable gloves.
- Ensure that the following are available at the site:
  - A hose and a supply of water for wetting down materials;
  - A plastic groundsheet that can fully wrap the quantity of asbestos cement sheeting and which will be disposed of with it; and
  - Packaging tap to seal the wrapped sheeting.
- Prevent children, or anyone else who may be affected by the work, from entering the immediate work area.
- Wear a suitable disposable dust mask to prevent inhalation of asbestos fibres.

- Wear disposable overalls. These should be taken off at the site and disposed of with the AC sheets. These overalls will prevent asbestos fibres clinging to your clothes where they could cause contamination

149. **Hazardous Waste Management:** Hazardous and chemical wastes can be generally referred to as materials either in their solid, liquid or gas states that exhibit a 'hazardous characteristic', usually ignitability, corrosivity, reactivity and toxicity when made in reference to chemicals. It is possible that hazardous chemicals will be used during construction. Hazardous waste materials, such as catalysts, will be handed back to the suppliers for specialist disposal. All Hazardous waste shipped from the site will be subjected to waste manifest to track generation, transportation through licensed and approved contractors. The contractor will:

- Store kerosene, diesel, petrol and lubricants in a bunded area with an impervious surface and with stormwater drainage provisions as approved by the Engineer.
- Store paint, and chemicals in a hazardous materials storage shed with walls, roof, ventilation and a bunded floor with an impervious surface;
- Ensure that the storage capacity of each bunded area is at least 105% of the total volume of hazardous material stored;
- Secure the areas and sheds used to store hazardous materials by erecting a security fence of minimum height 1.80m around each facility with the fence located outside the bund;
- Locate the hazardous materials storage areas at least 10.0m away from any watercourse;
- Contain and mop up spills of hazardous materials in accordance with manufacturer's specifications.

150. **Waste management training and awareness**: SP and the contractor will pursue training on waste management protocols with the construction team before civil works commences. In addition to that, all new staff or visitors will be briefed on the waste management requirements before he/she takes up a job or visit site. Workers will be reminded regularly through weekly meetings or daily pre-starts on waste management obligations. The contractor has the right to penalize workers when waste management protocols are not being followed.

5.3.11. Impacts on Protected Areas and other Sensitive Ecosystem

151. The subproject activities will not have any impact on protected areas. The subproject site consists mostly of a disturbed deciduous and cassava/potatoes plots and with a small-scale operation, the impacts are expected to be minor. All in all, no impact is envisaged for protected areas and sensitive ecosystem.

5.3.12 Risk of Spread of Communicable Disease

152. The spread of STIs, HIV and COVID-19 could be a possibility during construction due to influx of workers in the country. Nonetheless, all risks will be considered as a precautionary measure and mitigation measures developed. Implementation of the STIs, HIV, AIDS, GBV, SEA and COVID-19 awareness and prevention campaign will be undertaken during the pre-construction phase as well as construction by the contractor.

5.3.13 Social concerns

153. Community concerns regarding the subproject will be dealt with through the grievance redress mechanism (GRM) in chapter nine. Impact on adjacent residential buildings will be from the noise and dust from equipment. Other risks including spread of diseases between the construction team and the residential population is deemed minor or negligible. The contractor will need to provide first aid kits, safety equipment for workers and provision for taking victim to hospital. The contractor will be responsible for providing adequate training to construction workers and public in relation to safety issues, code of conduct and GBV. Alcohol consumption and inappropriate behavior by the workers or public will be monitored and dealt with by police. Mitigation measures include:

- Contractor to ensure worker's actions are controlled and code of conduct observed; and
- Educate workers to respect public properties or other important services.

5.3.14 Employment

154. Direct employment possibilities may arise as a result. A few skilled workers may need temporary housing or camp and the provision of water, food and basic sanitation during the construction phase. Increase in income generation will take place for local market vendors as the workers will have to buy local food produces from the market and shops.

5.4. Potential Operation impacts and mitigations

5.4.1 Community Health Concerns

155. For concerns that the communities may have regarding safety and accidents. For example, electrocution and skin disease. Mitigation measures will include:

- Potential risks will be identified, evaluated and addressed in a manner that follows the safeguard policies;
- Potential risks will be communicated through forms of community consultations or as deemed appropriate, in particular, risks associated with transmission lines to nearby communities;
- Provision for training will be made available to local communities to ensure that an understanding of OHS and social risk awareness is in place during accidents.

5.4.2 Natural Disaster Impacts

156. Guadalcanal Island is vulnerable to cyclones. Therefore, it is important infrastructures, and utilities are design proof to such conditions. Extreme weather events may cause damage to the distribution line and solar farm. SP will develop an emergency response plan to manage and respond to such events

5.4.3 Climate Change

157. The risks to the subproject as a result of climate change revolve around the ongoing operation and maintenance of the assets. The main climate change risk would be related to occurrences of extreme tropical cyclones. These events have the potential to damage the solar hybrid, including the poles and distribution lines. Over time, it could lead to tear and wear of distribution lines and associated apparatus. Risk of impacts on the subproject can only be addressed through inspection and routine maintenance works.

158. Fumes from construction machinery will contribute to the emission of greenhouse gases; however, considered to be negligible on a global scale. Therefore, the subproject will not have any significant impact on climate change.

5.4.4 Health and Safety

159. Observing general health and safety requirements, including the provision of protective gear and equipment to workers, will reduce the risk of accidents at the work sites. Measures include ongoing training of workers and reviewing Standard Operating Procedures (SOP) to suit condition at the subproject.

160. Mitigation measures include:

- Provide workers with training in occupational health and safety (OHS) issues, and on the specific hazards of their work;
- Ongoing training in SOPs; and
- Provide workers with personal protection equipment, such as safety boots, safety glasses, reflector vests, helmets, gloves, and protective clothing.

5.4.5 Management of waste

161. There is a possibility that the remains of the construction and demolished materials accumulate at the subproject site. The demolished materials and construction materials will be disposed at the designated site approved by SP. These wastes should be removed at the first instance during the construction phase to allow accessibility.

162. Operation of the subproject will generate wastes including drums, cables, timber and metal off-cuts and kitchen. The contractor will develop a waste management plan as part of its CESMP. Waste management measures will include the following measures:

- Regular collection and disposal of waste at the approved site;
- Regular inspection on oil sumps;
- Waste oil inventory and oil stored in safe containers, careful attention given during overhauls and maintenance;
- Discussion currently being pursued with the ECD on possible export of waste oil.

5.4.6 Sewage and Hydrocarbons

163. The offices, workshop and related facilities will have piped sewerage connections to a specified septic tank. Sludge shall be stored in holding tanks. The holding tanks will be periodically pumped out and the sludge buried at a suitable location which minimizes the risk of any leaching to water bodies.

164. Activities likely to cause spillage of hydrocarbons either into land or water shall be undertaken so far as possible in bund areas. In particular, vehicle wash downs, maintenance and refueling, except in emergencies, should take place in workshops and other hardstand areas with appropriate drainage systems, dump, including the capacity to intercept spilt hydrocarbons or oily water; Earth-bund locations within the subproject site where spilt hydrocarbons or oily water can be contained within the bund.

5.4.7 Water Tank

165. SP ensures the water pumps, tanks and reticulation network are always operational through regular maintenances'. Continuous supply of water is important to subproject site for use in emergency responses as well as domestic purposes.

5.4.8 Impacts on Air Quality

166. The impacts on air quality during operation of the subproject are negligible unless there is a need for maintenance and the use of heavy machinery. Engineering practices that can be employed to ensure that any air quality impacts generated during operation are minimized includes the following:

- Equipment will be checked at regular intervals to ensure they are maintained in working order and SP will record the checks as part of environmental monitoring; and
- Periodic qualitative air quality monitoring (by observation rather than testing).

5.4.9 Noise

167. Noise from the operation of the subproject is negligible unless there is maintenance from the use of machinery.

5.5. Decommissioning Impacts

5.5.1 Waste Impacts

168. Decommissioning of the solar hybrid will result in recycled materials including glass, semiconductor, steel, aluminium and copper. At the end of its operational life, the component parts can be dismantled using minimal impact approach and recycled or disposed of safely. SP will manage all waste according to the SIWMPCS. At this stage, SP is yet to identify oversea companies who would be interested in recycling such waste. Normally ECD will facilitate waste transactions under the Waigani Convention. Following SP and ECD discussions on the matter, SP will explore the viability of exporting solar waste overseas. SP will develop a waste management plan to address the issue of waste and pollution in the energy sector.

5.5.2 Storage sites

169. Minimal space is available for storage of waste materials unless it is recycled immediately after decommissioning. In Solomon Islands, recycling is a major concern as there are limited to no technology available. Therefore, SP and ECD will have to discuss a prior arrangement for recycling with companies overseas. Alternatively, while discussing disposal methods, a first priority will have to be determined for the appropriate sites for storage.

5.5.3 Access and Mobility

170. During decommissioning, access and mobility at the subproject site will have minor impacts. The contractor will agree on the work schedule with nearby communities or residential areas before decommissioning activities commence.

5.5.3 Vegetation restoration.

171. The emphasis will be on the use of local provenance species of native plants and that the emerging vegetation type and composition be similar, or at least close, to that was present before the subproject, at the same time considering vegetation types and densities that will

produce a quick coverage to minimize further damage to the environment and restore functional ecosystems, as well as vegetation types of cultural and economic significance preferred by end-users.

5.6. Cumulative impacts

172. The subproject solar site is located on registered land currently used by locals for gardening. Network cables will be installed/constructed parallel to existing road corridors. The landowners and Catholics have settled here in Visale over the last 200 years and as a result the natural habitats in the area have degraded exacerbated by change in land use patterns. The construction of the Solar Hybrid system and network will induce insignificant impact on existing processes and the environment. Minor impacts are anticipated since best engineering practices will be adopted. Noise, fumes and dust at the subproject site during construction and from the operation of the Solar Hybrid in addition to the daily operation of the road and domestic activities are negligible and deemed minor. It is therefore concluded that the subproject activities will not induce or enhance existing negative impacts but rather will increase opportunity for economic development.

6.0 ANALYSIS OF ALTERNATIVES

174. This section looks at undertaking the various alternatives of the subproject. There are three basic options: (1) Alternative Design and Technology (2) Alternative Site Options (3) leave the subproject as it is now without undertaking the proposed expansion (no subproject option). If the subproject were to continue, it would be necessary to take technical, environmental and social aspects of the subproject into consideration and ensure that these concerns are adequately considered in the decision making. It is therefore important to consider all practicable options and ensure that the best available option(s) is/are chosen. The following section details the development options.

6.1. Alternative to Design and Technology

175. The contract arrangement is an EPC contract. Therefore, the contractor is responsible for design, procurement, construction and commissioning of the subproject. The installation will be carried out in compliance to SP specification and SOPs for Solar Hybrid installation. The contractor will design and furnish all materials and equipment to be fully compatible with electrical, environmental and space conditions of the site. It will include all equipment to safely support the full demands of the Solar Hybrid system and be designed for unattended operation.

176. Installation of the solar requires technical machinery and or equipment operated by technically approved people. Localized machinery and equipment may be used as support.

177. SP had completed concept designs of all poles, conductors and associated apparatus. Pole types are based on the span length, location and geotechnical features of the site. Unlike other initial solar hybrid sites in the Solomon Islands, Visale will have 11kV HV line in its network purposely to allow expansion in the future. The subproject is currently in the concept design stage so it is highly likely that additional information on design alternatives and technologies will be available at detail design stage.

6.2. Alternative Site Options

178. Two sites were identified in the initial survey in 2017. However, it was reduced to a single site now due to the challenges experienced by SP dealing with customary lands. In addition to that, the other site is customary land and road access passes through a number of customary land. SP has therefore, decided to pursue negotiation on the registered land owned by the DMI. Thus, it is not feasible to consider other alternatives other than the one recommended since the other site will induce expenses to SP, exacerbate social and environmental issues. There is no other realistic alternative for the proposed location that will provide the same economic, environmental, and social advantage.

179. Why work has to be done at the current site:

- Registered land;
- Further away from residential buildings; and
- Access to the main seal road.

6.3. No Development Option

180. The “No Development Option” implies not proceeding with the subproject rather choosing to leave the site as it is at the current state. This option would likely lead to socio-economic impacts including but not limited to the following:

- Limited energy to meet growing demands;
- Without such expansion, SP will unable to meet SINEP targets set by the SIG;
- Failure to realize that improving energy efficiency will boost the potential for increased income generation through various business undertakings,

181. In view of the above, it is important to realize that the positive benefits of the subproject will outweigh the potential negative environmental and social impacts. Therefore, the “No Development Option” is not recommended.

7.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

Table 3: Environment Social Management and Monitoring Plan

IMPACT MANAGEMENT					IMPACT MONITORING		
Subproject activities	**Potential Environment Impacts**	**Mitigation approaches**	**Responsibility**	**Mitigation cost**	**Parameter to monitored**	**Means of verification and frequency**	**Responsibility**
PRE-CONSTRUCTION PHASE							
UXO Survey.	• Contact with UXO.	• Completion of the UXO survey by qualified personnel.	• Contractor.	• To be include in the BOQ	• Survey been carried out by approved personals	• Certificate showing the subproject area is UXO free	• RSIPF and SP
Development of preliminary designs /site plans / maps.	• Resettlement and damage to vegetation.	• The concept drawings and route are designed to avoid resettlement impacts and vegetation removal.	• Contractor and SP	• To be part of the subproject cost.	• Plans approved by SP	• Building permit	• SP
CONSTRUCTION PHASE							
Vegetation clearance for distribution lines and Solar Hybrid.	• Removal of grass.	• Minimize clearance to construction perimeter only. • Unnecessary clearance avoided. • Contractor to communicate clearance area to workers and monitor clearance activities	• Contractor	• Include in construction cost	• Area of vegetation; area of felled trees/vegetation removal	• During survey and activities - visual inspection before, during and after	• SP

IMPACT MANAGEMENT					IMPACT MONITORING		
Subproject activities	**Potential Environment Impacts**	**Mitigation approaches**	**Responsibility**	**Mitigation cost**	**Parameter to monitored**	**Means of verification and frequency**	**Responsibility**
Operation of construction machinery generating emissions.	• Emission of exhaust from vehicles and machinery. • Emissions of CO^2 and POPs.	• Maintain construction equipment. • Prohibit use of equipment that generates smoke.	• Contractor.	• Inc. in construction cost.	• Air quality, emissions.	• Weekly or after complaint - periodic visual inspection; • Any particulate matter and smoke.	• SP.
	• Dust caused by construction vehicles running at high velocity, • Degrade air quality/ Increase TSS in the atmosphere.	• Thorough watering to avoid dust. • Restrict operations if particulates are causing nuisance to sensitive receptors.	• Contractor	• Inc. in construction cost	• dust, particulate matter; • Use of tarpaulins and loading of vehicles; • Stockpiles.	• Weekly or after complaint - periodic visual inspection.	• SP
Operation of construction machinery creating noise	• Noise to communities and schools.	• Construction machine exhaust systems and noisy equipment will be maintained to minimise noise. • Limit noisy construction activities to day time hours, e.g. Construction activities. prohibited between 9pm and 6am.	• Contractor.	• Inc. in construction cost.	• Adherence to agreed schedule; • Complaints (no. logged with resolution).	• Weekly or after complaint - review schedule. • Consultation (ensure schedule being	• SP • ECD

IMPACT MANAGEMENT					IMPACT MONITORING		
Subproject activities	**Potential Environment Impacts**	**Mitigation approaches**	**Responsibility**	**Mitigation cost**	**Parameter to monitored**	**Means of verification and frequency**	**Responsibility**
		• Agree works schedule with stakeholders.				adhered to).	
	• Impacts on construction workers.	• Workers limit of exposure to noise will be strictly below 70 decibels per 8-hour shift. (See WB guidelines in Table 2) • Provide workers with noise abatement equipment (ear-muffs etc.). • Complaints will be addressed by contractor through the GRM.	• Contractor.	• Inc. in construction cost.	• Workers safety equipment.	• Weekly • Workers are provided with safety equipment.	• SP • ECD
Stockpile of Construction Materials.	• Construction materials washed out into marine environment • Increase siltation and turbidity or receiving environment	• Construction materials will be stockpiled away from the drain and covered. • Placement of diversion ditches around stockpiles.	• Contractor.	• Inc. in construction cost.	• No stockpiling close to water bodies.	• Weekly-Visual Inspection.	• SP • ECD
	• Dust from exposed stockpiles.	• Material stockpiles located in sheltered areas and to be covered. • Water stockpiles as necessary.	• Contractor	• Inc. in construction cost	• dust, particulate matter; • Stockpile covered.	• Weekly or after complaint - periodic visual inspection	• SP

IMPACT MANAGEMENT					IMPACT MONITORING		
Subproject activities	**Potential Environment Impacts**	**Mitigation approaches**	**Responsibility**	**Mitigation cost**	**Parameter to monitored**	**Means of verification and frequency**	**Responsibility**
Excavation works, installation of Solar Hybrid Generation System and distribution lines.	• Risks of accidents.	• Standard Operating procedures (SOP) for instalment correctly executed. • Workers wear personal protective equipment including clothing, helmets, safety boots, earmuff etc. • Completion of a detail OHS risk assessment prior to the commencement of activities. • Instalment of signage boards, markings, barricades where applicable; • Speed limits should be set and a safety audit may be carried out prior to completion of construction to ensure road safety signs are properly implemented. • Contractor to develop a traffic plan as part of the CESMP.	• SP • Contractor	• Inc. in construction cost.	• Workers wore safety equipment.	• Workers are provided with safety equipment. • Daily inspection. • Risk assessment completed and identified controls complied with.	• ECD and SP.
	• Accidental Discovery of UXO.	• Should UXO be discovered, the contractor is to immediately cordon off the area arrange the evacuation of nearby residences and inform the UXO contractor and RSIPF of the find.	• Contractor, SP	• Include in construction cost	• Occurrence of UXO at the construction site	• Upon discovery of UXO	• SP and RSIPF

IMPACT MANAGEMENT					IMPACT MONITORING		
Subproject activities	**Potential Environment Impacts**	**Mitigation approaches**	**Responsibility**	**Mitigation cost**	**Parameter to monitored**	**Means of verification and frequency**	**Responsibility**
	• Silt generation.	• Keep road side vegetation • Use of silt control devices and sediment traps/fences when required. • Construction of sediment settling ponds and bunds. Diverting turbid water to sediment settling ponds. • Implementation of an erosion and sediment control plan. •	• Contractor	• Include in construction cost	• Reduced soil erosion and sedimentation • Vegetation clearance minimized • No dump sites near waterways	• Weekly - visual inspection • Visual inspections during and after rain events to monitor the effectiveness of erosion and sediment control measures.	• SP and ECD
	• Accidental release of hydrocarbon from construction machines.	• Ensure all construction machines are well maintained. • A prestart on construction machine carried out every morning. • Oil/fuel remediation agents, oil pads, oil booms and geo-fabric clothes are procured for usage as part of the emergency response plan.	• Contractor	• Include in construction cost.	• Construction machineries maintain in good working order. • Spot check for visible oil • Water quality.	• Weekly - visual inspection.	• SP and ECD.

IMPACT MANAGEMENT					IMPACT MONITORING		
Subproject activities	**Potential Environment Impacts**	**Mitigation approaches**	**Responsibility**	**Mitigation cost**	**Parameter to monitored**	**Means of verification and frequency**	**Responsibility**
	• Direct discharge to adjacent creeks or streams.	• Development footprint will be provided with effective drainage systems which will avoid direct discharge to creeks or streams/ when the need arises.	• Contractor	• Include in construction cost	• No direct discharge to water bodies	• Weekly visual inspection • SP ECD	• SP and ECD
	• Access and Mobility at several road sections will be prohibited temporarily during the construction.	• Contractor to allow sections of the road area to be continuously accessed by affected party. • Signs and other appropriate safety features will be used to indicate construction works are being undertaken.	• Contractor •	• Include in Contract	• Maintenance of access; • Signage; • Road free of materials and debris; • Haulage routes rehabilitated	• During activities - Visual inspection; • Consultations; • Review of traffic management plan	• SP and ECD
Fuelling construction machines and storage of Hydrocarbons	• Hydrocarbon leakage / spills from construction sites / workshops.	• Detailed Emergency Response Plan (as part of CESMP) prepared by contractor to cover hazardous materials/oil storage, spills and accidents to land and water. • Chemicals will be stored in secure containers away from the water bodies. • Chemicals stored in bund area or compound with concrete floor and	• Contractor.	• Include in construction cost.	• Ensure storage sites are using existing. Concrete base.	• Weekly inspection.	• SP and ECD.

IMPACT MANAGEMENT					IMPACT MONITORING		
Subproject activities	**Potential Environment Impacts**	**Mitigation approaches**	**Respon sibility**	**Mitigatio n cost**	**Parameter to monitored**	**Means of verification and frequency**	**Responsibilit y**
		weatherproof roof and fire extinguishers. • Protective Equipment (PPE) to workers directly involved in handling hazardous substances. • Ensure all construction machines are well maintained. • Accidents reported to police within 24 hours.					
	• Spill associated with Hazardous substances.	• Store kerosene, diesel, petrol and lubricants in a bunded area with an impervious surface and with stormwater drainage provisions as approved by the Engineer. • Store paint, and chemicals in a hazardous materials storage shed with walls, roof, ventilation and a bunded floor with an impervious surface; • Ensure that the storage capacity of each bunded area is at least 105% of the total volume of hazardous material stored; • Secure the areas and sheds used to store hazardous materials by erecting a security fence of minimum	• Cont racto r	• Includ ed in constr uction cost	• Handling of hazardous materials.	• Weekly inspection	• SP

IMPACT MANAGEMENT					IMPACT MONITORING		
Subproject activities	**Potential Environment Impacts**	**Mitigation approaches**	**Responsibility**	**Mitigation cost**	**Parameter to monitored**	**Means of verification and frequency**	**Responsibility**
		height 1.80m around each facility with the fence located outside the bund; • Locate the hazardous materials storage areas at least 10.0m away from any watercourse; • Contain and mop up spills of hazardous materials in accordance with manufacturer's specifications.					
	• Smoking near storage and workshop areas causing fire	• Prohibit smoking close to fuel storage areas. • Put up signs of no go smoking zones. • Provide extinguishers and train workers on their use.	• Contractor.	• Include in construction cost.	• Signs and fire extinguishers.	• Code of conduct and housekeeping rules being adhered to. • Verify records of accidents	• SP and ECD

IMPACT MANAGEMENT					IMPACT MONITORING		
Subproject activities	**Potential Environment Impacts**	**Mitigation approaches**	**Responsibility**	**Mitigation cost**	**Parameter to monitored**	**Means of verification and frequency**	**Responsibility**
Presence of construction workers	• Waste generated at construction and installation sites causing nuisance and potential contamination to soil and adjacent water bodies.	• Garbage receptacles will be set up at construction sites, and will be collected and disposed every day. • Prepare waste management plan (as part of CESMP). • All wastes from work sites to be disposed of in approved landfill / areas by contractor. • Provide sufficient training in appropriate collection and waste disposal methods. • Collection and treatment of septic waste/temporary toilets during construction phase in accordance with ECD.	• Contractor.	• Include in construction cost.	• Waste management - visual inspection that solid waste is disposed of as per CESMP.	• Monthly, as required and spot checks - visual inspection. • Review of waste management plan.	• SP and ECD.
		• No wastes to be dumped in waterways. • Ensures wastes not discharged to rivers or coastal waters and that all wastes disposed of in proper areas. • Provide adequate and safe drinking water.	• Contractor	• Include in construction cost	• No direct discharges to local streams, coast or rivers; • Regularity of waste removal	• Visual inspection Weekly	• SP and ECD
	• Possibility of conflicts or antagonism between the public and the workers	• Facilitate reconciliation between parties- affected person, Contactor to involve in resolving the issue.	• Contractor	• Include in constr	• No. concerns raised and resolution;	• Ongoing - consult with public to monitor	• SP and ECD

IMPACT MANAGEMENT					IMPACT MONITORING		
Subproject activities	**Potential Environment Impacts**	**Mitigation approaches**	**Responsibility**	**Mitigation cost**	**Parameter to monitored**	**Means of verification and frequency**	**Responsibility**
		• Call the Police once it goes beyond control.		uction cost	•	environmental concerns.	
	• Risk of contractor engaged in GBV	• All workers will be required to undertake GBV trainings and sign the associated code of conduct prior to commencement of civil works.	• Contractor	• Include in construction cost	• Zero GBV tolerance.	• Incident reports and consultations.	• SP
	• Climate Change and Natural disasters.	• Inspection and maintenance. •	• Contractor	• Include in construction cost	• Equipment failure	• Weekly inspection and after every storm.	• Contractor.
OPERATIONAL PHASE							
Operation of Solar Hybrid System	• Impacts from maintenance machineries	• Maintain machineries at standard working condition • Safety PPE for workers. • Workers carrying out maintenance are trained to avoid electric shocks. • Completion of a risk assessment and implementation of SOPs.	• SP	• Include in operational cost.	• Air quality, emissions.	• Monthly or after complaint - periodic visual inspection. • Any particulate matter and smoke.	• SP
	• Accidents (involving electric shocks and burning).	• All SP workers and contractors are trained and certified.	• SP.	• Operational cost.	• Zero incidents.	• Incident reports.	• SP.

IMPACT MANAGEMENT					IMPACT MONITORING		
Subproject activities	**Potential Environment Impacts**	**Mitigation approaches**	**Responsibility**	**Mitigation cost**	**Parameter to monitored**	**Means of verification and frequency**	**Responsibility**
		• All households are wired by grade A licence contractor. • Advise communities during awareness to report to SP and Fire services of any burning incidents.					
	• Public safety on the use of electricity.	• Community Education and awareness at the preconstruction, construction and prior to commissioning of facility. • Awareness conducted at schools, church and institutions. • Awareness through media.	• SP.	• Operational cost.	• Zero Incidents.	• Incident reports. •	• SP.
	• Establishment of the network infrastructure throughout the district will introduce more roadside obstacles and the potential for collisions.	• Road safety assessment (majority of the poles will be within the road corridor and supposed to be 4m from road pavement-SP will avoid encroaching into people lands). Traffic in the area is lower and does not seem to pose any risk to the poles. Unless people are drunk which is law and order issue.	• SP.	• Operational cost.	• Zero Incidents.	• Incident reports.	• SP.
	• Road Accidents and safety of women associated with no street lamps.	• There are provisions to install streetlamps on its distribution network for the sake of community safety,	• SP.	• Operational cost.	• Budget for installation of street lamps.	• Installation of street lamps.	• SP.

IMPACT MANAGEMENT					IMPACT MONITORING		
Subproject activities	**Potential Environment Impacts**	**Mitigation approaches**	**Responsibility**	**Mitigation cost**	**Parameter to monitored**	**Means of verification and frequency**	**Responsibility**
		however not at this stage. Assessment on suitable location for street lights will commence soon after the subproject.					
	• Waste generated at solar (Solid waste) old batteries	• Garbage receptacles will be set up at construction sites, which will be regularly cleared by the SP. • SP to prepare waste management plan. • All wastes from work sites to be disposed of in approved landfill / areas by SP. • Workers will provide sufficient training in appropriate waste disposal methods.	• SP	• Include in operational cost.	• Waste management - visual inspection that solid waste is disposed of as per CESMP; • Visibility of oil and fuel.	• Monthly, as required and spot checks - visual inspection; • Review of waste management plan. •	• SP and ECD
DECOMMISSIONING							
Dismantling the solar hybrid	• Solar waste	• SP will manage all waste according to the Solomon Islands Waste Management and Pollution Control Strategy. At this stage, SP is yet to identify buyers of solar waste. Normally ECD will facilitate waste transactions under the Waigani Convention. Following SP and ECD discussions on the	• SP	• To be part operational cost.	• Solar Panels and associated E-wastes.	• During decommission.	• SP/ECD

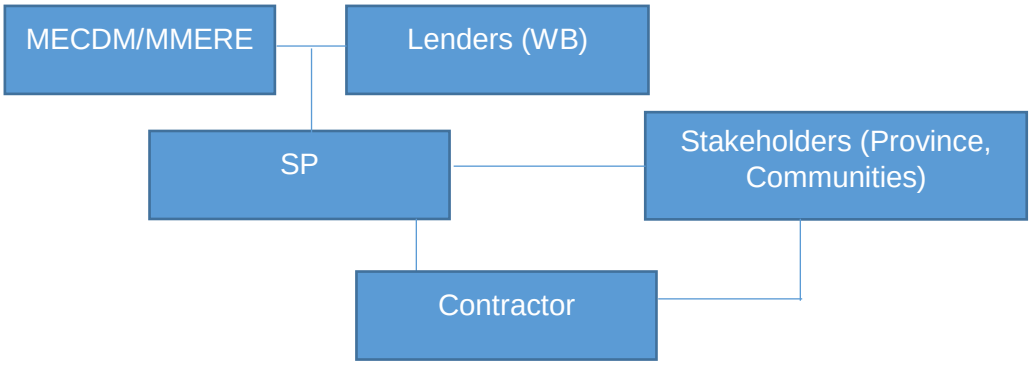
IMPACT MANAGEMENT					IMPACT MONITORING		
Subproject activities	**Potential Environment Impacts**	**Mitigation approaches**	**Respon sibility**	**Mitigatio n cost**	**Parameter to monitored**	**Means of verification and frequency**	**Responsibilit y**
		matter, SP will explore feasibility of exporting solar waste overseas. ECD recommend that SP discuss with a Fijian company on batteries disposal.					
	• Storage of waste materials to certain extend can occupy space, unless they are recycled or removed immediately after decommissioning.	• Storage facilities spaces and secure.	• SP	• To be part operati onal cost	• Storage facility	• After decommissi oning	• SP/ECD
	• During decommissioning, access and mobility at the subproject site will have minor impacts.	• SP will agree work schedule with the community before decommissioning activities commences.	• SP	• Operat ional cost	• Road access, signage	• During decommissi oning.	• SP/ECD.
Dismantle of standby generator and fuel tank.	• Spillage of oil and fuel.	• Ensure standard operating procedures for dismantle of generator and tank are in place. • All fuel and oil from generator pumped into drums before lifting to vehicle.	• SP	• Operat ional cost	• spillage	• During decommissi oning.	• SP/ECD.

7.1. Institutional Arrangement

182. This section identifies implementation arrangement for managing environment and social impacts, mitigations and reporting.

183. The overall organizational structure for environmental and social management for the subproject is in figure 15 below.

Figure 15: Organizational Structure for Environmental Social Management



7.1.1 Solomon Power

184. The overall management of all monitoring and inspection tasks comes under the SP. This covers all aspects of the required activities including coordination with other agencies that have national responsibilities over some of the tasks. The company is responsible for general project execution and with day-to-day subproject management activities, as well as monitoring.

185. SP will include key performance indicators in the Contract that regarding the Contractor's environmental, social and health and safety performance that will inform their compliance monitoring schedule.

186. SP will be responsible for compliance monitoring during construction and operation of the subproject. The ECD will also be responsible for verifying the monitoring undertaken by the SP through audits and spot-checks. The outcomes of the monitoring will be included in the monthly progress report.

187. SP, through the Capital Works Department will be the key contact for the subproject. The department is responsible for the delivery of a capital program aimed at expanding and developing

SP's position to meet future demands and challenges. SP recruited three (3) safeguards officers, an Environment and Social Safeguards Officer, Assistant Environment Officer and Assistant Social Development Officer to manage and implement SP's environment and social safeguards activities.

188. SP roles includes:

- Preparation of screening reports, proposal applications, Environment Social Management Plans and Public Environmental Reports for subprojects as required to meet requirements of the Environment Act 1998 and WB Policies;

- Arrange public consultation to advise affected communities of the scope and scheduling of the subprojects;

- Arrange for ESMP/PER to be attach to Bid Document;

- Arrange for reports to be sent to the MECDM and WB for evaluation. Following approval by the MECDM and the issuing of permits/approvals advise the SP and WB of the approval;

- Evaluate and approve the CESMPs prepared by the contractors as a condition of the contracts;

- Assist the management of GRM; and

- Undertake regular site visits to independently monitor the contractor's compliance with the CESMP.

7.1.2 Contractor

189. The contractor will be responsible for preparing a CESMP at construction stage and during implementation that is aligned with this plan and also informed through a risk assessment, whenever additional engineering information is available. These includes an emergency response plan, health and safety plan and waste management plan as part of their CESMP. The contractor will also be responsible for implementing all environmental, health and safety actions included in the CESMP. As a condition to contract, contractor will recruit an environmental safety officer (ESO) whose responsibilities will include:

- Coordinating with SP for preparing the CESMP;

- Provide training and awareness on environment, health and safety.

- Undertake STIs, HIV/AIDS, Malaria, Dengue, GBV, SEA and COVID-19 briefings and awareness raising amongst the contractor's employees;

- Contractor complies with the clauses in the contract and bidding documents in respect of environment, health and safety;

- Ensuring the contractor does not commence construction activities until requisite approvals have been received from ECD, provincial authorities and SP;

- Participating in monitoring with SP to ensure environmental, social management and health and safety activities are reported as required;

- Produce monthly environment, social and health and safety monitoring reports to SP; and

- Facilitating consultation with the affected stakeholders and ensuring smooth implementation of the subproject.

7.1.3 Ministry of Environment Conservation, Climate Change, Disaster Management and Meteorology (MECDM).

190. As the national agency responsible for environment and conservation, the ECD under MECDM will need to be involved in the various aspects of the subproject. Under the requirements of the Environment Act 1998, the ECD will need to review the ESMP/PER and monitor the progress of construction. The ECD has been fully informed of the status of the subproject and also awaits the submission of the ESMP/PER. The ECD will review and issue development consent for the subproject.

7.1.4 Ministry of Mines, Energy and Rural Electrification (MMERE)

191. The Mines and energy division (MED) under MMERE is responsible for ensuring the smooth implementation of the subproject. The MED from time to time will carry out inspections ensuring subproject indicators are implemented on time, specification and national requirements are effectively executed. SP will need to seek BMP approval from the ministry for sourcing gravel at any location, however not at this stage. The MED will also be responsible for coordinating this requirement with other departments in the ministry for quick review and approval of the BMP.

7.1.5 Guadalcanal Province

192. The provincial assembly is the governing arm of the province. The GPG TCPB shares an important role in approving development plans to certain extend. SP is responsible for liaising with Provincial planning division for consent. A building permit is tendered when a plan is being approved by the board or assembly.

7.1.6 Royal Solomon Islands Police Force

193. Guadalcanal is a major battle ground during the World War II. Provision in the contract BOQ will allow the contractor to carry out UXO survey prior to construction and during construction. Should UXO be discovered during the construction, the contractor and SP are to immediately cordon off the area, arrange the evacuation of nearby residences and inform the RSIPF of the find.

7.1.7 Communities

194. Visale comprise of six main villages with tribal chiefs, village chiefs, church leaders and women. Tribal chiefs and community elders are required to facilitate discussion with their tribes on easement for transmission and distribution lines. Provide support to SP on GRM issues, identifying landowners, signing the MOU and ensuring smooth implementation of the subproject. The interest of SP is to see successful completion of the subproject with equal participation from the communities and its stakeholders.

7.1.8 DMI

195. The key contact for the subproject is the superior general of the DMI. She will be the focal point for land matters and perhaps for the community. The superior general on behalf of the Catholic Church has sent consent in writing for SP to commence survey of the site. The church responsibility will include:

- Ensure land lease is within the subproject timeframe;
- Ensure necessary documents for transfer of land is available;
- Provide continuous support to the subproject during construction and when it is operational.

7.2. Environment Monitoring and Reporting

196. Monitoring is a component of an impact assessment that combats uncertainties pertaining to unanticipated impacts, to ensure mitigation measures are working and to reassure public on the progress of the development. Progressive monitoring must accompany various stages of the subproject activities (construction and operational phase). The Environmental social monitoring plan is based on the potential impacts, significance of the impacts and mitigation approaches identified during the screening. It comprises of parameters to be monitored, frequencies and responsible authorities as per impact. The Contractor is required to prepare a detailed environment and social monitoring plan based on Table 3 in consultation with SP. ECD is responsible for monitoring compliance, reviewing the company's monthly monitoring report and suggesting ways to improve or strengthen mitigation approaches. A monitoring checklist is in Annex 3.

Table 4: Responsibilities for Environmental Social Management & Monitoring

Subproject Stage	Responsible Organization	Responsibilities
Feasibility studies and appointment	Solomon Power	• Prepare ESMP/PER including overall ESMP (Table 3) • Preliminary design
Feasibility studies and project review and approval	ECD	• Review and approval of ESMP/PER including overall ESMP (Table 3)
Detailed Design	Contractor	• Prepare detailed design and specification • Submit design to SP for approval • Prepare CESMP based on specifics of detailed design • Submit CESMP to SP for review and approval
	SP	• Approve the Contractor's detailed design and specification and CESMP
Construction	Contractor	• Implementation of CESMP • Submission of monthly reports to SP • Provision of awareness/training to workers • Regular Safety awareness as part of tool box meetings (covering OH&S, PPE and safety signs displaying work progress)

Subproject Stage	Responsible Organization	Responsibilities
		• Consultation and awareness to workers on code of conducts and management of communicable diseases
	SP	• Supervise implementation of CESMP • Audit construction phase through environmental and OHS inspections and review monitoring data
	ECD	• Audits and spot checks
Operation	SP	• Provide budget to undertake environmental monitoring • Undertake environmental monitoring and prepare bi-annual reports • Prepare maintenance reports to adaptively manage environmental risks related to operations (as per ESMP/PER) • Complete preventative maintenance to prevent environmental, social and OHS incidents and nuisance.
Decommissioning	SP	• Ensure all waste associated with decommissioning is disposed in a manner accepted by ECD. Provide budget for waste export. • Consult with ECD who will provide options on disposals and processes.
	ECD	• Provide support to SP on Waigani Process and other conventions on export of waste.

7.3. Training.

197. SP and contractor will conduct the environment, social, health and safety training for all workers before construction commences. The training will prepare workers to manage and protect the environment, to manage any potential social impacts and to ensure the safety of the public and the construction team.

7.5.1 Environmental and Safety Induction Training.

198. Mandatory, all workers attend the Environmental Safety Induction Training. The training covers legislation and regulations, policy, organization structure, duties and responsibilities, mitigation measures, targets in the ESMP and housekeeping rules/guidelines. The major topics will include air pollution control; waste management; vegetation clearance controls, health and safety; handling of hazardous substances, emergency preparedness; and, first aid training.

7.4.2 Environmental and Safety Toolbox Talk.

199. In addition to that, all workers will attend the weekly environmental and safety toolbox talk. The purpose of the talk is to rectify lesson learnt and re-emphasizing the importance of environment and safety procedures. The Environment Safety Officer will update all workers when Standard Operating Procedures (SOP) is being developed or reviewed.

7.4.3 Refresher training.

There is provision for refresher training on specific topics. These can be done annually depending on the nature of the work and approval from the SP management.

8.0 PUBLIC CONSULTATION AND PARTICIPATION

8.1. Consultation Activities

200. The major stakeholders in this subproject include the GPG, MLHS, MECDM and MMERE. All these agencies are important and they produce approvals and permits important for the subproject. Initial consultation was completed by SP including subproject evaluation and economic viability through cost benefit analysis. The subproject plans and schedules are already known to the SIG and GPG. The consultation and household survey for the ESMP/PER was undertaken on March 2019. It includes community awareness and social survey.

201. Recently, SP was selected to become a member of the GPG TCPB. The board comprise of the following people:

1. Timothy Ngele (PS GP),
2. Ben Salepo (GP lands),
3. Benedict Tora (GP lands),
4. Rowley Wanega (MLHS),
5. Ray Anderson (Solomon Water),
6. Kellyson Kwakwala (Solomon Power),
7. Edward Danitofea (MECDM),
8. Jack Uruhime (MLHS),
9. Allen McNeil (COL-MLHS) and
10. Derrick L (MID).

202. Kellyson from SP in a recent meeting with the GPG TCPB highlighted SP projects including the Visale subproject situated on GP land. Because of his involvement, stakeholders important to the subproject including the GPG TCPB were informed in advance. Perhaps, SP will have to make a formal submission to the GPG TCPB for approval to comply with the TCBP Act.

203. Further public consultations and media awareness will be carried out prior to commencing construction to alert the stakeholders about the construction schedule.

8.2. Results of Household survey and interviews

204. The result of household survey provides opportunity to understand the current social-environment issues. Majority of the analysis are provided in section 4 of this report. Agenda on public consultation includes customer service, safety, subproject schedules and environment/social impacts and mitigation. SP officers from the relevant departments within the organization discussed the topics. Issues raised during the consultation.

Table 5: Consultation issues and measures suggested

Issues raised	Measures Suggested During Consultation
• Installation of the transmission line in will require clearing of crops or trees along road side corridor. Communities feel that SP must	• SP will compensate crops and trees affected by the subproject activities based on SIG MAL rates.

compensate affected owners based on SIG rates.	
• Locals want network extended from where it currently terminates.	• There is provision to expand the network in the future.
• Visale communities and elders feel that a review in the tariff will enhance economic activities in the area. A reasonable rate for rural communities is important and SP management according to elders should relook at it.	• Electricity tariff remains the same for urban and rural. SP is planning to review the tariff.
• Reiterate the importance of electricity usage and its safety	• Awareness on the use of electricity will be conducted prior to commissioning of the subproject including standard safety requirements. It is important public avoid tampering on electricity and SP assets.
• Public safety during construction and operation-There are concerns over noise and access during construction.	• Contractor will submit a traffic management plan ensuring safety signs and speed limits. Sunday will be observed as a rest day.
• Majority of the questions are related to cost of connection to households.	• Cost of wiring and connection covered under the OBA arrangements. SP will meet all connection cost to each household. Each household will pay minimal cost to SP when they submit their applications.

Figure 16: Public Consultation, Visale

8.3. Consultation and Disclosure

205. The ESMP/PER documenting the mitigation measures and consultation process will be submitted to MECDM and will be available for public review. Further consultation and disclosure will be carried out during the implementation through:

- The media before construction and operation commences; and
- Information regarding the approved subproject and the proposed environmental management measures will be posted at suitable locations at the subproject site.

206. The ESMP/PER report will be available to the public from SP website or upon request through phone and email.

9.0 GRIEVANCES REDRESS MECHANISM

207. Any concerns, issues or grievance during the course of the subproject will be addressed in a transparent and timely manner, and without retribution to the affected person (AP)[16]. These concerns may pertain to the subproject's environmental performance or social risks.

208. An initial process has been set up to address any issues and/or problems raised directly at the subproject level in the first attempt. However, if this cannot be resolved, then the grievances will be addressed through a mechanism of referral to ECD within the MECDM. The GRM process and forms will be made available to all households within the subproject neighborhood.

9.1. During construction

209. It is anticipated, that during the construction phase, most complaints that may arise are expected to be minor complaints regarding dust, health & safety and noise, and can be resolved easily. All complaints received at the site office are to be entered into a registry kept on the site, this includes information such as date, name, contact address and reason for the complaint. A duplicate entry copy is given to the AP for their record when the complaint is registered. The register will indicate the party responsible for resolving the complaint and the date when this was made together with the date the AP was informed of the decision and how the decision was given to the AP. The register is then signed off by the person responsible for a decision to be made and dated. The register must be kept at the front desk of the SP office, and it is a public document. The copy given to the AP will show the procedures for assessing the complaint with a statement affirming the AP rights to make a complaint. There are no costs involved when applying to AP for raising a complaint.

210. Complaints received by the AP are discussed directly with the SP Project Manager. For straightforward complaints, the PM can make an on-the-spot determination to resolve the issue. For complicated complaints, the PM will forward the complaint to the SP Management. The Management has two days to resolve the complaint and make a decision to the AP. If the AP can discuss the grievance directly with the SP Management. If the AP complaint is dismissed, the AP will be informed of their rights to take it to the next level. A copy of the decision is to be sent to the ECD and MED.

211. If the AP is not satisfied, the complaint can be taken to the ECD Director, who will appoint the ECD Officers to review the complaint. The Director will then have 15 days to make a determination.

9.2. During Operation and Decommissioning

212. 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.

[16] *Affected Person (AP) refers to anyone affected by the development, can be an organization or government agency.*

10.0 CONCLUSION

213. The study shows that there are no significant environmental social impacts and the overall ESMP has described mitigation measures to ensure that all impacts can be mitigated to acceptable levels. Consultation undertaken shows stakeholders are supportive of the subproject as they recognize its importance. No significant flora or fauna will be affected nor will any conservation, cultural or heritage sites be affected.

214. Prior to commencing construction, the contractor will need to prepare a CESMP when further engineering details are available. During construction, SP will be responsible for monitoring and supervising compliance with the CESMP.

215. The subproject will have minimal impacts, none of which are catastrophic, all of which can be satisfactorily mitigated. Based on the above, it is concluded that adverse environmental social impacts arising from the subproject can be minimized to minor levels. There is no need for further assessment or EIS.

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ANNEX

Annex 1: Multilateral Agreements

Multi-lateral Agreements that the Solomon Islands is a party to Convention or Treaty	Status	**Purpose/Aim**	**Agency Responsible**
Regional MEAs			
i. Pollution Protocol for Dumping	Ratified 10/9/98	Prevention of pollution of the South Pacific region by dumping	Marine Div/ECD
ii. Pollution Protocol for Emergencies	Ratified 10/9/98	Cooperation in combating pollution emergencies in the South Pacific region.	Marine Div/ECD Project: National Pollution Prevention Plan
iii. Natural Resources & Environment of South Pacific Region (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
iv. Waigani Convention on Hazardous & Radioactive Wastes 1995	Ratified 7/10/1998	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			
i. Liability for Oil Pollution Damage	Ratified	Strict liability of ship owner for pollution damage to a coastal state within a certain amount.	Marine Div
ii. Marine Pollution Convention (London)	Ratified	Prevention of marine pollution by dumping of wastes and other matter.	ECD/Foreign Affairs
iii. Desertification (UNCCD)	Acceded 16/4/1999	Agreement to combat desertification and mitigate the effects of drought in countries experiencing drought or desertification.	Agriculture Div/ECD Project: National Action Plan on Land Degradation and Drought; National Capacity Self-Assessment (NCSA)

iv. POPs Convention (Stockholm)	Acceded 28.7/2004	Protection of human health and environment from persistent organic pollutants.	ECD/Environmental Health Div. Project: National Implementation Plan
Biodiversity			
i. CITES	Instrument of ratification being prepared	Regulations and restriction of trade in wild animals and plants through a certification system of imports and exports.	ECD
ii. World Heritage Convention	Acceded 10/6/1992	Protection of sites of Outstanding Universal Values. Solomon Islands currently has East Rennell Island as a World Heritage site.	Museum/ECD
iii. Convention on Biological Diversity (UNCBD)	Ratified 3/10/1995	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 Project: NCSA; National Biodiversity Strategy and Action Plan; International Waters Program; 3rd National Report
iv. Cartegena Protocol	Acceded	Protection of human health and the	ECD

Annex 2: Other important Legislation

Act	Date	Main objectives
River Waters	1973	Control of river waters for equitable and beneficial use; establishes activities for which permits are required.
National Parks	1978	Establishes national parks; establishes restrictions on use and provides for appointment of park rangers.
Wild Birds	1978	List scheduled birds for protection. Establishes bird sanctuaries and strict hunting season for several birds.
Agriculture and Livestock	1982	Applies to agricultural and livestock industries. Defines noxious weeds and their control.
Forest Resource and Timber Utilization	1991	Governs licensing of felling of trees and sawmills; timber agreements on customary land. Establishes State Forest and Forest Reserves and management systems. The Forestry Bill 2004 seeks to replace the Act and provide more control in conservation of forests and improved forest management.

Fisheries	1998	Framework for fisheries management and development, including licensing of fishing vessels and processing plants. Lists prohibited fishing methods, provides for establishment of Marine Protected Areas (MPAs) and coastal management plans.
Provincial Government Act,	1997	The Provincial Government Act of 1997 gives power to the provinces to make their own legislation including environment and conservation. Schedule 3 of the Act provides a list of activities for which the provinces have responsibility to pass ordinances. The State of the Environment Report (2008) shows that eight provincial ordinances have been passed which include: o one environmental protection ordinance, o six wildlife and wildlife management and conservation area ordinances, and o one marine and freshwater ordinance.
Labour Act	1978	This Act deal with employment of workers. Part IX Care of Workers, requires the employer under: o Article 65: to provide workers with rations. o Article 66: to protect workers and dependents from malaria. o Article 67: to provide workers with an accessible supply of clean, non-polluted water for drinking, washing and for other domestic purposes. Water supplies may be inspected by a Health Officer. o Article 68: requires the employer to make sufficient and proper sanitary arrangements for workers. o Article 69: requires the employer to provide accommodation for the worker and his family if they are not conveniently located to the work place. o Article 70: requires the employer to provide medical care at the workplace. o Article 71: states that depending on the circumstances the employer may be required to provide medical facilities,
The Safety at Work (Pesticide Regulations)	1983	This regulation is included as a component within the Safety at Work Act and deals with the following: o Article 3: requires the formation of a Pesticides Registration Advisory Committee. o Article 4: Requires a Register of Pesticides to be maintained. o Article 13: shows that all pesticide containers are to be labelled with the following: a. The trade name of the pesticide. b. The net weight and ISO approved name of the active ingredient, together with its formulation. c. Directions for use and what the pesticide is to be used for. d. Hazard label regarding storage, and handling and safety equipment required for application. e. Minimum withholding periods prior to harvest. f. First aid treatment.

		g. Name of manufacturer and registration number of the pesticide. o Article 15: shows that no unlabelled pesticides can be imported, while Article 16 states that pesticides cannot be sold, supplied or used other than in the original container. o The First Schedule classifies pesticides into 4 hazard levels depending on their oral or dermal toxicity as follows: 1a - extremely hazardous; 1b - highly hazardous; II - moderately hazardous; and III - slightly hazardous.

Annex 3: Monitoring Checklist (pre-construction and construction)

	Subproject activities	Applies	Mitigation approaches	Monitoring Responsibility	Parameter to monitored	Means of verification and frequency	Achieved (yes, no)	Remarks/ Action
PRE-CONSTRUCTION PHASE	UXO Survey	• Contactor	• Completion of the UXO survey by qualified personnel.	• SP,	• Survey been carried out by approved personals	• Certificate showing the project area is UXO free	•	•
	Development of preliminary designs /site plans / maps	• Contractor	• The concept drawings and route are designed to avoid resettlement impacts and disturbance to vegetation.	• SP.	• Plans approved by HCC and the town country planning board	• Building permit	•	•
CONSTRUCTION PHASE	Vegetation clearance	• Contractor	• Minimize clearance to the construction perimeter; • Unnecessary clearance avoided.	• SP, Contractor	• Area of vegetation; area of felled trees/vegetation removal	• During survey and activities - visual inspection before, during and after	•	•
	Operation of construction machinery generating emissions	Contractor	• Maintain construction equipment; • Prohibit use of equipment that causes excessive pollution (e.g. generates smoke).	SP, Contractor	• Air quality, emissions,	• Weekly or after complaint - periodic visual inspection; • Any particulate matter and smoke		
		Contractor	• Thorough watering to avoid dust	SP, Contractor	• dust, particulate matter; • Use of tarpaulins and loading of vehicles; • Stockpiles.	• Weekly or after complaint - periodic visual inspection	•	•

	Subproject activities	Applies	Mitigation approaches	Monitoring Responsibility	Parameter to monitored	Means of verification and frequency	Achieved (yes, no)	Remarks/ Action
	Operation of construction machinery creating noise	Contractor	• Construction machine exhaust systems and noisy equipment will be maintained to minimise noise. • Limit noisy construction activities to day time hours, i.e. construction activities prohibited between 9pm and 6am. • Agree works schedule with stakeholders.	SP, Contractor	• Adherence to agreed schedule; • Complaints (no. logged with resolution).	• Weekly or after complaint - review schedule • Consultation (ensure schedule being adhered to)	•	•
		Contractor	• Workers limit of exposure to noise will be strictly below 85 decibels per 8-hour shift. (See WB noise guideline in Table 2). • Provide workers with noise abatement equipment (ear-muffs etc.) • Complaints will be addressed by contractor the GRM.	SP, Contractor	• Workers safety equipment.	• Weekly • Workers are provided with safety equipment	•	•
	Stockpile of Construction Materials	Contractor	• Construction materials will be stockpiled away from the drain and covered when necessary. • Completion of an erosion and sediment plan. • Placement of diversion ditches around stockpiles.	SP, Contractor	• No stockpiling close to water bodies.	• Weekly-Visual Inspection	•	•

	Subproject activities	Applies	Mitigation approaches	Monitoring Responsibility	Parameter to monitored	Means of verification and frequency	Achieved (yes, no)	Remarks/ Action
		Contractor	• Material stockpiles located in sheltered areas and to be covered	SP, Contractor	• dust, particulate matter; • Stockpile covered.	• Weekly or after complaint - periodic visual inspection	•	•
	Clearing, excavations and installation of solar	Contractor	• Standard Operating procedures (SOP) for instalment correctly executed. • Workers wear protective equipment including clothing, helmets, safety boots, earmuff acts	SP, Contractor	• Workers wore safety equipment.	• Workers are provided with safety equipment • Daily inspection	•	•
		Contractor	• The area surrounding the instalment site bund and secure. • Spills clean as per emergency response plan	SP, Contractor	• emergency response plan; • Spills cleaned and area rehabilitated; • Workers are provided with safety equipment.	• Weekly inspection	•	•
		Contractor	• Should UXO be discovered, the contractor is to immediately cordon off the area arrange the evacuation of nearby residences and inform the RSIPF of the find.	SP, Contractor,	• Occurrence of UXO at the construction site	• Upon discovery of UXO	•	•
		Contractor	• Keep road side vegetation	SP, Contractor	• Reduced soil erosion and sedimentation	• Weekly - visual inspection	•	•

	Subproject activities	Applies	Mitigation approaches	Monitoring Responsibility	Parameter to monitored	Means of verification and frequency	Achieved (yes, no)	Remarks/ Action
			• Use of silt control devices and sediment traps/fences when required. • Construction of sediment settling ponds and bunds. Diverting turbid water to sediment settling ponds.		• Vegetation clearance minimized • No dump sites near waterways			
		Contractor	• Ensure all construction machines are well maintained. • A prestart on construction machine carried out every morning. • Oil/fuel remediation agents, oil pads, oil booms and geo-fabric clothes are procured for usage as part of the emergency response plan.	SP, Contractor	• Construction machineries maintain in in good working order • Spot check for visible oil • Water quality	• Weekly - visual inspection	•	•
		Contractor	• Development footprint will be provided with effective drainage systems which will avoid direct discharge to creeks or streams (when the need arises).	SP, Contractor	• No direct discharge to water bodies	• Weekly - visual inspection • SP, ECD	•	•
		Contractor	• Contractor to allow sections of the road area to be continuously accessed by affected party. • Signs and other appropriate safety features will be used	SP ,Contractor	• Maintenance of access; • Signage; • Road free of materials and debris;	• During activities - Visual inspection; • Consultations; • Review of traffic management plan	•	•

	Subproject activities	Applies	Mitigation approaches	Monitoring Responsibility	Parameter to monitored	Means of verification and frequency	Achieved (yes, no)	Remarks/ Action
			to indicate construction works are being undertaken.		• Haulage routes rehabilitated			
	Fuelling construction machines and storage of Hydrocarbons	Contractor	• Detailed Emergency Response Plan (as part of CESMP) prepared by contractor to cover hazardous materials/oil. storage, spills and accidents. • Chemicals will be stored in secure containers away from the water birdies. • Chemicals stored in area or compound with concrete floor and weatherproof roof and fire extinguishers. • Ensure all construction machines are well maintained. • Accidents reported to police within 24 hours.	SP, Contractor	• Ensure storage sites are using existing concrete base;	• Weekly inspection	•	•
		Contractor	• Prohibit smoking close to fuel storage areas. • Put up signs of no go smoking zones. • Provide extinguishers and train workers on their use.	SP, Contractor	• Signs and fire extinguishes	• Code of conduct and housekeeping rules being adhered to. • Verify records of accidents	•	•
		Contractor	• Store kerosene, diesel, petrol and lubricants in a bunded area with an impervious surface and with stormwater	Contractor	• Handling of hazardous materials.	• Weekly inspection	•	•

	Subproject activities	Applies	Mitigation approaches	Monitoring Responsibility	Parameter to monitored	Means of verification and frequency	Achieved (yes, no)	Remarks/ Action
			drainage provisions as approved by the Engineer. • Store paint, and chemicals in a hazardous materials storage shed with walls, roof, ventilation and a bunded floor with an impervious surface; • Ensure that the storage capacity of each bunded area is at least 105% of the total volume of hazardous material stored; • Secure the areas and sheds used to store hazardous materials by erecting a security fence of minimum height 1.80m around each facility with the fence located outside the bund; • Locate the hazardous materials storage areas at least 10.0m away from any watercourse; • Contain and mop up spills of hazardous materials in accordance with manufacturer's specifications					

	Subproject activities	Applies	Mitigation approaches	Monitoring Responsibility	Parameter to monitored	Means of verification and frequency	Achieved (yes, no)	Remarks/ Action
	Presence of construction workers	Contractor	• Garbage receptacles will be set up at construction sites, which will be regularly cleared by the contractor. • Contactor to prepare waste management plan (as part of CESMP). • All wastes from work sites to be disposed of in approved landfill / areas by GPG, Communities and SP. • Contractor will provide sufficient training in appropriate waste disposal methods.	SP, Contractor	• Waste management - visual inspection that solid waste is disposed of as per CESMP;	• Monthly, as required and spot checks - visual inspection; • Review of waste management plan	•	•
			• No wastes to be dumped in waterways. • Contractor ensures wastes not discharged to rivers or coastal waters and that all wastes disposed at designated sites approved by the community and GPG. • Contractor to provide adequate and safe drinking water.	SP Contractor	• No direct discharges to local streams, coast or rivers; • Regularity of waste removal	• Visual inspection Weekly	•	•

	Subproject activities	Applies	Mitigation approaches	Monitoring Responsibility	Parameter to monitored	Means of verification and frequency	Achieved (yes, no)	Remarks/ Action
		Contractor	• Facilitate reconciliation between parties- affected person, contractor to involve in resolving the issue. • Call the Police once it goes beyond control.	Contractor	• No. concerns raised and resolution; •	• Ongoing - consult with public to monitor environmental concerns	•	•

Annex 4: General Work Permit

CONTRACTOR SITE SAFETY GUIDE FOR SIEA PROJECT SUPERVISORS

APPENDIX 1: GENERAL WORK PERMIT

CONTRACTOR GENERAL WORK PERMIT			
PROJECT NO.		PERMIT NO.	
(A) WORK TO BE UNDERTAKEN			
(B) PERMIT DETAILS		(F) NAMES OF PERSONS INVOLVED	
Location		EMPLOYEE NAME / SIEA INDUCTED / SITE INDUCTED / COMMENT	
Permit Duration		1.	
Start Date/Time		2.	
End Date/Time		3.	
THIS PERMIT IS ONLY VALID FOR THE TIME SPECIFIED		4.	
		5.	
(C) NAMES OF PERSONS SUPERVISING WORK		6.	
Responsible Person		7.	
Standby Person		8.	
Note: It is the responsibility of the Responsible person to ensure that the personnel involved in carrying out the work fully understand the detail and requirements of work under this permit.		9.	
		Note: Complete extra names on another sheet of paper where required using above format and attach to this permit.	

(D) STATEMENT BY RESPONSIBLE PERSON			(G) PRECAUTION AND PROTECTION		
I hereby acknowledge receipt of this permit and state that I fully understand my duties. I am aware of the nature and position of the work area and plant covered by this permit. I am satisfied that I and the persons under my control to work under this permit should have no difficulty in keeping clear of unsafe plant in the course of the work.			REQUIREMENTS	REQUIRED	N/A
			Full time supervision		
			Standby Person		
			Safety Harness		
			Head Protection		
			Eye Protection		
			Ear Protection		
			Hand Protection		
SIGNATURE	DATE	TIME	Feet Protection		
			Body Protection		
			Reflector Vests		
(E) SIEA ISSUING AUTHORITY			***Persons entering the worksite have been instructed to take all of the above precautions.***		
TITLE	SIGNATURE	DATE / TIME	COMMENTS:		
Property Manager					
Chief Engineer			(H) REFERENCES:		
			1. Work Methodology		
(I) CANCELLATION OF PERMIT BY RESPONSIBLE PERSON			2. Check Sheets		
			3. Drawings		
The work under this permit is now complete and the work area has been vacated.			4. JSA		
			5.		
SIGNATURE	DATE	TIME	6.		

Document No:OHSC34 Version 1	*Custodian: OHS Officer*	
Created: February 2016	*Last Review: November 2018*	*Next Review: December 2019*

15

SIEA UXO Clearance Framework and Guide

November 2014
Revised June 2019

Table of Contents

Acronyms

AOD	Abandoned Ordnance
CWPM	Capital Works Programme Manager
EOD	Explosive Ordnance Disposal
MID	Ministry of Infrastructure and Development
OH&S	Occupational Health and Safety
RSIPF	Royal Solomon Islands Police Force
RSIPF-EOU	Royal Solomon Islands Police Force – Explosive Ordnance Unit
SIEA	Solomon Islands Electricity Authority **(Authority)**
SIG	Solomon Islands Government
UXO	Unexploded Ordnance
WWII	World War 2

1.0 Introduction

Solomon Islands was the site of severe battle between the Japanese Army and the American Allied Forces during WWII. The war resulted in hundreds of thousands of firearms and UXO items left behind.

WWII ordnance found in Solomon Islands can be defined as either unexploded (UXO) or abandoned (AXO). Unexploded ordnance are explosive ordnances that has been primed, fused, armed or prepared for use in armed conflict but has failed to explode. Abandoned explosive ordnances are explosive ordnance unused during the war and subsequently left behind.

For the purpose of this guide, UXO is used as the general term to describe unexploded or abandoned ordnance, munitions and explosive devices left behind during WWII which represents a hazard to people and to any future development of the land on which they are abandoned.

Although UXO is not captured in the Environmental Act 1998 and Environmental Regulation 2008, UXO clearance activities have become an integral part in any development activity in the Solomon Islands. As the ministry responsible for infrastructure development in SI, MID has a draft UXO procedure developed as a means to render safe and take responsibility for UXO related hazards on any development activity occurring on SIG crown land.

Note that this guide only provides guidance for the management of UXO threats. It does not give detailed guidance on EOD contracting practise. The safety of SIEA employees, its clients and customers, developers and partners, consultants and contractors are not guaranteed.

More guidance on international standards on unexploded ordnance for the construction industry can be obtained from **CIRIA C681: Unexploded Ordnance (UXO)**

2.0 Objective of the Guide

The overall purpose of this guide is to provide a policy and framework governing responsibility and procedures to assess, mitigate and eliminate any UXO related hazard from any SIEA project site before any construction work commences. It provides guidance on the management of any UXO hazards associated with any development activity carried out by the Authority.

This guide also helps the Authority conduct appropriate UXO risk management procedures at the design phase, provide budget for and seek appropriate advice and guidance on UXO contamination and disposal.

It provides the steps to follow to allow EOD contractors to sweep and clear contaminated project sites before any building, engineering, geotechnical investigations, and maintenance work of a construction nature starts.

3.0 Target Audience

This guide is targeted for SIEA staff, its clients and customers, developers and partners, consultants and contractors. It should be applicable to health authorities, the environmental

division, land owners and other relevant local agencies and stakeholders involved in the development project.

SIEA Contractors and Engineers are equally responsible for the wellbeing of their personnel on site and would be advised at the initial contract meetings of their responsibility, the process to manage UXO risks and who to contact at SIEA regarding UXO sightings and threats during project construction.

4.0 Responsibility and Risk Mitigation Measures

Risk mitigation measures are put in place to ensure so far as is reasonably practical the health and safety of SIEA employees and of any other persons affected by the development activity.

4.1 Authority

SIEA and all its employees have a responsibility under the SIEA OH&S policy[17] to ensure the safety of its staff and every other person involved or affected by its normal day to day operation or any development activity.

The responsibility to report a sighting of a UXO or any suspicious article found at project sites or any SIEA location in the country resides with the SIEA and all its employees.

In the event of a suspicious UXO find, the following risk mitigation measures should immediately be followed.

- the area must be cordoned off appropriately
- physical measures put in place to avoid unauthorised tampering of the UXO find
- highly visible markings are provided at the HIGH RISK area.
- the UXO risk is communicated to surrounding communities

The find is reported to the SIEA Capital Works Programme Manager (CWPM) and the RSIPF-EOU. The CWPM will be responsible for the assessment, mitigation or elimination of any UXO related hazard with responsible authorities and EOD clearance contractors. SIEA will keep statistics and records of UXO information from studies done on its sites and the report made available to public upon request.

A reporting system is required to be established, communicated to all parties and managed for UXO clearance activities.

SIEA is responsible for public awareness and consultation and building employee and stakeholder capacity to respond to the UXO threats at SIEA locations

UXO clearance will be considered and integrated into capital development activities and budget.

[17] The SIEA policy on Occupational Health and Safety 2010 is being reviewed.

4.2 General Public

The general public must be consulted and encouraged to provide feedback and comments on their general short and long term safety during planning and design stage through the operational life of the project. These public consultations are carried out as part of required activities at the initial project initiation, planning and design stage.

Public comments and concerns must be properly documented and timely feedback provided. The mechanism to address public concerns will follow the existing SIEA mechanism for handling of customer complaints, through the Customer Service Department and the Public Relations Officer.

4.3 EOD Contractors

EOD contractors are required to be competent and registered to carry out this type of service. They are required to have the necessary expertise and equipment to identify, isolate, remove and safely dispose all UXO threats with assistance from the RSIPF-EOU.

The EOD contractor is responsible for site safety procedures and are required to have in place appropriate strategies to manage risks and environmental impacts and have appropriate insurance coverage.

The contractor will provide to SIEA before any clearance work begins,

- Supporting documentation on competency (experience and references), insurance coverage and legal registration where necessary
- Proposed suitably qualified and experienced staffing to carry out the service
- Proposed procedures complying with international standard UXO clearance practices
- Proposed UXO identification and clearance methodology and timing
- Contract amount for the service

The typical activities to be carried out by EOD contractors is summarised below.[18]

- Carry out and complete UXO survey of the project site including affected areas outside of the project site but related to the project.
- Cordon off areas and prevent unauthorised tampering where suspected UXO threats are determined.
- Arrange for and carry out safe removal of all UXO ordnance from project site.
- Responsibly dispose UXO ordnance in accordance with relevant local law
- Ensure strategies and resources are in place to manage unintended accidents and explosions.
- Provide a report confirming completion of UXO survey, detection, removal and disposal.

[18] The procedures are summarized from the MID's '9.0 Unexploded Ordnance Procedure'

- Provide necessary documentation to RSIPF – EOD and other relevant SIG agencies for the issuing of a Certificate of Clearance.
- Continuously monitor, document and report to SIEA and RSIPF any residual UXO threats arising during project implementation

The contractor will confirm and certify in accordance with **CIRIA C681: Unexploded Ordnance (UXO**) or an alternate internationally accepted standard.

4.4 RSIPF – EOU

The RSIPF– EOU is the body responsible for clearance and disposal of UXO finds. The RSIPF EOU also responds to public reports of UXO and undertake clearance activities. Where there are no nearby police stations in the outer islands, reports should be directed to relevant government district agencies which then notify police at the provincial headquarters.

The RSIPF EOU will provide a Certificate of Clearance after suspected UXO ordnances have been removed by them or by EOD clearance contractors before any construction work can begin.

5.0 Risk Assessment and Management

5.1 Preliminary Risk Assessment

Preliminary risk assessment is required to be carried out to enable SIEA to identify any potential UXO risk or threat and decide whether a detailed risk assessment is required.

Preliminary risk assessment includes:

- examination of existing historical data
- talking with local surrounding communities about any past occurrences with UXO's
- provide probability on threat potential and
- recommend further steps to take

This is to be documented and filed and communicated to the CWPM or Project Engineer. A Preliminary risk assessment form is attached in Annex 1.

If potential risks are identified, a detailed risk assessment leading to detection and identification, recovery and disposal will be initiated.

5.2 Detailed Risk Assessment

In the Detailed Risk Assessment stage, project planning will take into consideration UXO activities in the design and budget for the project.

Risk mitigation measures are put in place and the public made aware of the UXO risk.

6.0 Contact Details

All SIEA staff, clients and customers, developers and partners, consultants and contractors are to contact the following SIEA and RSIPF personnel regarding UXO issues on SIEA land.

Organisation	Contact Detail

Royal Solomon Islands Police Force (RSIPF)	Director Explosive Ordnance Unit P.O. Box G1723 Honiara Tel: 23820
Ministry of Environment, Climate Change, Disaster Management and Meteorology (MECDM).	Director –Tel:24070 Environmental Conservation Division P.O. Box 21 Honiara Tel: 23031/28054 Undersecretary technical
Ministry of Infrastructure Development (MID)	Under Secretary (Technical) P.O. Box G8 Honiara Tel: 24247-Undersecretary Admin Tel: 20331-Undersecretary Technical

7.0 Annex

Annex 1. Preliminary risk assessment form

<table>
<tr><td></td><td colspan="3">Details</td></tr>
<tr><td>Name of assessor</td><td colspan="3"></td></tr>
<tr><td>Date of assessment</td><td colspan="3"></td></tr>
<tr><td>Site Address</td><td colspan="3"></td></tr>
<tr><td>Development Proposed</td><td colspan="3"></td></tr>
<tr><td>Historical findings</td><td colspan="3"></td></tr>
<tr><td rowspan="3">Findings from Interviews</td><td>Name of interviewee</td><td colspan="2">Detail</td></tr>
<tr><td></td><td colspan="2"></td></tr>
<tr><td></td><td colspan="2"></td></tr>
<tr><td rowspan="2">Threat potential / Probability[19]</td><td colspan="2">Probability and risk of UXO encounter</td><td>Rating</td></tr>
<tr><td colspan="2"> 
</td><td></td></tr>
<tr><td>Recommendation</td><td colspan="3"></td></tr>
<tr><td>Other Notes</td><td colspan="3"></td></tr>
</table>

Note: Attach site plan and map of area assessed.

[19] The threat probability rating is extracted from CIRIA C681: Unexploded Ordnance (UXO)

Annex 6: Consultation list

VISALE CONSULTATION
28th THURSDAY 2019

NAME	VILLAGE	SIGN.
(1) Fr John T	Visale station	
(2) Alister Huka	Visale primary SCH	
(3) FRANCISCA Afutaa	Visale primary SCH	
4. Willie Matea	VISALE SCHOOL	
5, Luke Tahisen	Veravaolu	
6, BERNADETH-TAHISEU	VERAVAOLU.	
7 SABASTYN	GURUMAI	
8 Benard Rapasa	VISALE STATION	
9 FRANCIS KOKUTI	TINA	
10 Kalisto Lekoe	Barumbora	
11. Francis Tatea	Tina	
12. Batista Kaoni	Legavauna	
13. Amos Niaku	Gurumai	
14. Michael Tahiseu	Visale Sch.	
15 Charles Mavisi	Tina	
16. Solomon Panaksonu	Tina	
17. Sebastine Koribuang	Tina	
18. Bernard Bechana	Tavapa	

Annex 7: Consent to Survey-DMI

DAUGHTERS OF MARY IMMACULATE

St Joseph's Convent

PO Box 512, Honiara

SOLOMON ISLANDS

24/4/ 2018

SOLOMON POWER
P.O.BOX, 6
HONIARA, SOLOMON ISLANDS

Dear Mr. Martin Sam 25/04/18

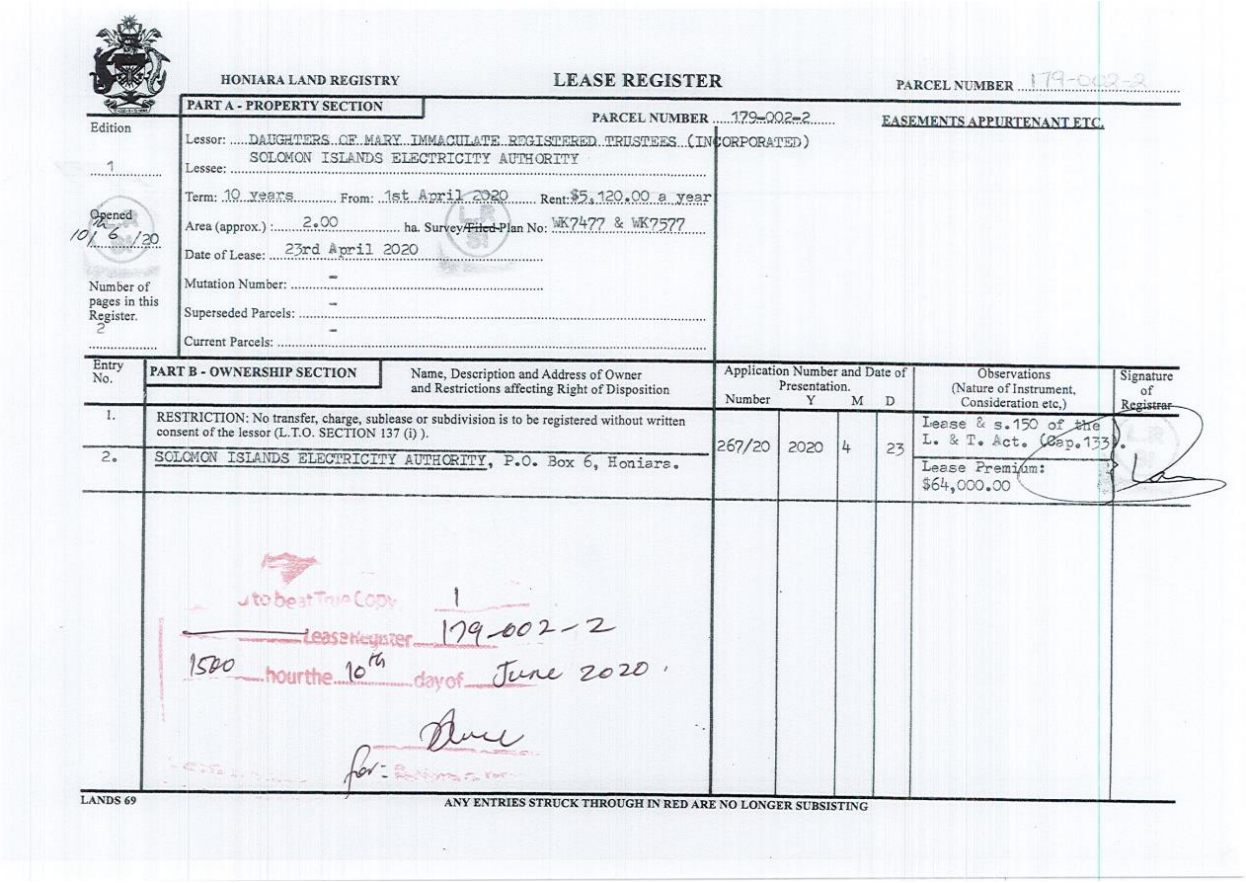
RE: Approval for Solomon Power to carry out the survey on Tina land Parcel No. 179-002-2 under Land Title of Daughters of Mary Immaculate congregation.

Thank you, for your letter dated on 13th March 2018, I am sorry for not replying your letter immediately because we are doing consultation with Arch Bishop Christopher Cardon OP and with other sisters before we can finalize our decision. We would like let you know that we were agreed and permit for Solomon Power Company to start survey Tina land Parcel No.179-002-2. We kindly ask you to let us know when you are ready to start the work so that we can accompany you to see the area.

Thank you for your understanding I am looking forward to hear from you.

Sincerely in Christ
Sr. Daniela Tovatada DMI
Superior General

Annex 8: Land Title



HONIARA LAND REGISTRY

LEASE REGISTER

PARCEL NUMBER 179-002-2

PART A - PROPERTY SECTION

PARCEL NUMBER 179-002-2

EASEMENTS APPURTENANT ETC.

Edition: 1

Opened: 10/6/20

Number of pages in this Register: 2

Lessor: DAUGHTERS OF MARY IMMACULATE REGISTERED TRUSTEES (INCORPORATED)

Lessee: SOLOMON ISLANDS ELECTRICITY AUTHORITY

Term: 10 years From: 1st April 2020 Rent: $5,120.00 a year

Area (approx.): 2.00 ha. Survey/~~Filed~~ Plan No: WK7477 & WK7577

Date of Lease: 23rd April 2020

Mutation Number: -

Superseded Parcels: -

Current Parcels: -

Entry No.	PART B - OWNERSHIP SECTION — Name, Description and Address of Owner and Restrictions affecting Right of Disposition	Application Number and Date of Presentation. Number	Y	M	D	Observations (Nature of Instrument, Consideration etc.)	Signature of ~~Registrar~~
1.	RESTRICTION: No transfer, charge, sublease or subdivision is to be registered without written consent of the lessor (L.T.O. SECTION 137 (i)).	267/20	2020	4	23	Lease & s.150 of ~~the~~ L. & T. Act. (Cap.133).	
2.	SOLOMON ISLANDS ELECTRICITY AUTHORITY, P.O. Box 6, Honiara.					Lease Premium: $64,000.00	

~~to be~~ True Copy 1

~~Lease~~ Register 179-002-2

1500 hour the 10th day of June 2020.

for:-

LANDS 69

ANY ENTRIES STRUCK THROUGH IN RED ARE NO LONGER SUBSISTING

Page 2. PART C - INCUMBRANCES SECTION **LEASE REGISTER** PARCEL NUMBER 179-002-2

Entry No.	Nature of Incumbrance	Application Number and Date of Presentation Number	Y	M	D	FURTHER PARTICULARS	Signature of Registrar	Surrenders, Cancellations etc.
1.	Obligations incident to lease	267/20	2020	4	23	The agreements, covenants, obligations, liabilities etc. contained or implied in the lease.		

2
Lease Register 179-002-2
1500 hour the 10th day of June 2020.

ANY ENTRIES STRUCK THROUGH IN RED ARE NO LONGER SUBSISTING