Initial Environmental Examination

September 2017

Vanuatu: Energy Access Project

Port Olry Grid Extension Project – Espiritu Santo Island, Sanma Province (Part 2)

Prepared by the Department of Energy, Republic of Vanuatu for the Asian Development Bank.

ABBREVIATIONS

ABC	-	Aerial bundled conductor
ADB	-	Asian Development Bank
CAC	-	Community Advisory Committee
CPP	-	Consultation and Participation Plan
DEPC	-	Department of Environmental Protection and Conservation
DGMWR	-	Department of Geology, Mines and Water Resources
DOE	-	Department of Energy
DSC	-	Design and Supervision Consultant
EIA	-	Environmental Impact Assessment
EIS	-	Environmental Impact Statement
EMP	-	Environmental Management Plan
EPC	-	Engineer, Procure and Construct
FAR	-	Fish and aquatic resources
GRC	-	Grievance Redress Committee
GRM	-	Grievance Redress Mechanism
HSP	-	Health and Safety Plan
IEE	-	Initial Environmental Examination
IES	-	International environmental specialist
IUCN	-	International Union for the Conservation of Nature
kW	-	kilowatt
L/s	-	litres per second
MOCC	-	Ministry of Climate Change, Adaptation, Meteorology & Geohazards, Energy, Environment and Natural Disaster Management
MSMP	-	Materials and Spoils Management Plan
NDMO	-	National Disaster Management Office
NES	-	National environmental specialist
NGO	-	Non-governmental organization
PEA	-	Preliminary Environment Assessment
PPE	-	Personal protective equipment
PPTA	-	Project Preparatory Technical Assistance
SEMP	-	Site-specific Environmental Management Plan
SPC	-	Sanma Provincial Council
SPS	-	Safeguard Policy Statement (June 2009)
STI	-	Sexually Transmitted Infections
SWER	-	Single wire earth return system
UNDP	-	United Nations Development Programme
UNELCO	-	Union Electrique du Vanuatu Limited
VPMU	-	Vanuatu Project Management Unit
VUI	-	Vanuatu Utilities and Infrastructure Limited
WMP	-	Waste Management Plan

CONTENTS

EXECUTIVE SUMMARY

1. **Background**. The Asian Development Bank (ADB) is supporting the Vanuatu government through the Department of Energy (DOE) to develop reliable and sustainable supply of electricity in the provinces of Sanma and Malampa to assist economic growth and increase the capacity to support greater access to electricity for local residents, businesses and industry. The outcome will be increased access to electricity generated by renewable energy sources. A project preparatory technical assistance has been undertaken and completed feasibility study of a small run-of-river hydropower scheme located on the Brenwe River, Malekula Island (Malampa Province) and grid extensions on Malekula and Espirito Santo (Sanma Province). The feasibility study includes this initial environmental examination (IEE) of the grid extension on Espirito Santo. The grid extensions proposed for Malekula are included in the IEE for the Brenwe hydropower scheme.

2. The feasibility study of the grid extensions focuses on the needed increase in access to electricity with the grid extension components as a benefit from the provision of lower cost power from hydropower plant developments. Without such hydropower plant projects extensions using diesel power are marginal or un-viable. The grid extension proposed for Espirto Santo will be linked to the existing energy generation system which includes Sarakata hydropower scheme, the diesel plant at Luganville (the provincial capital), and a small solar component.

3. The IEE is intended to meet the requirements of the ADB for Category B projects as described in the Safeguard Policy Statement 2009 (SPS) as well as comply with the requirements of an environmental impact assessment report as required under the environmental assessment requirements of the government. The objectives of the IEE are to: (i) describe the existing environmental conditions; (ii) identify potential environmental impacts; (iii) evaluate and determine the significance of the impacts; (iv) develop an environmental management plan (EMP) detailing mitigation measures, monitoring activities, reporting requirements, institutional responsibilities and cost estimates to address adverse environmental impacts; and (v) carry-out public consultations to document any issues/concerns and to ensure that such concerns are addressed in the project design. This IEE is submitted to ADB by the borrower and the final IEE report will be disclosed to the public by the government's executing agency and uploaded to ADB's website.

4. **Project Description.** Current reliance on high cost diesel generation in provincial centres provides a direct disincentive for grid extension as the additional costs are not matched by additional revenues. Renewable energy such as hydropower and solar has significant potential to reduce generating costs and allow the potential of more cost-effective expansion of the grid. Reduced generation costs combined with increased capacity will allow expansion of the distribution grids. The extension of the grid along the east coast of Espirto Santo (from Luganville to Port Olry) is identified in the National Energy Road Map.

5. The feasibility study recommended the adoption of 12.7 kV single wire earth return systems (SWER) as a least cost approach for grid connected supply to rural communities. The use of aerial bundled conductor and careful siting of poles will reduce impact on vegetation in the distribution line corridor.

6. **Categorization** The subproject is classified as Category B in accordance with the SPS, because the project's potential adverse environmental impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed readily. The results of this IEE and the environmental management plan (EMP) will be updated if necessary at the

detailed design / tender preparation stage by the project management unit responsible for implementing the project.

7. **Implementation Arrangements.** The executing agency for the project is the Ministry of Finance and Economic Management (MFEM) and the implementing agency is DOE within the Ministry of Climate Change, Adaptation, Meteorology & Geohazards, Energy, Environment and Natural Disaster Management (MOCC) supported by the Vanuatu Project Management Unit (VPMU) established within the Prime Minister's Office. The VPMU manage the project on behalf of MOCC-DOE and will lead design and implementation of the project. The VPMU will be supported by a design and supervision consultant (DSC). The DSC will include international specialists who will provide capacity building to MOCC-DOE and VPMU staff. The DSC will assist the VPMU in procurement (preparation of tender documents, tender evaluation) and supervision of construction. It is most likely that the project will be implemented under an engineer, procure and construct (EPC) contract and under such an arrangement the EPC contractor will be responsible for the final design and construction of the project. The VPMU and DSC will include an international environmental specialist to assist the government meet all its obligations with respect to the clearances and EMP for the project as well as provide training to VPMU and MOCC-DOE in monitoring the contractor's compliance with the EMP and safeguard requirements. The facilities are likely to be operated by a private company under a concession arrangement.

8. **Policy, Legal and Administrative Framework**. The Project shall comply with requirements of the Environmental Management and Conservation Act 2010 and the Environmental Impact Assessment Regulations 2011 which require that for development of hydropower projects an EIA must be undertaken by the project proponent and clearance obtained from the Department of Environmental Protection and Conservation (DEPC). The Project will also comply with the requirements of ADB's SPS 2009. Government environmental clearance and development consent (and other permits) must be obtained before any works commence.

9. **Environmental Management Plan**. Mitigation measures, environmental monitoring, and capacity development are required to minimize the environmental impacts in the pre-construction, construction and operation phases. The DSC and contractor will be tasked with finalizing the detailed design and compilation of updated EMP and the contractor will be responsible for implementing the EMP.

10. Implementation of internationally recognized good construction environmental practices forms the basis of the EMP which covers issues such as erosion and sedimentation control, materials sourcing and spoil management, waste management, minimization of habitat disturbance, and worker and community health and safety. The EMP will form part of the construction contract documents and the contractor will be required to prepare a construction environmental management plan (CEMP) based on the contract EMP. The contractor will submit the CEMP to VPMU for approval prior to commencement of works.

11. The operation of the project should have beneficial effects on the environment overall through more efficient provision of electrical power from renewable resources and improved environmental management by the government.

12. **Information Disclosure, Consultation and Participation.** The stakeholder consultation process disseminated information to the general public, project affected communities and key environmental stakeholders. Information was provided on the scale and scope of the project and the expected impacts and the proposed mitigation measures through consultation with government departments, local authorities and the general public in meetings. The process also

gathered information on relevant concerns of the local community for the project so as to address these in the project design and implementation stages. No significant environmental concerns were raised during consultations and the local communities were happy for the project to go ahead so that they could benefit from the electricity generated including employment opportunities.

13. The IEE will be disclosed according to the provisions of ADB Public Communications Policy 2011 and requirements of the laws of Vanuatu

14. **Grievance Redress Mechanism.** A grievance redress mechanism (GRM) will be established for the Project to receive, evaluate and facilitate the resolution of affected people's concerns, complaints and grievances about the environmental and social performance of the project. The GRM is based on accepted practices in Vanuatu and provides an accessible, time-bound and transparent mechanism for the affected persons to voice and resolve social and environmental concerns linked to the project.

15. **Conclusion and Recommendations**. The potential environmental impacts arising from design, construction, operation and maintenance of the project will be minor, localized and acceptable provided that the mitigation measures set out in the EMP are implemented properly. Key findings are summarized below:

- The project involves the 60 km extension of the electricity grid from Luganville to Port Olry;

- The careful placement of power poles and the use of arial bundeled conductors can minimize impacts on trees. The contractor will be required to select a line route and location for poles within the road corridor that minimizes the need for tree cutting and removal as much as possible. Where cutting or trimming of trees is necessary, trimming will be minimized in accordance with internationally recognized minimum clearance requirements; and

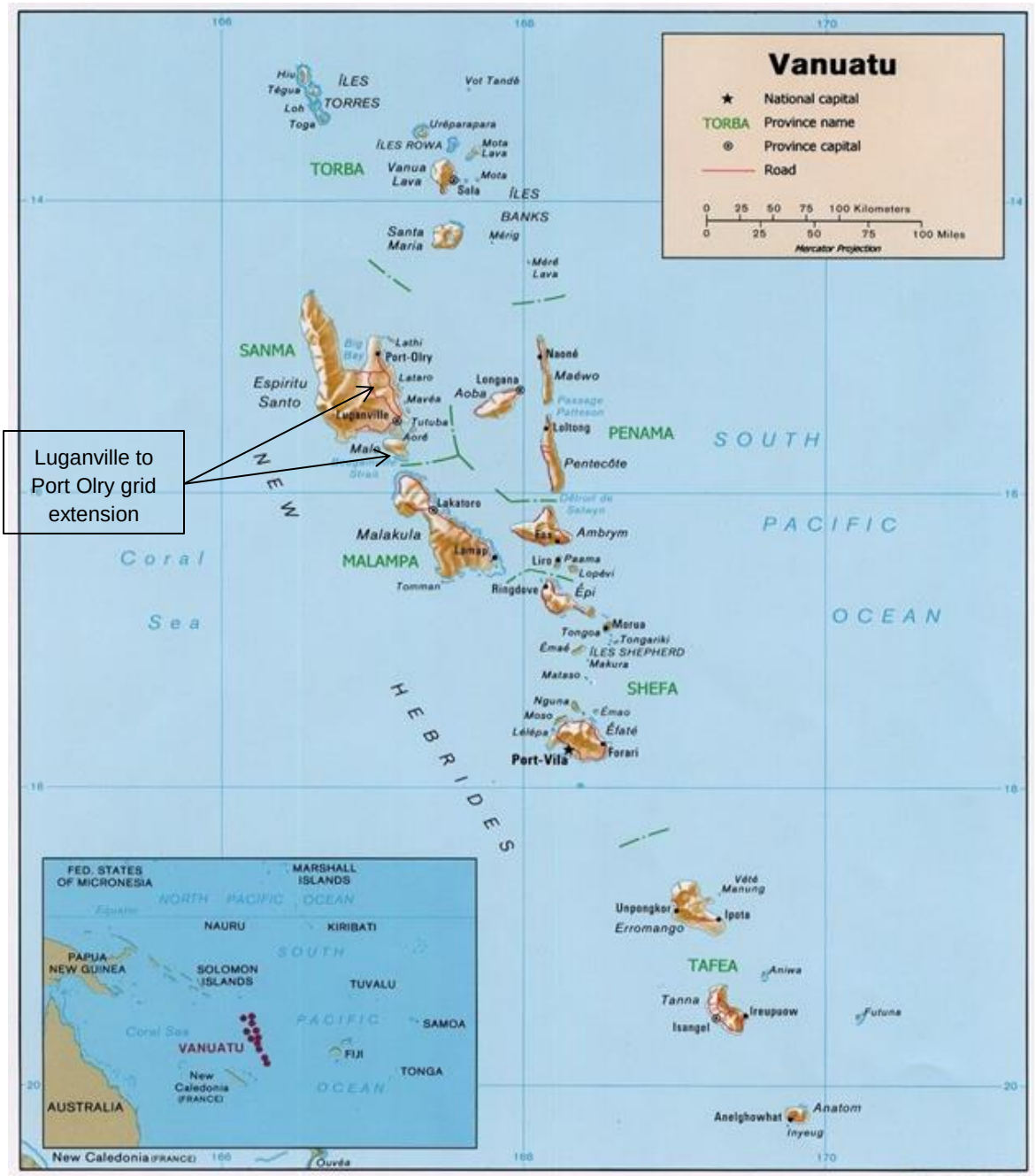
- Nearby communities consulted are happy for the project to be implemented and expressed their desire to benefit from both electricity generated and employment opportunities during construction and operation.

16. This IEE, including the EMP, is considered sufficient to meet ADB's and government environmental safeguard requirements in respect of the expansion of the grid between Luganville and Port Olry. No further or additional impact assessment is considered necessary at this stage.

I. INTRODUCTION

1. Vanuatu comprises around 80 islands with a total land area of 12,300 square kilometres spread over some 1,300 kilometres in a north to south direction, between latitudes 12° to 23° south and longitudes 166° to 173° east (Figure 1.1). The current population is estimated to be 215,000, of which 80 percent live in rural villages on the seven main islands of Efate, Espiritu Santo, Tanna, Malekula, Pentecost, Ambae, and Ambrym.

Figure 1.1 - Republic of Vanuatu



Source: Vanuatu Statistics Office

2. Since 1994, the country has been divided into six provinces: TORBA (Torres and Banks); SANMA (Santo and Malo); PENAMA (Pentecost, Ambae and Maewo); MALAMPA (Malekula, Ambrym and Paama); SHEFA (Shepherds and Efate); and TAFEA (Tanna, Aniwa, Futuna, Erromango and Aneityum). Each province hosts a provincial government that delivers services to the inhabitants.

3. Electricity in Port Vila and two provincial administrative centres of Lakatoro (Malekula, Malampa Province) and Lenakel (Tanna, Tafea Province) is provided by Union Electrique du Vanuatu Limited (UNELCO) and in Luganville (Santo, Sanma Province) it is provided by Vanuatu Utilities and Infrastructure Limited (VUI). UNELCO operates mainly diesel power station and VUI operates a hydropower station at Fanafo and diesel generator in Luganville.

4. There are also several micro-hydropower stations operated by rural communities, on Maewo and Epi. The government through the Department of Energy (DOE) has requested support from Asian Development Bank (ADB) to develop reliable and sustainable supply of electricity in the provinces of Sanma and Malampa to assist economic growth and increase the capacity to support greater access to electricity for local residents, businesses and industry.

5. A project preparatory technical assistance has completed feasibility study of a small run-of-river hydropower scheme located on the Brenwe River, Malekula Island (Malampa Province) and grid extensions on Malekula and Espirito Santo (Sanma Province). The feasibility study includes this initial environmental examination (IEE) of the grid extension on Espirito Santo. The grid extensions proposed for Malekula are included in the IEE for the Brenwe hydropower scheme.

I. POLICY AND LEGAL FRAMEWORK

6. The implementation of the project will be governed by the environmental laws and regulations of the Republic of Vanuatu and the safeguard policies of the ADB.

A. Government of Vanuatu

1. Constitution and Environmental Sector Policy

7. Environmental management is enshrined in the 1980 Constitution of the Republic of Vanuatu. The Constitution provides the overarching administrative and legal mandate for the protection of all Vanuatu lands and other associated environmental resources such that:

- "All land in the Republic of Vanuatu belongs to the indigenous custom owners and their descendants." (Article 73)

- "Every person has the following fundamental duties to himself and his descendants and to others to protect Vanuatu and to safe guard the national wealth, resources and environment in the interest of present and of future generations" (Article 7(d))

8. The protection of land and all associated environmental resources, for future generations is therefore a fundamental responsibility for all people of Vanuatu mandated by the Vanuatu constitution. Following on from this the sustainable use and management of land in Vanuatu is addressed within existing Vanuatu national laws and policies that supports economic development. The government's policy on environment and conservation is to provide an affordable framework of environmental protection and compliance within Vanuatu. This policy has

been materialized through the enactment of the Environmental Management and Conservation Act N°12 of 2002. As of March 2003, this represents the only legislation governing environmental protection of all natural resources in Vanuatu.

9. A number of important sectorial policies, strategies and aspirational documents that support the environmental management commitments of the Vanuatu Constitution and/or are relevant to the project are listed below. Relevant aspects of these documents are summarized in Annex 1A. They include:

- The National Biodiversity Strategy and Action Plan 1999
- National Energy Policy Framework 2007
- National Rural Electrification Policy 2000
- National Energy Road Map (2013-2020) 2013
- Priorities and Action Agenda of Government of Vanuatu 2006
- Productive Sector Policy (2012-2017)
- National Forest Policy 1997

2. Environmental Legislation

10. **Environmental Management and Conservation Act.** The defining national environmental legislation is the Environmental Management and Conservation Act No. 12 of 2002 which was amended to Environmental Protection and Conservation Act (CAP 283) in 2010 (the Act). The Act resulted in the establishment of the Department of Environment and Conservation (DEPC), which admsinisters the Act. The Act establishes the protection of the environment within Vanuatu and makes provision for the conservation, sustainable development and management of the environment and the regulation of related activities. This includes land, air and water. Specifically the Act introduces the requirement for environmental assessment and provides for the conservation of biodiversity and the establishment of protected areas in Vanuatu.

11. In Vanuatu all development, other than residential buildings or custom structures, requires an environmental clearance before construction can commence. Furthermore, any development on the coast requires the written consent of the Minister for Lands through a Forshore Development Consent. The Act is supported by the accompanying regulatory instrument, the Environment Impact Assessment Regulations (Amendment) Order N° 105 of 2013.

12. **Environmental Impact Assessment Regulations.** The Regulations (amended in 2012)[1] establishes the procedures for undertaking the environmental assessment of prescribed activities. The developer is required to first submit a development consent application following which the DEPC will conduct a preliminary environment assessment (PEA) which determines whether (i) no further assessment is required, (ii) no further assessment is required but an environmental management and monitoring plan is required, or (iii) where major projects are considered such

[1] The Environment Impact Assessment Regulations (Amendment) Order N° 102 2012 replaced the original Environmental Impact Assessment Regulations Order N° 175 of 2011.

as logging, large agricultural developments, mining and other prescribed activities as noted above, an EIS is required.

13. The DEPC prepare terms of reference for the EIS which would include technical, economic, environmental and social investigations. The EIS also requires public consultation. A steering committee reviews the EIS and recommends to the Director of the DEPC for approval, refusal or for more information. The Director can approve a prescribed activity with or without conditions. Importantly, no development can commence without an approval from the DEPC. The Director of the DEPC may issue a notice to stop or restrict the activity if the approval conditions are not being met.

14. Environmental standards are not provided in the Regulations as Vanuatu currently does not have national environmental standards. However, the DEPC requires World Health Organization standards to be used.

15. The Regulations do provide guidelines for licenses to discharge waste or emissions but without clearly defined national standards the enforcement of these is difficult.

16. This IEE will be submitted to DEPC for approval under the procedures outlined above. The Director of DEPC advised the Consultant that the ADB approved IEE for the project will be accepted by DEPC as meeting the EIA requirements for the project under the Act.[2] On this basis, the approval (environmental clearance) shall be issued. However, should any additional/supplementary assessment be required by DEPC to obtain approval under the Act and its regulations, this will be undertaken during the pre-construction phase of project implementation.

3. Other Legislation Relevant to the project

17. The government has enacted a series of laws across multiple sectors that contain provisions that apply to the management of the environment and natural resources. These laws including the government institutions responsible for their implementation are listed below. A summary of the sections these laws that address environmental management issues including their relevance to the project, is provided in Annex 1B.

- Public Health Act 22 1994 - Department of Health
- Water Resources Management Act 2002 - Department of Geology, Mines and Water Resources (DGMWR)
- Pollution Control Act 2013 - DEPC
- Draft Waste Management Bill[3] 2012 - DEPC
- Forest Act 2001 - Department of Forests
- Quarry Act 2013 - DGMWR

[2] This advice was provided to the Consultant during a meeting with the Director of DEPC 15 May 2014. (See Annex 5 Table A5.1.)

[3] This Bill is scheduled to go before Parliament in 2014.

- Control of Nocturnal Noise Act 1965 - DEPC
- National Parks and Nature Reserves Act 1993 - National Parks Board
- Preservation of Sites and Artefacts Act 1965 - Vanuatu Cultural Centre
- Wild Bird Protection Act 1989 - DEPC
- National Disaster Act 2000 - National Disaster Management Office
- Pesticides Control Act 1998 Department of Agriculture

18. While these laws provide a basic legal framework for environmental management, the system has several significant weaknesses.

19. Firstly, there are instances where conflicts occur due to inconsistencies between various national laws, or where the national laws are not in tune with local laws and policies especially the by-laws and policies of the provincial councils. Another significant weakness is the fact that, while environmental legislation has been enacted into law, apart from the Environmental Regulations, there are no rules and regulations to require and guide the enforcement of the laws. For example, the Pollution Control Act was enacted by Parliament in 2013 but with no regulations there is no formal legal basis for enforcement.

20. Similarly, there are no regulations for waste management under the Waste Management Act or for conservation under the National Parks and Conservation Act and until such regulations are enacted, there is no formal legal basis for enforcement.

21. Institutionally, there is lack of coordination between and among the government departments and other institutions at various levels that handle environmental concerns and management responsibilities. This results in legal and procedural overlaps, gaps and conflicts. Based on a review of the legislation relevant to the project, a summary of the national consents and permits required for the project, including supporting documentation, is presented in Table 2.1.[4]

Table 2.1 - Permitting Requirements for the Project

Permit Required	**Agency Responsible**	**Documentation**
Development Consent	DEPC	Development Application as per the Environmental Impact Assessment Regulations Order N° 175, 2011 (amended in 2012)
Right to construct, operate and maintain works associated with resources that do not comply with customary rights and rights of occupiers	DGMWR	As above
Permit for any discharge of pollution (as per Pollution Control Act 2014)	DEPC	Application to Director of DEPC (no prescribed form[5])

[4] It is noted that the Draft Waste Management Bill is expected to be passed by parliament into law in 2014 and if so, a waste disposal permit will be required from the Director of DEPC.

[5] Regulations for the Act are currently in draft form.

Permit Required	Agency Responsible	Documentation
Building Materials Permit (as per criteria defined in Quarry Act N° 9 2013)	DGMWR	Application to Director of DGMWR. (No prescribed form[6].)

Source: Distilled from review of existing legislation

4. International Treaties and Agreements

22. Vanuatu is a signatory to a number of international conventions, treaties and agreements with environmental and conservation implications as well as for the protection, promotion and safeguarding of cultural heritage and traditional knowledge. These are presented in Annex 1C.

B. ADB Safeguards Policy

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

24. The SPS categorizes potential projects or activities into categories of impact (A, B or C) to determine the level of environmental assessment required to address the potential impacts. The Project is categorized as environment Category B because potential adverse environmental impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed readily. Accordingly this IEE has been prepared as the requisite level of assessment to address the potential impacts in line with the SPS.

II. DESCRIPTION OF THE PROJECT

A. Existing Power Grid System

25. **The system**. Electricity is currently generated and supplied in Luganville via a concession contract with VUI, the parent company being the Pernix Group. The present maximum demand of Luganville is 1.6 MegaWatt (MW) but more typically 1.4 MW. The existing installed capacities in the area are a 1.2 MW Sarakata hydropower plant and 2.85 MW of diesel fuel oil generation. There is a 20 kV combined transmission and distribution line from the Sarakata hydropower scheme, a 20/5.5 kV substation near Luganville with primary medium voltage distribution being provided to Luganville at 5.5 kV.

26. **Consumer base and tariffs**. The customer base is approximately 2,350 with 1,700 consuming an average of <75 kWh/mth. The Utilities Regulatory Authority (URA) monitors the concession contract and sets tariffs for the concession. Whilst power tariffs in Vanuatu are high with a base tariff of VUV 55.01/kWh (USD0.59/kWh) the lower cost generation from the Sarakata HPP has enabled VUI and the URA to set lower tariffs in the Luganville concession with a base

[6] Regulations for the Quarry Act are currently in draft form.

of VUV 47.07/kWh. Never-the-less residential tariff rates include a significant lifeline cross-subsidy from high consumption consumers to low consumption customers.

27. **Potential for growth**. Prefeasibility load growth assessments from an earlier technical assistance and the National Energy Road Map were further reviewed and consultations held with VUI and DOE. These confirmed the modelling for Luganville was appropriate, although at considerable variance to the National Energy Road Map and earlier technical assistance. Thus maximum demand for 2032 has been revised downward from 4.7 MW to 2.2 MW. Table 3.1 summarizes the growth projections.

Table 3.1 – Luganville Energy and Maximum Demand Projections

Unit	Year							
	2013	**2017**	**2022**	**2027**	**2032**	**2037**	**3042**	**2047**
MWh	9,055	10,093	10,779	11,329	11,907	12,514	13.153	13,824
MD, kW	1,707	1,903	2,032	2,136	2,245	2,359	2,479	2,606

Note: MWh = MegaWatt hour; MD = maximum demand; kW = kiloWatt

Source: Feasibility Study for Grid Extensions TA 8285-VAN (February 2015)

28. The feasibility study calculated 900 households in 2019, based on 3% household growth, and a total customer base approaching 1,000 customers.[7] The load assessment assumes 90% of customers using 30kWh/month and 10% (larger household consumers, businesses, churches, schools, dispensaries and other community facilities) using 200 kWh/month, deriving an overall average of 47 kWh/month per customer.

29. **Grid extension options**. Options for grid extensions were assessed in urban, peri-urban and rural areas up to 10 km and remote or long extensions in excess of 10 km from the existing grid. Single wire earth return (SWER) system under 2-wire 1-phase, 3-wire 3-phase and 1-wire options were assessed. This developed a framework to determine viable projects.

[7] The 2009 Census Summary Release noted that household growth on Santo averaged 2.8% between 1999 and 2009. The East Coast is a highly desirable location, therefore the feasibility study assumed a higher than average household growth rate of 3%.

30. As an extension exceeds 2 km as 3 wire 3-phase or 3 km as 2 wire 1-phase it becomes a lower overall cost to construct as a 12.7 kV SWER line. As there is some induced imbalance in the 3-phase system hence increased losses, where extensions exceed 3 km and 4 km respectively for 3-wire or 2-wire systems SWER has lowest life cycle costs. This analysis is on the basis of spans being optimised within the ratings of the selected poles, sags and tension limits of the conductors.

31. SWER spans using high strength conductor can exceed 250 m along the flat using standard 11.9 m poles and using small rises in the routing extend beyond subject to pole strength and turnoff loads. Span limits have more to do with allowing for possible future 3-phase upgrade if the 12.7 kV SWER line capacity is likely to be exceeded in the future.

32. **Application of SWER**. SWER systems are common in Australia, Canada, New Zealand and Southern Africa including South Africa, Mozambique, Namibia and Zambia. A SWER line has capacity limits at 8 amps operation 100 kVA, 12 Amps 150 kVA and at 20 Amps 250 kVA. The limits are due to i) avoiding interference in telecommunications fixed wiring, not an issue in Vanuatu where mobile communications are the norm; and ii) the higher the SWER current the greater the investment in grounding of transformers is required to minimise step and touch potentials for safety (equipotential voltage gradient control). In the cases studied for Vanuatu the SWER lines are generally to isolated villages whereby the total of all the connected villages along that line are unlikely to exceed 100 kVA (8 Amps) so standard SWER high voltage earth grids will be adequate for most installations. Advantages and disadvantages of the SWER system are provided in Table 3.2.

Table 3.2 – Advantages and Disadvantages of SWER

Advantages	Disadvantages
○ Cost reduction ○ One conductor, less pole top equipment ○ Long, hilltop to hilltop spans ○ Fewer switching and protection devices ○ Design simplicity ○ Speed of construction ○ Reduced maintenance costs ○ Reduced fire hazard - avoid conductor clashing	○ Earthing must prevent dangerous step and touch potentials ○ Load balance problems can erode efficiency of three phase supply line ○ Voltage control can be difficult ○ Power quality can be compromised ○ Load density limitations

Source: Feasibility Study for Grid Extensions TA 8285-VAN (February 2015)

33. The Port Olry line has potential to exceed 100 kVA, though unlikely to exceed 250 kVA unless a significant hotel or other commercial enterprise surfaced. So for this line, design allows for future upgrading to 3-wire 3-phase by intermediate pole insertion and provision of additional conductors. To enable this initial pole spacing's of 167 m ruling rather than 250 m and a larger conductor, 50 mm2 AAAC compared with 24 mm2 hi-strength ACSR, is provided. In practice intermediate poles may not be required at all locations depending on ground topography and maximum conductor operating temperature.

B. Project Components and Location

34. **Pole selection**. VUI currently procures tubular steel poles of 9.0 and 11.9 m from a Chinese source. VUI advised they were investigating a pole source via INGAL-EPS of Australia. The PPTA consultant reviewed these poles and found them to be used extensively in Australian and New Zealand: they are particularly competitive in rural construction. Chinese manufacture of the poles is closely controlled and quality is high. At 9.0, 9.6 and 11.9 m they can be containerised,

thus shipping costs minimised. They are relatively light, easily transportable and manual erection methods may be used.

35. **Conductors**. VUI currently uses three different types of overhead line conductors. For this project, use of medium voltage aerial bundled conductors (ABC) is proposed where lines are through heavily vegetated or coconut plantation localities.

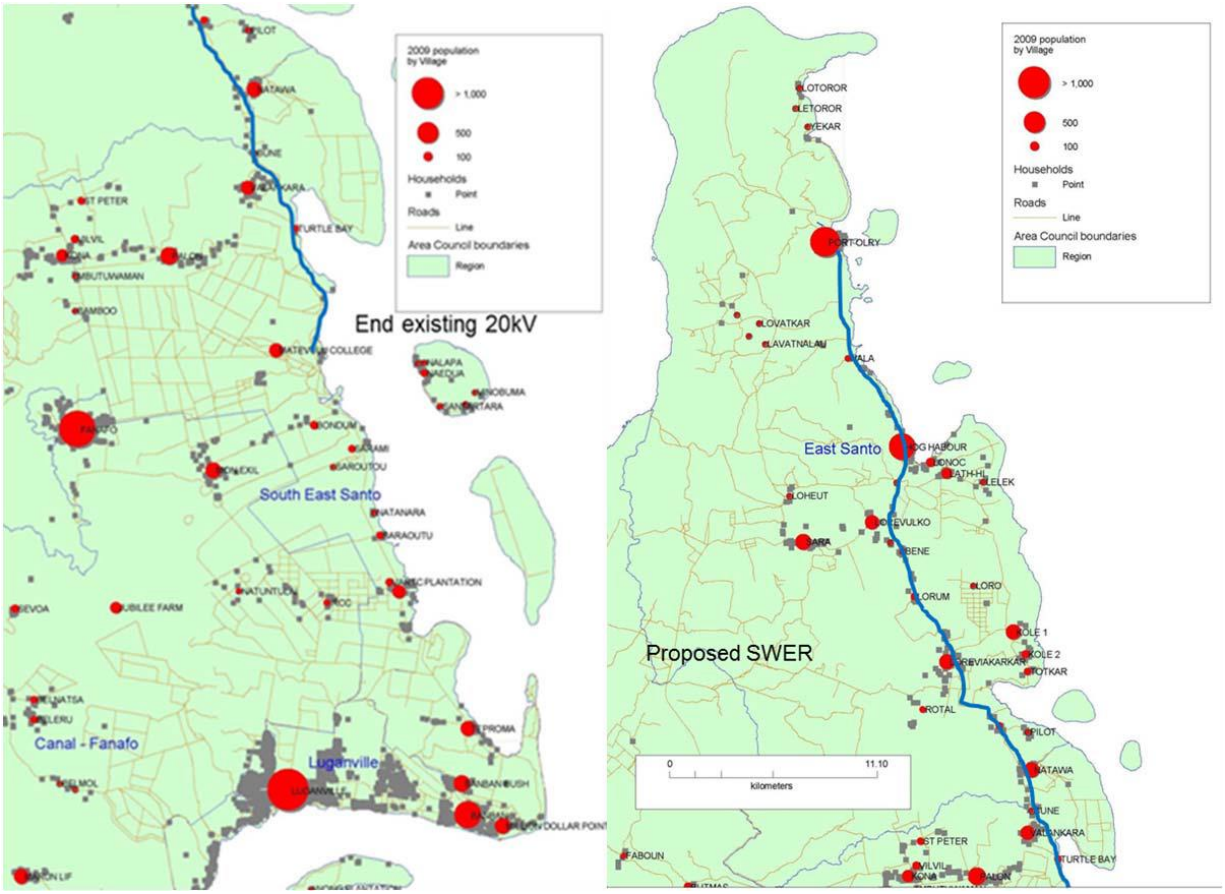
36. **The proposed grid extension route**. The route to Port Olry will follow the fully sealed two lane highway along the coast. There are numerous coconut plantations and cattle farms. There are various small resorts along the route and a number of small off-shore islands may be easily accessible.

37. With minimal removal of encroaching trees and coconut palms a 3-phase open wire of 125 m ruling spans could be constructed with up to 167m spans. Long span (250 m) construction of SWER is possible along the entire route with minimal vegetation trimming/removal needed. The extension would require between 250 and 480 poles depending on the span length. The line route will follow existing roads and tracks wherever possible.

38. The 60 km 12.7 kV SWER grid extension will involve i) vegetation trimming along the road corridors where required to ensure adequate safety clearances for the power; ii) transporting 11 m steel or concrete poles to the road side; iii) erection of poles; iv) stringing of conductors; and v) installation of transformers where required. These sequential activities are primarily manual activities involving a small team with minimal use of mechanical equipment. No excavation is required other than manual digging for the pole footing. Concrete foundations will be provided for the pole footings

39. The location of the corridor is shown in Figure 3.1.

Figure 3.1 - Location of Port Olry Grid Extension



Source: Feasibility Study for Grid Extensions TA 8285-VAN (February 2015)

40. The proposed grid extension would capture a large customer base – estimated at over 750 households and businesses (based on 2009 Census) inlcduing adjacent communities within 4-5 km of the main road. From the end of the existing 20 kV line there are numerous villages along the route. Port Olry, a community approximately 60 km north of Luganville is currently supplied via a small coconut oil mini-grid system. Between Luganville and Port Olry there are numerous intermediate villages: Turtle Bay (100 households), Natawa (>50 households), Hogg Harbour (>150 households), and various small resorts and other smaller communities of 20-40 households within the catchment of the route. There is considerable potential for economic development given excellent roads and beautiful beaches for tourist industry expansion and business development if complimented with access to reliable grid connected power systems.

41. **Operation and maintenance**. Significant cost impost will be the costs of a Luganville based concessionaire servicing the Port Olry locality. Whilst there is a good road, providing meter reading, fault servicing and routine maintenance would incur higher operating costs - at the cost to the Luganville community who would have to fund through tariff impacts. Utilising pre-payment meters would bring down the costs of routine meter reading. SWER lines have low maintenance an operation costs with good reliability, so this is a benefit to limiting operation and maintenance costs. However these are far lesser costs that running the Port Olry coconut oil generation operation if that was brought under the Luganville concession area.

III. DESCRIPTION OF ENVIRONMENT (BASELINE DATA)

A. Physical Resources

1. Climate, Air Quality and Noise

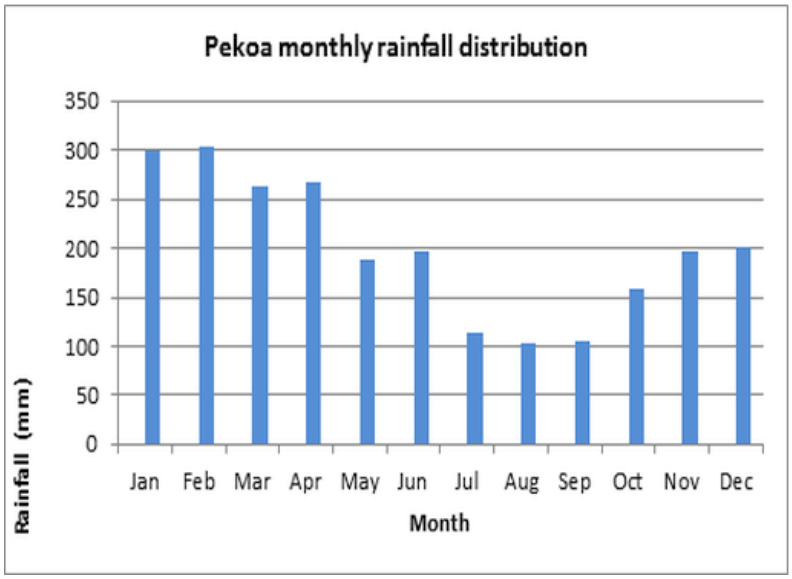
42. Espiritu Santo situated in the northern part of the Vanuatu archipelago experiences a wet tropical climate. Average temperatures range from between 21°C and 27°C and average humidity ranges between 75% and 80%. Temperatures vary slightly between the dry season (from July to September) and the wet season (from November to April). The warmest months are January-March and the coolest are July to September. The mean annual rainfall at Luganville (Pekoa Airport Gauging Station) over the 43 year period 1971 - 2013 is 2401 mm However, the range of annual rainfall maxima over that period shows significant variability with an annual maximum of 3,474 mm (1988) and a minimum of 689 mm (1983)[8].

43. Rainfall is associated with the monsoon winds, which change direction due to the movement of the inter-tropical convergence zone in winter and summer. In the summer (wet season) months of October to April, north-easterly wind conditions bring warm humid airstreams, and associated cyclonic disturbances. During this period about 68% of the annual recorded rainfall occurs. From May to September (dry season) south-easterly trade winds affect the country. The driest month as recorded at the Pekoa gauging station is August where mean monthly rainfall of 98 mm has been recorded as shown in Figure 4.1.

44. While no air quality measurements are available for Vanuatu air quality is good due to the remoteness of the archipelago, a small population and good exposure which promotes reliable air movement. Fires for disposing of rubbish and vehicle emissions particularly in Port Vila provide localized areas of poor air quality. CO_2 emissions are considered to be 0.4 mt/capita which is very low in comparison to the East Asia and the Pacific Region at 2.1 mt/capita.[9]

[8] Data obtained from Vanuatu Meteorological Service
[9] ADB. 2011. Vanuatu Interisland Shipping Support Project (IEE for Litzlitz Wharf)

Figure 4.1 - Mean Monthly Rainfall at Pekoa Station (1971-2013)



Source: Vanuatu Meteorological Service

2. Topography and Soils

45. Espiritu Santo Island is the largest island in the Vanuatu archipelago encompassing approximately 3,900 km^2 in area. The island has two main geomorphic features. The first is a deeply dissected western mountain range of volcanic and volcaniclastic rocks extending from the northern end of the Cumberland Peninsula to the southwest tip of the island and including Vanuatu's highest mountain Mt Tabwemasana at 1,879 m. The second feature is an eastern reef limestone plateau comprising a series of terraces. The limestone terraces also form a fringe along the southern margin of the island.

46. The limestones are overlain by thick clay soils and only locally by small amounts of river and coastal alluvium. Soil cover on the limestones is derived from ancient air fall ash from nearby volcanoes. The soils are mature and comprise light brown clays showing relict tuffaceous texture with thickness increasing with altitude of the limestone.[10]

47. The volcanic mountains of Espiritu Santo and Malekula are overlain by shallow, less mature, but generally fertile, volcanic soils (Mueller-Dombois and Fosberg 1998).[11] Soils developed on alluvium are immature but fertile and low in potassium.

3. Geology, Seismicity, and Natural Hazards

a. Geology

48. The islands of Vanuatu along with the Santa Cruz group to the north collectively form the subaerial expression of the New Hebrides Arc. The New Hebrides Arc is part of a narrow chain of Tertiary to Holocene volcanic island arcs extending from Papua New Guinea and the Solomon Islands through Fiji, Tonga and the Kermadec islands in the north to the islands of Matthew and

[10] Loan,C and Lum, J 1997. Soil Geochemistry Mobile Metal Ion Survey on Eastern Santo, Vanuatu. SOPAC Technical Report No. 253.
[11] Mueller-Dombois, D & Fosberg, F. 1998. Vegetation of the Tropical Pacific Islands. Springer Verlag, New York

Hunter in the south, and is a partly emerged ridge of around 200km in width. The ridge is underlain by an east dipping subduction zone where the India-Australia tectonic plate to the west is being consumed by the Pacific plate to the east.

49. The geology of Espiritu Santo reflects a dynamic geological history controlled by evolving plate boundary tectonism that has occurred from Late Oligocene to the present. This has included associated phases of volcanic activity, uplift and submergence in an overall island arc setting. Such a geological history and setting has given rise to a complex assemblage of Late Oligocene to Early Pliocene marine and subaerial volcanic and volcaniclastic sedimentary rocks intercalated with reef carbonates. Typical rock types include tuffs, breccias, turbidites sandstones, reef limestones, mudstones and pelagic sediments. These have been intruded by occasional stocks of gabbro, andesite and diorite. This assemblage is represented by the rocks that form the central and western mountain ranges of Espiritu Santo and Malekula and has undergone extensive dissection due to uplift and erosion during the Quaternary period.[12] Late Pliocene to recent reef limestone terraces abut the eastern margin and fringe the southern edge of the western mountain range, reflecting the interplay between tectonic uplift and sea level changes that have occurred in the area during the Quaternary period.

b. Seismicity and Natural Hazards

50. Vanuatu is exposed to a wide range of geological, hydrological and climatic hazards. The United Nations Office for Coordination of Humanitarian Affairs assesses that Vanuatu is one of the most natural disaster prone countries in the world and is highly vulnerable to the impacts of natural disasters.[13]

51. This is reflected in the World Risk Report 2012 which ranks Vanuatu as the world's most at risk country in respect to exposure and vulnerability to natural disasters.[14] Between 1980 and 2010 the country experienced 31 major disaster events, costing over $205 million. Of these events there were nine earthquakes, fourteen tropical cyclones, and five volcanic eruptions directly impacting over 200,000 people with over 200 deaths. Climate-related events, including floods, landslides and storms, comprised approximately half the disaster events, but were markedly predominant in terms of the number of people affected and damage and losses experienced. For example, the proportion of reported people affected by climate related disasters was 88% compared with 12% affected by earthquakes and volcanoes.[15]

4. Water Resources

52. The largest rivers on Espiritu Santo include the Sarakata River (located in the southeast of the island close to the provincial capital – Luganville) and the Tafwakar River (to the east of Sarakata River) provide abundant water resources for the island's population. Since 2010 DGMWR in cooperation with DEPC, other government agencies and NGOs has been implementing the Global Enviornment Fund financed integrated water resources management Ridge to Reef Programme within the Sarakata catchment. A key objective of the programme is watershed protection to reduce the impacts of downstream flooding, and restoration of the watershed ecosystem.

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[12] Brief overview distilled from McFarlane A and Carney J,N 1985 op.cit.
[13] United Nations Office for the Coordination of Humanitarian Affairs (OCHA); Vanuatu: Natural Hazard Risks (2011)
[14] University Institute for Environment, Human Security and Alliance Development Works. 2012. World Risk Report.
[15] Government of Vanuatu. Disaster Statistics www.preventionweb.net

B. Biological Resources

1. Terrestrial Habitats

53. **General.** The regional terrestrial ecosystems of Vanuatu vary with altitude, major substrate type windward versus leeward position and human influences. Mueller-Dombois and Fosberg summarizes the ecosystems in landscape[16] terms as follows: [17]

- Lowland rain forest (with six variations)
- Mountain cloud forest and related vegetation
- Seasonal forest scrub and grassland (with three variations)
- Vegetation on new volcanic surfaces
- Coastal vegetation including mangroves
- Secondary and cultivated woody vegetation

54. The terrestrial biodiversity in Vanuatu is significantly less rich than its neighbouring countries such as New Caledonia, the Solomon Islands, Fiji and Papua New Guinea. Overall biodiversity richness and endemism in Vanuatu range from low to moderate. This is largely because the islands of Vanuatu are geologically younger and smaller in size and are isolated from large land masses.

55. Vanuatu's flora is thought to be more closely allied with that of the Solomon Islands to the north with some elements from Fiji and very few from Australia or New Caledonia. Similarly the fauna demonstrates closer affinities with Solomon Islands. Internally there is a biogeographic divide with islands to the north of Efate demonstrating significant differences to the islands in the south. Overall, Vanuatu's biodiversity remains poorly known with detailed studies of only a few genera and few studies of the biota of the smaller or less accessible islands. Available information suggests that Vanuatu's biodiversity is relatively intact and possibly better preserved than in most Pacific Island countries. A few plants and animals that have been studied in detail (orchids, palms, lizards and flying foxes) show that a significant number of endemic species are found on some islands.

56. **Threats to Vanuatu's biodiversity.** Over-exploitation of plants and animal resources is the most likely cause for the reported decline in the abundance and distribution of many species. Examples include the coconut crab (*Birgus latro*), green snail (*Turbo marmoratus*). Plants such as kava (*Piper methysticum*) sandalwood (*Santalum austrocaledonicum*) white wood (*Endospernum medullosum*) and the melektree (*Antiarus toxicana*) are also in decline.

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[16] *Landscape* is the geographical equivalent of the term *ecosystem*. However, while the term *ecosystem* is often interpreted as an interactive system involving the functional relations of primary producers, consumers and decomposers by energy transfer and nutrient dynamics the term *landscape* is more generally understood as a larger land segment with its built-on component. The functional relationships in a landscape are seen as an interaction of climate geology, geomorphology, soils and disturbance regimes with the prevailing built-on component.

[17] Mueller-Dombois, D & Fosberg, F. 1998. *Vegetation of the Tropical Pacific Islands*. Springer Verlag, New York.

57. Degradation of habitats mainly through the destruction of rainforest for subsistence agriculture is considered a significant factor affecting Vanuatu's biodiversity. Along with this new development practices coupled with declining respect for traditional resource management systems and traditional authority structures contribute to the degradation of habitat. Degradation of freshwater habitats through over exploitation of freshwater species and clearing of catchment vegetation on some islands have resulted in much reduced aquatic diversity.

58. Introduction of invasive species imported in the past such as Mile-a-Minute (*Mikania sp*) and American rope (*Meremia sp*) are suppressing regrowth of tree forests and can cause loss of wildlife. Other invasive species of concern include: water hyacinth (*Eichhornia sp*), rats and feral pigs, the fire ant (*Wasmania auropunctata*), African snail (*Euglandina fulica*) and the Indian Mynah Bird (*Acridothera tritis*).

59. **Project Area.** The project area is a coastal zone with areas of lowland rainforest (recognized as the natural vegetation on all islands of Vanuatu on their southeastern windward sides including areas up to about 500-600 m elevation). The more heavily vegetated araes between settlements and plantations are in various stages of recovery following disturbances by cyclones and human activities.

60. In the forested areas, principal canopy tree species include Kleinhovia hospita, Intsia bijuga and Gyrocarpus americanus. The subcanopy typically includes Diospyros acris, Syzygium sp, Garcinia pancheri, Myristica fatua, Terminalia, Tieghemopanax and (endemic) Veitchia palms. The undergrowth is rich in ferns (Tectaria, Asplenium and Selaginella). Other tree species characteristic of southern Espiritu Santo as identified by the Department of Forestry include Pterocarpus indicus (Rosewood), Dracontomelon vitiensis (Nakatambol), Antiaris toxicaria (Melek tri), Castanospermum australe (Black bin) Endospermum medullosum (Whitewood) and Pometia pinnata (Nandau).[18]

61. Overall the natural habitat of the project area is classified according to the SPS definition as a highly modified habitat with what is considered to be of relatively low biodiversity value.

2. Terrestrial Fauna

62. Whilst a range of wildlife was reported during community consultations as being present in the catchment including birds, frogs, lizards and aquatic fauna, the modified to highly modified habitat is considered generally poor in terms of wildlife for village hunting purposes. Wild pig populations are low and occasionally hunted.

63. A review on studies on the flora and fauna for the Vanuatu Biodiversity Strategy and Action Plan (1999) noted the presence of more than 1100 plant species, 297 coral species, 80 species of insects, 13 mammal species and more than 469 shallow fish species. However, many species are in decline. The only terrestrial mammal species in Vanuatu are bats including four pteropodids (fruit bats) and eight microchiroptera. Six of these species are endemic or near endemic. About 121 bird species have been recorded in Vanuatu comprising 32 seabirds, 15 shorebirds, and 74 land and freshwater birds.[19]

64. Of the 74 land and freshwater birds, 56 bird species are considered resident breeding species; ten introduced, one is a non-breeding visitor and seven have been recorded less than

[18] Species list provided by Department of Forestry during stakeholder consultations
[19] Parr, J. 2007. *Important Bird Areas in Vanuatu*. Birdlife International, Fiji.

five times.[20] Isolation has led to the development of nine endemic species in Vanuatu and one the Buff-bellied Monarch, *Neolalage banksiana* belongs to an endemic genus.

3. Protected Areas and Areas of Conservation Value

65. There are no protected areas or recognized areas of conservation value within or immediately adjacent to the project area. The nearest recognized conservation areas include the proposed Nambauk Conservation Area located approximately in the Tafwakar River catchment and the proposed Butmas Conservation Area located 15 km north of the existing Sarakata hydropower scheme. Both conservation areas are in the process of being legally recognized and both will not be affected by the grid extension project.

4. Rare and Endangered Species

66. The IUCN Red Book lists 17 endemic species in Vanuatu for which Red Book list categories have been assigned. Four species of bird are categorized as vulnerable and one species of bird is categorised as near threatened. A further four endemic birds are least concern. The remaining listed species include three reptile species of which two are least concern and one is data deficient. Details are provided in Table 4.1. With the exception of “least concern” yellow fronted white eye, the Red List species are not known to inhabit the project area, they are observed in the more heavily forested areas further inland from the coastal zone.

5. Persistent Organic Pollutants

67. There is no legislation governing the intentional production and use of persistent organic pollutants in Vanuatu. The Global Enviornment Fund Evaluation Report noted that DDT was used for the control of malaria carrying mosquitoes until 1989, and some of the used stocks of transformers in Vanuatu contained polychlourobyphenals[21] The main sources of dioxin and furan releases in Vanuatu are from the incineration of quarantine and medical waste and uncontrolled burning, including landfills and backyard rubbish fires. Vanuatu lacks the capacity to record control or monitor releases of dioxins and furans. The knowledge and application of best available techniques and best environmental practices for new or existing sources in Vanuatu is very limited or non-existent.

Table 4.1 - IUCN Red Book List of Endemic Vanuatu Fauna

Species Group	Name	Red List Category	Habitat
Birds	Vanuatu Imperial Pigeon *Ducula bakeri*	VU	Forest
	Vanuatu Kingfisher *Todiramphus farquhari*	NT	Forest
	Vanuatu Scrub Fowl *Megapodius layardi*	VU	Forest
	Vanuatu Starling *Aplonis santovestris*	VU	Forest

[20] Ibid.

[21] Global Environment Facility (2014) GEF Vanuatu and SPREP Portfolio Evaluation (1991-2012) Volume I: Evaluation Report

Species Group	Name	Red List Category	Habitat
	Royal Parrot Finch *Erythrura regia*	VU	Forest
	Tanna Fruit Dove *Ptilinopus tannensis*	LC	Forest
	New Hebrides Honey Eater *Phylidonyris notabilis*	LC	Forest
	Buff-bellied Monarch *Neolalage banksiana*	LC	Forest
	Yellow fronted White Eye *Zosterops flavifrons*	LC	Forest, plantations, gardens
Reptiles	*Lepidodactylus vanuatuensis*	LC	Scrubland
	Vanuatu Silver Vineskink *Emoia nigromarginata*	LC	Forest
	Vanuatu Sawtailed Gecko *Perochirus guentheri*	DD	Marine coastal

Source: IUCN website: www.iucnredlist.org

C. Socioeconomic and Cultural Resources

1. Population and Communities

68. Espiritu Santo is the third largest island of Vanuatu. In 2009, the total rural population of Espiritu Santo Island (excluding Luganville) in Sanma Province was 38,307 composed of 7,864 households. The male ratio was slightly higher than female at 51.3:48.7 while average household size was 4.87, which was the same as that of the national average of 4.9. Luganville the capital is primarily urban while the areas outside the town are primarily rural.

69. The population is predominantly Ni Vanuatu Melanesian. Luganville the main provincial and government administrative centre of Sanma Province receives an influx of people from other areas of Santo as well as from other provinces of the country and according to the 2009 census, the annual urban growth rate is 2% compared with the only other urban area in Vanuatu, Port Vila which has a growth rate of 4.1%.

70. Population and projections from the 2009 Census indicate that the wider project area has a population of approximately 2989 and 712 households, increasing to 915 households by 2019. Table 4.2 provides data from the 2009 Census.

71. Approximately 83% of households in Santo rural own their houses while 9% and 7% respectively are renting or rent free. Of the land where the house stands 46% are customary owners, 17% have urban lease, and 9% rural lease while 20% occupying the land with informal agreement.

Table 4.2 – Project Area Population and Projections

Location	2009 Census (no.)				Projection (no. of h'holds)	
	Female	Male	Total	H'holds	2014	2019
Port Olry	456	472	928	193	217	244
Port Olry adjacent villages	na	na	na	87	100	116
Hogg Harbour	362	353	715	145	168	189
Loreviakarkar	128	136	264	55	64	72
Lorevulko	105	129	234	53	61	69
Kole 1	129	129	258	53	61	69
Natawa	123	147	270	58	67	76
Valankara	116	138	254	55	64	72
Turtle Bay (resort)	33	33	66	13	15	17
Total	**1452**	**1537**	**2989**	**712**	**825**	**915**

Source: Government of Vanuatu Statistics Office – 2009 Census

2. Health and Education

72. According to the UNDP Human Development Report 2013 the human development index of 0.626 ranks Vanuatu 124th out of 187 countries. This value is below the average of for countries both in the medium human development group and in East Asia and the Pacific and indicates a low level of development (based on health, education, and income).

73. There are several health facilities in Sanma Province as reported in 2009, namely one hospital; 11 health centres; 12 dispensaries; and 56 aid posts. The ratio of facilities per person was 1:74. Amongst infectious diseases, malaria and tuberculosis are major public health concerns. However, the incidence of sexually transmitted infections (STIs), acute respiratory tract infections, diarrhoea, and viral hepatitis is significant.

74. In 2009, of the Santo population 15 years and above, 27% of the rural population was reported to have completed primary education; another 22% had some primary education, 10% had a certificate and 7% had some senior secondary education. Approximately 15% had no schooling. Nealry 7% had a college degree and 2% had completed a bachelor's degree. The literacy rate of the province was reported to be about 93%; with the rate for females (94%) being greater than for males (91.9%).

3. Cultural Heritage

75. Vanuatu has a rich history, and Ni-Vanuatu people adhere closely with many ancient traditional practices, even up to the present day. The concept of "kastom" relates to cultural, historical and religious traditions. It is most intimately tied to the land, natural resources and revenue for the spiritual forces of nature. While there are many sites that are preserved by their custom owners, sites that are officially designated as having cultural and historical significance are limited in numbers.

76. Vanuatu is rich in settlement sites from these ancient times, but many of the sites have disappeared and have not been relocated. Within the project area, no significant cultural or

archaeological discoveries have been reported. However, the forest and bush areas contain traditional herbal medicines and food.

4. Land use, Livelihoods and Employment

77. The main use of land by majority of rural Ni-Vanuatu (>80%) is subsistence farming. Due to population growth, pressure has been placed on the land and the forest mainly for new gardens. Almost every household in rural Vanuatu owns a small patch of garden as the main source of food. The main crops grown are coconut, cocoa, root crops such as cassava, taro, yam, sweet potato, banana, and recently kava for which demand has increased significantly. After land clearance, lands are normally cultivated for one to three years followed by a longer fallow period ranging from 1 to 5 years however due to decreasing amount of space fallow periods are becoming shorter.

78. Coconut and copra are the major cash earning activities in the provinces. The level of smallholder copra and livestock production is increasing although there are fluctuations in the world price year to year. The production for cocoa on the other hand is also increasing over the years because of the high world price and the increased number of buying points in the provinces. The 2009 Census reported that main sources of income of majority (48%) of Santo households are sale of agriculture, fishery or handicraft products. About 36% derive their cash income from salaries and wages while about 5% from operating their own business and 7% from unspecified sources. However, about 4% reported having no cash income at all.

79. According to the Household Income and Expenditure Survey Report 2010, the average monthly income of Sanma households was 94,000 Vatu with an average per capita income of 18,800 Vatu. Approximately 58% of household income is from cash sources; on the other hand, 26% of total household expenditure is in cash. Luganville households have comparatively lower average household monthly income at 74,100 Vatu compared to the province; likewise its average per capita monthly income is much lower at 13,200 Vatu. The majority of the income is derived from cash income and almost 60% of total expenditures are cash expenditures.

5. Infrastructure

80. **Water Supply**. From the 2009 Census data, 25% of households have a shared pipe system while about 18% of households have village tanks and 17% their own household tank. On the other hand 14% have a private piped system while 15% source their drinking water from a river, lake or spring. The rest source their drinking water either from village stand pipe, unprotected well, bottled water or other unspecified sources.

81. In terms of toilet facility, the majority (49%) of Santo rural households use pit latrines (either individual or shared). Only about 6% reported the use of water sealed toilet whether individual or shared while about 14% of households use the flush type toilet. Likewise less than 1% reported having no toilet at all.

82. **Energy.** According to the 2009 Census data, only about 30% of households on the island are reported to use the electricity grid with the majority (48%) using kerosene lamp as main source of lighting. The rest either use solar (3%), candle (7%), gas (3%) or coleman lamp (3%) as source of light. A few (2%) reported generator as providing their source of light.

83. Nationally, only 15% of Vanuatu's population is connected to the local grids in Port Vila, Luganville, and Lakatoro/Norsup where electricity is generated by diesel and/or hydropower.

84. **Waste Management.** There is no organized waste management system in any rural areas of Vanuatu. The six provincial councils have adhoc waste disposal sites with no proper management systems in place. From the 2009 Census data, about 32% of all households dispose of their waste by burning. In urban areas (Luganville) about two thirds of households dispose of their waste using authorized waste collection.

85. **Transport**. Private transport services, including buses and taxis, are common in the islands with an increase in the number of vehicles registered. In terms of basic infrastructure and social services the villages within the influence zone of the subproject can be reached by gravel road. Transport is limited to one public bus per day and some private vehicles.

86. Of the 269 total households surveyed as part of the poverty and social assessment work for the project, more than half (166) are not connected to electricity although the main grid passes along the road and a distribution line had been put up by VUI. On the other hand VUI is working on extending the line by almost a kilometre to cover more households in the area close to the forestry centre.

87. **Industries** Vanuatu has a small industrial sector. The manufacturing sector, located mainly in Port Vila and Luganville is mostly food processing and is actually declining. There are no major processing industries in the project areas or in other parts of islands. However, Santo is a major contributor to the national economy through copra, cocoa and kava commodities. Handicrafts are also produced by small home or village enterprises and incomes are not regular.

6. Tourism

88. Tourism is the most significant contributor to the national economy, and accounts for about 75% of the foreign exchange, 20% to the gross domestic product and an estimated 5,000 jobs. Most tourism activities in Vanuatu are closely linked to the coastal and marine areas. Fundamental among these are the relatively clean, pristine and scenic shorelines and coastal waters where most of the tourist resorts are located. In 2011 there was a 5% increase in the total number of visitors to Vanuatu compared to 2010, mostly from the buoyant cruise ship industry. In 2011 tourism arrivals numbered 248,898.

89. Santo receives a large number of tourists annually due to reliability of sea and air transport, accommodation and the pristine and scenic shorelines. The strong, unique and diverse culture and the undisturbed way of life in some parts of the islands are also the main attraction which contributes significantly to the increase in the number of tourist arrivals to Vanuatu.

IV. ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

90. The following section provides an assessment of the project's likely impacts on physical, biological, socio-economic and physical cultural resources, and identifies mitigation measures to ensure all such environmental impacts will be avoided or managed/reduced to acceptable levels. The mitigation measures identified below along with other environmental management requirements normally associated with international best practice will be implemented in accordance with the EMP presented in Section VII. The relatively small scale nature of the works coupled with local labour intensive approach and rigorous implementation of the above mitigation measures will ensure that the minor impacts will be managed or minimized to acceptable levels.

A. Impacts on the Physical Environment

1. Erosion and Loss of Top Soil

91. The project will not include activities that will cause erosion or loss of top soil. The diameter of the poles is approximately 300 mm and will require an auger driven hole of approximately 0.5 m^2 including the concrete pad/footing every 125 m or every 250 m depending on which length of span is selected during detailed design. Spoil from the holes can be re-used for residential and/or community purposes as required.

2. Sedimentation and Water Quality

92. There is little potential for even localized and short term water contamination from runoff of suspended sediment as the project will not create exposed surfaces or slopes. As noted above excavation for the poles will be small. Scheduling the excavations in the drier months (May - Oct) will further reduce risk of sediment laden run-off. The works can be undertaken within one season (about four months).

3. Dust and Noise

93. Owing to the limited scope of works, largely manual construction methods and small requirement for equipment (i.e. auger on small tip-truck) and poles, conductors, distribition lines and cement and sand hauled on another one or two truck(s), the impact of dust and noise generation will be negligible. To mitigate the minor effect of sedimentation it is recommended that construction be undertaken in the dry season, this can create potential for some dust nuisance where unsealed roads are disturbed by the trucks. This will be temporary and sporadic. If required by residents, implementation of good practice construction methods such as watering of the roads will ensure impacts are minimized and acceptable. Dry materials (sand and cement) haued by truck will be covered.

4. Materials, Spoil and Waste Management

94. **Materials and spoil management**. Sand and cement for the concrete footing for the poles will be brought to the site and will be stored under a tarpaulin or similar suitable covering to prevent dispersal/dust generation. Excavation activities will be limited with a corresponding limited volume of excess spoil needing to be disposed of. As a first priority, where excavated materials are not required by the local community, they can be transported to the provincial government works yard to be used elsewhere as fill. If this can not be achieved and excess material needs to be stockpiled, the location of any stockpiled material will be discussed with the local community. The EMP addresses this through inclusion of the following:

- Sand and cement to be stored on the truck and covered by tarpaulin or similar, trucks will not be permitted to transport dry materials without a suitbale cover;
- Excavated material for reuse and recycling methods to be employed;
- Requiring consultation with and endorsement from Sanma Provincial Council (SPC) and local landowners for disposal of excess spoil;
- Stockpiling material within 50m of a waterway will not be permitted;

- Excess spoil to be disposed of only as per the site and method approved by the SPC and local community; and

- Methods of transportation to minimize interference with normal traffic.

95. Effective implementation of the above by the contractor will ensure that potential environmental impacts associated with the management and disposal of construction materials will be negligible.

96. **Waste management**. There will unlikely be much other waste generated by the works. A contractor's camp and dedicated work sites/yard will not be required. Any waste materials such as conductor wrapping, remnant cable/line, cement bags and any other residuals (including minor rubbich generated by contrcator's employees) will be collected and disposed of at an approved dump site within the route corridor, or transported back to Luganville and disposed of at the town dump site.

97. The contractor will be expected to address waste management issues and measures in the construction EMP (CEMP) prepared to control the effects and minimise risk form the works. The waste management measures will cover the following issues:

- Identification of expected types and volume of waste arising;

- Waste reduction, reuse and recycling methods to be employed;

- Agreed reuse and recycling options and locations for disposal/endorsement from SPC;

- Designation of waste disposal areas agreed with local authorities;

- Residual waste to be disposed of in disposal sites approved by local authorities and not located within 500m of rivers or streams;

- Burning of construction wastes to be prohibited; and

- Disposal of solid wastes into drainage ditches, rivers, other watercourses, agricultural fields and public areas shall be prohibited.

98. Provided that waste management is undertaken as per the approved methods and implemented in accordance with the above recommendations, the environmental impacts associated with waste management are expected to be negligible.

B. Impacts on the Biological Environment

99. **Impacts on terrestrial habitat and biodiversity**. The proposed use of predominantly manual labour over mechanical equipment during construction will reduce the risk of excessive vegetation clearance. However, this will require close construction supervision to ensure vegetation clearance is minimized. Such provisions shall be included in the CEMP.

100. The approximately 60 km, 12.7 kV line grid expansion route from Luganville to Port Olry will be aligned along the existing road corridor. The careful placement of power poles and the use of ABC can minimize impacts on trees. The contractor will be required to select a line route and location for poles within the road corridor that minimizes the need for tree cutting and removal as

much as possible. Where cutting or trimming of trees is necessary, trimming will be minimized in accordance with internationally recognized minimum clearance requirements.

101. Any compensation to local residents for loss of trees will be provided in accordance with the resettlement plan. Implementing the above measures will ensure that the resultant impact on biodiversity associated with trimming and or cutting of trees for the transmission line will be negligible.

102. Workers will be prohibited from poaching or hunting any birds or wildlife from within the project corridor or wider catchment.

C. Impacts on the Socio-economic Environment

103. **Social impacts related to construction workers**. The workforce is expected to be in the order of 12 (line strining crew, auger operators, people directing/managing traffic, and supervisor) for a period of about four months, there will be no need for a dedicated or large-scale accommodation. There could be the need for a works office and storage/maintenance area to be established, this would be undertaken through consultation with local land owners and the SPC (in case a provincial government works yard is available).

104. The contractor will be required to adopt good management practices to ensure that both physical impacts and social impacts associated with the office/yard are minimized. Any fuel and construction debris associated with the site office and storage/maintenance area will be stored safely and disposed of according to the waste management measures agreed.

105. Social impacts include i) potential for conflict between workers from outside and local residents and communities; and ii) minor risk of spread of communicable diseases including STIs and HIV.

106. The proposed measures to mitigate the risks include:

- Location of site office and facilities to be agreed with local community including land owners) with facilities approved by the VPMU and managed to minimize impacts and any negotiation or lease arrangements to follow established procedure as per the resettlement plan;

- Induction of workers on requirements of the project's consultation and participation plan (CPP)[22] and grievance redress mechanism (GRM)[23] and protocols established for any contact between local communities and contractor/workers;

- The project will be required to implement communicable disease awareness and prevention measures targeting risk of spread of STIs and HIV as outlined in the project's poverty and social assessment and gender action plan. This should include the areas proposed for grid extension;

[22] A framework CPP has been prepared for the project. The CPP will be further developed during the initial stage of project implementation.
[23] Elaborated in Section VII.

- The contractor will put up notice boards regarding the scope and schedule of construction activities, as well as any disruptions or access restrictions;

- The site office/yard will be fenced and sign-posted and unauthorized access or entry by general public will be prohibited;

- Standing and open water (including puddles, ponds, drains etc) within the office/yard shall not be permitted to reduce possible disease vectors;

- To reduce risk of contamination of local water sources, wastewater effluent from workshop (if any) will be passed through gravel/sand beds or an oil separator and all oil/grease contaminants will be removed before discharging it into natural water courses. Storgae of fule, and oil and grease residues if generated, shall be stored, handled and disposed of as per the agreed provisions of the CEMP;

- The contractors facilities area will be cleaned up to the satisfaction of VPMU and local community after use; and

- Post-construction the area shall be fully rehabilitated and all waste materials shall be removed and disposed to disposal sites approved by local authorities.

107. Effective implementation of the above measures will ensure that potential social impacts associated with the contractor's work crew and site office/yard will be negligible.

5. Occupational Health and Safety

108. The overall project will be required to reduce risk of accidents during construction activities; the same level of care is required for the grid expansion component on Santo as the hydropower plant components and transmission/grid expansion on Malekula. The CEMP will cover both occupational health and safety (workers) and community health and safety. The CEMP will be appropriate to the nature and scope of grid expansion activities and as much as reasonably possible meet the requirements of good engineering practice and World Bank's Environmental Health and Safety Guidelines.

109. The CEMP will include agreement on consultation requirements (workers and communities) established in the project's CPP, establishment and monitoring of acceptable practices to protect safety, links to the complaints management system for duration of the works (in accordance with agreed GRM), and system for reporting of accidents and incidents.

110. Mitigation measures to be implemented by the contractor to ensure health and safety of workers are as follows:

- Before construction commences the contractor will conduct training for all workers on environmental, safety and environmental hygiene. The contractor will instruct workers in health and safety matters as required by good engineering practice and Environmental Health and Safety Guidelines;

- The site office/yard and construction vehicles will be equipped with first aid facilities including first aid kits. A suitable vehicle will be available for transport to Luganville for medial or emergency treatment if required;

- Regular meetings will be conducted to maintain awareness levels of health and safety issues and requirements;

- Workers shall be provided (before they start work) with appropriate personnel protective equipment (PPE) suitable for civil work such as safety boots, helmets, gloves, protective clothes, goggles, and ear protection at no cost to the workers. Site agents/foremen will follow up to see that the safety equipment is used and not sold on;

- Provision of potable water supply in all work locations; and

- The site office/yard will be securely fenced and warning signs erected. Unathroized people shall not be permitted within the cam and work sites/yards.

111. All measures related to workers' safety and health protection shall be free of charge to workers.

6. Community Health and Safety

112. Community safety can be threatened by works in public areas. General measures and requirements of the CEMP which apply equally to community and workers have been discussed above, this will include measures to minimize risk to community safety including:

- Communication to the public through public/community consultation as per the provisions of the CPP including notice boards and meetings etc. regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restrictions;

- Barriers (e.g. fence) and signboards shall be installed around the site office/yard and construction areas to deter access to or through the sites;

- Provision of warning signs at the periphery of the site warning the public not to enter; and

- Strict imposition of speed limits along access through residential areas and where other sensitive receptors such as schools, hospitals, and other populated areas are located.

113. Such measures will manage risk to community health and safety to acceptable levels.

7. Physical Cultural Resources

114. Consultations with the local communities confirmed that there are no known physical cultural resources (including tambu sites) within the corridor of the grid expansion route. However, during excavation for the poles, accepted "chance find" procedures will be followed for any accidental discovery of burial sites or archaeological artefacts, so that such artefacts are properly recorded and preserved.

D. Operation Impacts

115. The expansion of the low voltage distribution system will not create impacts during operation.

V. INFORMATION DISCLOSURE AND CONSULTATION

116. Stakeholder consultations on environmental issues for the project were undertaken at both the national, provincial and community level.

A. National Level Consultation

117. Consultations at the national level were undertaken on a one on one basis with relevant agencies. Key institutions and their responsible personnel were identified by the environmental safeguards team and meetings arranged accordingly. This was undertaken in Port Vila and Luganville. The purpose of the consultations was to i) briefly outline the key features of the the project project (sub-project location, indicative lay out/footprint etc) ii) ascertain key stakeholders' views and concerns in relation to the proposed developments and iii) obtain information from the stakeholders on environmental and social characteristics of the sites that would assist in the preparation of the IEEs including any constraints that need to be addressed.

118. A list of key national stakeholders consulted including summary of information obtained and significant comments made is provided in Annex 2. Relevant information obtained and comments made during the consultations have been integrated into the IEE where appropriate. No significant environmental constraints on the proposed the project were identified through the national level consultations with all those consulted being supportive of the project. The most significant comment came from DEPC's Biodiversity Officer who expressed the importance of ensuring that aquatic biodiversity of project areas was surveyed so that adequate mitigations can be implemented as necessary to protect any vulnerable species that might be present.

B. Provincial and Community Consultation

119. Provincial and community consultations in respect of both environmental and social issues were undertaken in Luganville (Sanma Provincial Council) 20 March and with communities on 16 May 2014. The project consultation personnel included the Consultant's international environment specialist (IES) and international and national social/resettlement specialists. Owing to a national meeting of provincial councils on 16 May, representatives of SPC were unable to accompany the team to Fanafo Village. Key activities during the consultation visit included:

1. Introductory meeting with SPC;
2. Consultation meeting with project affected land owners, interested stakeholders and community members of Fanafo and Mon Exil villages.

120. The purpose of the provincial and community consultation was to disseminate basic project information and obtain the views and concerns of communities with respect to environmental issues related to the project with a view to addressing these issues in the project design and implementation. The consultations also provided the opportunity to gather relevant site specific information from the stakeholder's perspective on the physical biological and social environments of the project area.

121. **Sanma Provincial Council**. An initial meeting was held with the SPC to introduce the Safeguards team, explain the purpose of the visit and consultation process within the context of the overall TA objectives including government and ADB safeguards requirements, obtain information relating to the community's readiness for the project including any issues of concern they might have, and to request the SPC's assistance in supporting the consultation process. Four members of the SPC attended the meeting. Other members were absent due to their

involvement in responding to a local landslide disaster in which six people lost their lives as a result of tropical cyclone Lusi. A list of the attendees is provided in Annex 2.

122. A power point presentation delivered by the IES provided the opportunity to inform the SPC of what the project entailed. The presentation included sketches of the key project components, a summary of potential environmental and social impacts and benefits arising from the project, and a preliminary assessment of the significance of such impacts and likely mitigation measures required to ensure impacts are minimized and acceptable.

123. The SPC were very familiar with the key components of the project and expressed overall support for the project and advised they would be available to assist in coordinating and participating in community consultations. On environmental issues the IES was referred to the SPC's Environment Extension Officer who was unable to attend the meeting. The IES met with SPC's Environment Extension Officer on 27 March. He advised there were two community based conservation areas in Santo including Nambauk and Butmas. Nambauk conservation area is 6 km west of the existing Sarakata hydropowerhouse within the Tafwakar River catchment and will not be affected by the project. Butmas conservation area is located about 10km north and west and will also not be affected by the project.

124. **Community consultation/information dissemination.** Community consultations were held at Fanafo (including participants from nearby Mon Exil Village) on 16 May. A total of 20 people attended the meeting. The meeting commenced with introduction of the consultant team by the national social/resettlement specialist. The IES then outlined overall purpose of the stakeholder consultation to provide project information and listen to any concerns and answer any queries the community might have with respect to the project and particularly environmental and social impact issues. The social/resettlement specialist addressed land and social issues.

125. No significant environmental concerns were raised. The community was advised that the findings of the IEE would be integrated into the design and operation of the project and that the IEE will be publically available once completed.

126. One participant expressed keen interest that local people might be employed as labourers during project construction and recieve skills training. With regard to social concerns, the participants inquired on what direct benefit the communities would derive from the project considering that many villages are not electrified. It was clarified that the objective of the project is to expand coverage and ensure access to electricity by the rural communities.

127. **Disclosure**. Initial disclosure of the project to local communities and key government stakeholders was undertaken during the community consultation and participation process. This included a description of the project using maps and diagrams, and its potential social and environmental impacts and proposed mitigation measures.

128. The communities were advised that the finalised IEE would be made available to the communities as well as being posted on the ADB website. The IEE will be disclosed appropriately to the communities in accordance with the projects CPP, ADB Public Communications Policy 2011, and government requirements as per EIA Regulations Order No. 175 of 2011.

VI. ENVIRONMENTAL MANAGEMENT PLAN

A. Introduction

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

130. An EMP for the project is presented below and complies with government and ADB requirements. The EMP includes the following information:

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

B. Implementation Arrangements and Institutional Responsibilities

131. It is likely that the project will be implemented under an engineer, procure and construct (EPC) contract and design and supervision consultant (DSC). Under such an arrangement the EPC contractor will be responsible for the final design of the project based on the feasibility study design, project construction, project commissioning, and training of the operator. Currently Vanuatu's generation and distribution facilities are operated under concession agreements by two operators; VUI (Espiritu Santo) and UNELCO (Efate, Malekula and Tanna).

132. **Department of Energy**. The DOE (within MOCC) is the implementing agency for the project. The DOE will be responsible for ensuring that sufficient resources are in place to undertake its environmental safeguards responsibilities.

133. **Environmental management responsibilities.** The VPMU will implement the project on behalf of MOCC-DOE. The VPMU will be responsible for overall implementation including procurement, construction, and commissioning.

134. The VPMU will be supported by the DSC which will include an IES to support the existing environment officer (EO) in the VPMU and to ensure environmental safeguards are implemented in accordance with government and ADB requirements.

135. The VPMU will be responsible for ensuring that the environmental assessment is submitted to DEPC for issue of environmental permit and confirming whether a water resources permit is required, the EMP is updated, cleared and then implemented during each stage of the project (procurement, construction and operation), that the EPC contractor prepares and submits a suitable SEMP, and monitoring compliance with the approved SEMP. This includes ensuring that all government and ADB requirements and procedures relating to environmental safeguards are complied with. The VPMU will be supported by a DSC during all aspects of project implementation. In respect of environmental management and safeguards application the IES will support the VPMU in the following tasks:

- Preparation of the EPC tender documents including integration of the EMP from the approved IEE and draft method statements for the CEMP;
- Consult with DEPC to check whether the IEE meets the EIA requirements of the EMC Act and Environment Regulations Order 2013, re-format/upgrade the IEE as necessary, make the application for development consent on behalf of the DOE and obtain a development consent as required;
- Ensure that VPMU and the EPC contractor are aware of any consent conditions and implications those might have for project implementation;
- Work with the VPMU's social specialists in respect of implementation of the CPP and GRM;
- Supporting tender evaluation with respect to contractors' environmental management capability and proposed EMP provisions;
- Providing training/induction on EMP updating (based on detailed design) and requirements to successful contractor;
- Review and approval of contractor's cEMP;
- Monitoring compliance of the contractor with the approved cEMP and other provisions of the EPC contract;
- Review of contractor's monthly reports on safeguards application;
- Providing inputs to quarterly progress reports and safeguards monitoring reports to be submitted to VPMU and ADB; and
- Capacity building of government in environmental management and supervision aspects of project implementation.

136. The IES will oversee that EMP design and construction requirements are fully integrated into the tender documents and assist government meet all its obligations for EMP and safeguards implementation as outlined above. A key aspect of the IES's role will be training and capacity building of the VPMU's in-house environment officer and other staff (including management) in

implementation of its obligations under government law and regulations. Given that the existing VPMU is already responsible for coordinating safeguard issues for three large projects, it is recommended that an additional environment officer be recruited.

137. A terms of reference for the IES has been prepared. To meet the TOR it is recommended that three person months of IES time is required intermittently over the procurement and construction period.

138. **EPC contractor.** The EPC contractor will be responsible for ensuring that all environmental design and construction environmental mitigation requirements specified in the EPC contract are included in the design and properly implemented during construction.

139. The EPC contractor will include staff to be specifically responsible for preparation and implementation of the CEMP. Based on the detailed design of the project, the EPC contractor will be required to prepare the CEMP which describes the contactor's construction methodology and measures and plans for implementing the CEMP as specified in the EPC contract. This includes maintaining a site diary and a grievance registry (as per the GRM). The CEMP shall be approved by the VPMU prior to the EPC contractor's mobilization to the site. The EPC contractor will be required to report on the implementation status of the CEMP.

140. **Department of Environmental Protection and Conservation**. The DEPC is responsible for the administration and enforcement of the Act and EIA Regulations 2011. As such the DEPC is responsible for i) issuing a development consent for the project by way of review and approval of the IEE (as EIS) and ii) monitoring and enforcing compliance of the project with the conditions of the development consent.

141. **Department of Geology Mines and Water Resources.** The DGMWR has overall responsibility for water resources management in Vanuatu as per the Water Resources Act. The Act requires that if a land lease grants the right to use any water the lessee must apply to the Director of Water Resources for the right to use the water for any purpose other than the customary rights or for domestic purposes.

142. The Act also requires that the project owner obtains a building permit, namely "the right to construct, operate and maintain works associated with resources that do not comply with customary rights and rights of occupiers as specified in Part 2 Division 1 Section 4 of the Water Resources Management Act. VPMU will therefore be required to apply for and obtain both a water use right and a building permit from the Director of Water Resources during the detailed design / pre-construction stage.

C. Capacity Building Requirements

143. **DEPC.** The DEPC operates at the national level from its office in Port Vila. However, certain environmental management and monitoring functions can be delegated to provincial administrations if and when they have the resources and capacity to conduct these activities. Currently Sanma Province is the only province that has a full time resident Environmental Officer.

144. DEPC currently has 17 staff, 10 of which are permanent, seven on contract and two volunteers who make up four divisions: i) Biodiversity Conservation Division, ii) Environmental Protection Division, iii) Environmental Assessment and Planning Division (one EIA officer and one compliance officer) and iv) Support Services Division. Within the current structure there are skill gaps across all levels. The Environmental Assessment and Planning Division has the mandate

for overall coordination and effective implementation of the EIA process and procedures, as well as implementation and enforcement of the Act.

145. A number of institutional constraints to effective implementation of the Act have been identified by others in previous reviews. These include:

- Lack of capacity and funding for carrying out the DEPC's functions under the Act;
- Environmental officers are uncertain about their powers to enter land in the course of their duties;
- Many rural subdivisions around Vanuatu, particularly for Efate, Malekula and Santo have not complied with the Act; and
- Complications associated with the fact that various Ministerial responsibilities are in potential conflict. For example the DEPC was part of the Ministry of Lands, which also has functions of promoting development, while the subject of foreshore development lies within the responsibility of the Ministry of Internal Affairs.

146. ADB has recently commenced institutional support to DEPC through *Technical Assistance for Strengthening and Use of Country Safeguard Systems* (RETA 7566-REG), which aims to address the above constraints. Key components of the technical assistance include:

- Capacity assessment and review of DEPC's track record in implementing the Environment Act and EIA regulations;
- Diagnostic of environmental related laws and regulations;
- Preparation of an action plan based on i) recommendations of capacity assessment and legal diagnostic study, and ii) consultation with key government agencies, development partners and NGOs; and
- Strengthening procedures through development of tools for DEPC to improve capacity in implementing the Environment Act and EIA regulations. This will involve, interalia, preparation of manuals and development and delivery of training materials.

147. **VPMU.** The VPMU currently has five staff comprising Director, Project Management Advisor, Civil Engineer, Environment (Safeguards) Specialist and Financial Specialist. Three additional staff are expected to join the VPMU later in 2014. They include a Communications and Public Relations Officer, Monitoring and Evaluation Officer and Executive Secretary.

148. The VPMU is currently the implementing agency for three major government infrastructure projects including the Port Vila Urban Development Project, Vanuatu Interisland Shipping Support Project and Lapetasi International Multi-purpose Wharf Development Project. It is understood that additional projects may be added to VPMU's current portfolio over the next year and if so further staff will be required. All of the projects are supported by international technical consultants which include international and national specialists responsible for supporting the VPMU in undertaking its environmental responsibilities (as described above for project).

149. VPMU's environment specialist has more than six years' experience supervising and coordinating environmental and social/resettlement requirements for infrastructure projects and

as such has benefitted from significant on-the-job training and mentoring from international environmental consultants. That being said, additional resources will be required as additional projects are added to the VPMU's portfolio. Whilst support is provided through consultants, currently there is only one experienced national environmental consultant specialist in Vanuatu and that person is working on all three of VPMU's projects. Thus it is recommended that VPMU recruits an additional NES to support implementation of the project.

150. It is recommended that the terms of reference of the DSC's IES under the project include a significant component for training of graduate national environmental specialists. Such training could involve a series of modules ranging from preparation of EIAs and EMPs to implementing, monitoring and reporting of EMP implementation including the various EMP activities required through the project procurement and implementation process.

D. Grievance Redress Mechanism

151. In order to receive and facilitate the resolution of affected peoples' concerns, complaints, and grievances about the project's environmental performance a GRM will be established for the project. The GRM is intended for addressing environment related grievances as well as social issues (including land acquisition/resettlement issues) in relation to construction activities.

152. The GRM will be used for addressing any complaints that arise during the implementation of the project. The GRM will include a proactive component whereby prior to commencement of construction a meeting will be convened by government's VPMU and the implementation team (DSC, EPC contractor) to formally advise the community of project implementation details (designs, activity schedule, access constraints etc.), so that all necessary project information is communicated effectively to the community and their immediate concerns can be addressed. This will include explaining to the community how the GRM will work. If required, following comments and agreement with the community at this meeting, the GRM may be amended and updated by the VPMU.

153. The GRM will address affected people's concerns and complaints proactively and promptly, using an understandable and transparent process that is gender responsive, culturally appropriate, and readily accessible to all segments of the affected people at no costs and without retribution. The mechanism will be consistent with the Government of Vanuatu's administrative and judicial processes.

154. **Type of grievances covered.** The GRM will cover any complaints or concerns made by stakeholders or affected communities and will include:

- Negative impacts on a person or a community (e.g. financial loss/loss of subsistence resources, physical harm, nuisance, impacts on social infrastructure, damage to property outside designated site boundary);
- Dangers to health and safety or the environment;
- Failure to comply with mitigation measures, standards or legal obligations;
- Harassment of any nature;
- Criminal activity;

- Improper conduct or unethical behaviour;
- Financial malpractice or impropriety or fraud; and
- Improper disclosure or attempts to conceal any of the above.

155. **GRM Establishment and Procedure.** During the EPC tender process, VPMU with support from the MPC will assist the affected communities/villages establish a community advisory committee (CAC) made up of affected persons representatives, community representatives and representatives of the customary land owners. The CAC will be chaired by the Village chief. In the event that the village chief is a "customary owner" the chair of the CAC may be represented by the community religious leader. The community will be advised that the CAC will be the first point of contact for any person with a grievance in regard to the project. The chair of the CAC will be responsible for communicating community members' grievances to the EPC contractor or to the VPMU. The chair of the CAC will form part of the grievance redress committee (GRC) which will be made up of the CAC chair, contractor's representative, MPC representative and VPMU. Prior to the selected contractor's mobilization, the VPMU will convene a public consultation meeting in Unmet. The meeting will be attended by the EPC contractor, VPMU/DSC, MPC and any other interested community members. The objectives of the meeting will be as follows:

- Describe the disclosure requirements and process for the project as per the provisions of the CPP;
- Introduction of key personnel of each stakeholder including roles and responsibilities;
- Presentation of project information to the communities by the EPC contractor (timing and location of specific construction activities, design issues, access constraints etc.) This will include a brief summary of the EMP - its purpose and implementation arrangements;
- Establishment and clarification of the GRM to be implemented during project implementation including communications activities to ensure communities are continually advised of project progress;
- Identification and confirmation of CAC for affected communities and membership of the GRC; and
- Elicit and address any immediate concerns of the community based on information provided above.

156. Following the pre-mobilization public consultation meeting, complaints associated with the construction activity or other Project related matters will be routinely handled through the GRM as explained below and shown schematically in Figure 7.1. The GRM will be updated if necessary as per any agreement reached during the pre-mobilization public meeting.

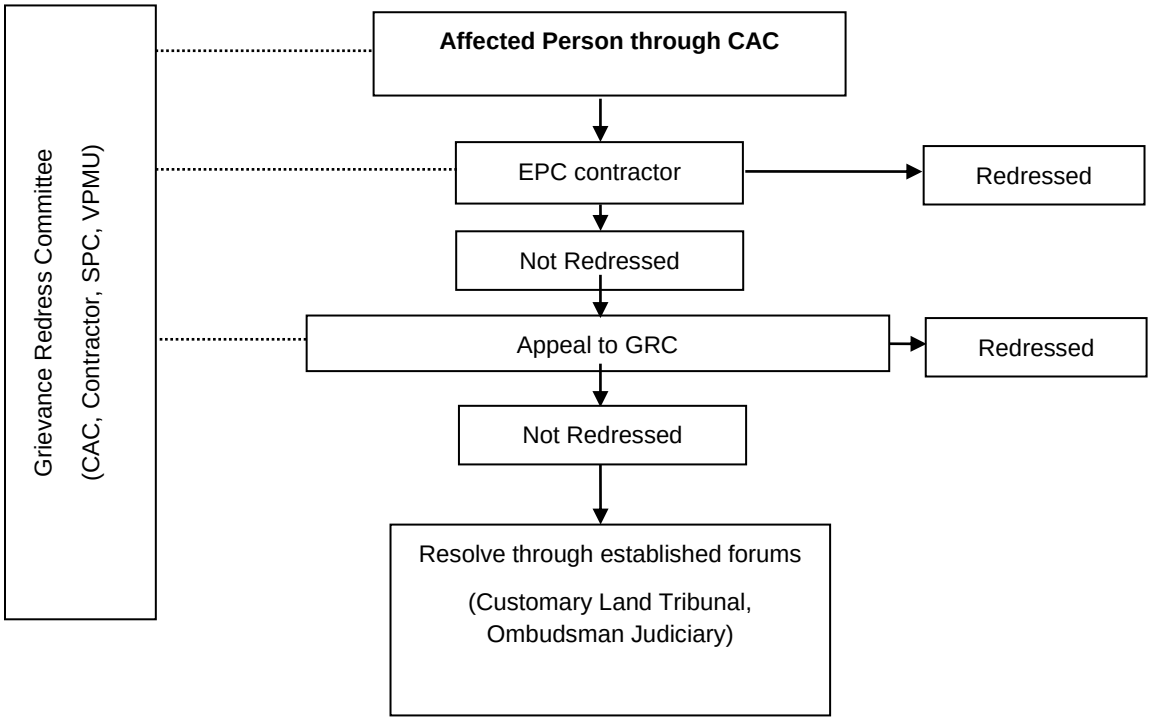
157. **Step one**. Individuals will lodge their environmental complaint/grievance with the CAC. The CAC will discuss the complaint and either resolve it with the complainant or where this is not possible or the complainant is not satisfied with the CAC's solution the chair of the CAC will bring the individual's complaint to the attention of the EPC contractor's environmental engineer. He/she will record the complaint in the onsite environmental complaints register. The Environmental Engineer will discuss and resolve the complaint with the chair of the CAC.

158. **Step two**. If the complaint is not resolved within one week, then the chair of the CAC will bring the complaint to the attention of the GRC. The GRC will meet to resolve the issue. The GRC is expected to resolve the complaint within a period of two weeks. The resolved complaint will

then be communicated back to the complainant via the chair of the CAC. The EPC contractor's environmental engineer will then record the complaint as resolved and closed in the environmental complaints register.

159. **Step three**. Should the complaint not be resolved through the GRC, the issue will be adjudicated through established forums including the Customary Land Tribunal, the Ombudsman and the Judiciary depending on the nature of the complaint. DOE will keep track of the status of all complaints through the EPC contractor's monthly report and QPR and will ensure that they are resolved in a timely manner. All GRM matters will be subject to monitoring and disclosure.

Figure 7.1 - Grievance Redress Mechanism



E. Environmental Mitigation and Monitoring Matrix

160. The EMP matrix for the project is provided in Table 7.1 and identifies the following:

- Potential environmental impacts that could occur during each stage of the project;
- Proposed mitigation measures to address each impact;
- Agency responsible for implementing mitigation measures;
- Monitoring tasks to ensure mitigation measures have been implemented effectively during each stage of the project; and
- Schedule and responsibility for monitoring.

Table 7.1 - EMP Matrix: Environmental Mitigation and Monitoring Plan

Environmental Issue/Project activity	Mitigation and/or Enhancement Measures				Monitoring Plan			
	Measures and Actions	**Responsible to Implement**	**Timing to Implement**	**Cost**	**Parameter to monitor**	**Frequency & Verification**	**Responsible to Monitor**	**Cost**
DESIGN / PRE CONSTRUCTION								
Project disclosure	1. Submit ADB-approved IEE to DEPC for approval using applicable form and obtain a Development Consent as per the EIA Act. 2. Ensure DEPC approved EMP and any conditions of Development Consent are included in EPC tender documents including i) requirement for EPC contractor to seek DEPC approval and update EMP in the case of significant changes to FS design ii) requirement for EPC contractor to prepare a construction EMP (CEMP) for approval of VPMU/DSC before commencement of construction. The CEMP will demonstrate the manner (location, responsibilities, schedule/ timeframe, budget, etc.) in which the contractor will implement the mitigation measures specified in the EMP approved under DEPC Development Consent. 3. Tender document to include upgrading of the existing transformer bay to internationally recognized standards with respect to oil containment facilities including oil separator at drainage outlet. 4. Implement plan for Grievance Redress Mechanism as described in the IEE 5. EPC contractor's project design to adhere to all design related mitigation measures in FS EMP or in updated EMP as approved under DEPC Development Consent.	1 to 4: VPMU/DSC 5 EPC contractor	1 and 2 Immediate. 3: During tender preparation 4:Before start of civil works 5:EPC detailed design phase	1 to 4: Cost included in VPMU/DSC staffing 5: Cost included in EPC contract	Environmental approval for the project obtained from DEPC. Complete check of items 1 to 5.	Prior to signing of EPC contract and start of site works. Once.	VPMU	Cost included in VPMU budget for additional NES to support the project procurement and impl.
Environmental capacity development	1. VPMU to commit to provide sufficient resources for project duration. 2. DSC to train VPMU/EO in implementation of EMP as well as general training in ADB safeguards requirements to raise awareness and build capacity of environmental	1: VPMU 2: DSC 3: EPC contractor	Initiate during procurement period and continue throughout	1: & 2: IES and NES cost included as part of VPMU (project) costs	1.ADB loan covenants 2.IES TOR, DSC progress reports to VPMU/ADB	Prior to start of site works and throughout construction phase.	VPMU	As above.

Environmental Issue/Project activity	Mitigation and/or Enhancement Measures				Monitoring Plan			
	Measures and Actions	**Responsible to Implement**	**Timing to Implement**	**Cost**	**Parameter to monitor**	**Frequency & Verification**	**Responsible to Monitor**	**Cost**
	management in VPMU. A mix of workshops and on-the-job training to be used. 3. Conduct contractor / workers' orientation on EMP provisions.		project construction	3:Included in EPC contract cost	3. EPC Tender documents and check during construction.			
Environmentally responsible procurement	1. EMP is included in EPC tender documents to ensure that mitigation measures are budgeted and to prepare the contractor for environmental responsibilities. 2. Specify in tender document that contractor shall engage appropriately qualified and experienced staff to take responsibility for the environmental management and safety issues and monitor the effectiveness and review mitigation measures as the project proceeds. 3. EPC contractor to submit construction environmental management plan (CEMP) based on contractual EMP for approval by DSC (i.e., waste and materials management, traffic, noise and dust management etc.). 4. Contractor recruit qualified and experienced staff to oversee implementation of environmental and safety measures specified in the EMP.	1 & 2: DSC for VPMU 3: Preparation of SEMP - EPC contractor, Approval of SEMP-DSC 4: EPC contractor	1 & 2: Bid preparation 3 & 4: Before start of civil works	Included in bid cost	1 & 2: Inclusion in bid docs 3 & 4: Check compliance	Bid preparation stage. Before start of site works	VPMU/IES & NES	VPMU – as above. IES & NES – included in DSC staffing
Disclosure of CPP and GRM and establishment of procedures	1: Project documents disclosed to public and communities in an appropriate form and manner and accessible place 2: Inclusion of appropriate measures from CPP and GRM in tender documents	VPMU	Before EPC contractor mobilization	Included in bid cost	EPC tender document; Grievance registry, monthly reports	Monthly Grievance registry, monthly reports	EPC contractor, VPMU	Included in project cost VPMU - as above.
Workers and public safety	CEMP to include measures covering workers and public safety and to identify interfaces between the works and the public, formulate measures to ensure safety of workers and the public, and prevent accidents due to the construction works.	EPC contractor in preconstruction	Before start of civil works	Cost included in EPC contract.	EPC tender document. Check at preconstruction.	During EPC tender preparation and again before start of works	VPMU/IES & NES	VPMU – as above. IES & NES – included in DSC staffing
Grievance Redress Mechanism established	Establishment and implementation of GRM confirmed by VPMU.	VPMU	Before start of civil works	Met by VPMU/ project	GRM confirmed and agreed with community.	Before start of civil works	VPMU	Incl. in VPMU budget for additional NES

Environmental Issue/Project activity	Mitigation and/or Enhancement Measures				Monitoring Plan			
	Measures and Actions	**Responsible to Implement**	**Timing to Implement**	**Cost**	**Parameter to monitor**	**Frequency & Verification**	**Responsible to Monitor**	**Cost**
Raise awareness of EPC contractor on environmental management matters	Induction safeguards training for EPC contractor	DSC	Before submission of SEMP	Cost included in project and contract	Approved SEMP	Before submission of SEMP	VPMU	Included in VPMU budget for additional NES
CONSTRUCTION STAGE								
Physical Impacts								
Noise and dust nuisances	1. Construction equipment and vehicles will be maintained to a good standard and provided with muffler silencers. 2. Watering of roads/route corridor during dry periods 3. Monitor and investigate complaints; propose alternative mitigation measures.	EPC contractor	Throughout construction phase	Cost included in contract	Check implementation	Twice a month as part of routine construction monitoring	DSC (IES/NES)	As above
Erosion and loss of topsoil	1. Schedule excavation activities in the drier months (May - Oct) 2. Minimize vegetation clearance corridor or footprint of components 3. Stockpile topsoil for later use in landscaping or made available to local community for their use	EPC contractor	Throughout construction phase	Cost included in contract	Check implementation of all items	Twice a month as part of routine construction monitoring	DSC (IES/NES)	Included in DSC staffing
Sedimentation and water quality impact	1. Schedule excavation activities in the drier months (May - Oct); 2. Minimize width of vegetation clearance; 3 Immediately re-vegetate and/or stabilize exposed surfaces and stockpiles of excavated material; 6. Effective construction supervision to ensure above measures implemented	EPC contractor	Throughout construction phase	Cost included in contract	Check implementation of all items	Twice a month as part of routine construction monitoring	DSC (IES/NES)	As above.
Materials and spoil management	1. Identify and implement measures for materials and spoil management as part of CEMP; 2. Topsoil, overburden, and low quality materials shall be properly removed, stockpiled near the site, and stored for reuse. 3.Areas for disposal to be agreed with land owner and SPC and recorded by the VPMU/DSC and monitored	1: EPC contractor to prepare CEMP and submit VPMU/DSC to assist and approve 2 to 8: EPC contractor	1: One month before start of site works 2 to 8: Throughout construction phase	Cost included in contracts	Check implementation of items 1-8 and CEMP provisions	1: Before construction 2 - 8 Implementation of CEMP provisions: Monthly	DSC (IES/NES)	As above

Environmental Issue/Project activity	Mitigation and/or Enhancement Measures				Monitoring Plan			
	Measures and Actions	Responsible to Implement	Timing to Implement	Cost	Parameter to monitor	Frequency & Verification	Responsible to Monitor	Cost
	5. Spoil will not be disposed of in rivers and streams or other natural drainage path. 6. Surplus spoil will be used where practicable for local repair works to fill eroded gullies and depression areas and degraded land in consultation with local community. 7. Spoil disposal shall not cause sedimentation and obstruction of flow of watercourses, damage to agricultural land and densely vegetated areas. 8. Spoil disposal sites shall be located at least 50 m from surface water courses and shall be protected from erosion.							
Waste Management	1. Prepare and implement waste management measures of CEMP to cover all aspects of waste storage and disposal (incl. accidental spills if required). 2. Areas for disposal to be agreed with land owner and SPC and checked, recorded and monitored by the VPMU/DSC. 3. Segregation of wastes shall be observed. 4. Recyclables shall be recovered and sold to recyclers. 5. Residual wastes shall be disposed of in disposal sites approved by local authorities and not located within 500m of rivers or streams. 6. Site offices and works yard shall be provided with garbage bins 7. Burning of construction and domestic wastes shall be prohibited. 8. Disposal of solid wastes into drainage ditches and public areas shall be prohibited. 9. All general solid waste will be collected and removed from the work areas and disposed in local waste disposal sites as identified by the SPC.	1: EPC prepare WMP, VPMU/DSC IES to assist and approve 2 to 9: EPC contractor	1: One month before start of site works 2 to 9: Throughout construction phase	Cost included in contracts	Check implementation of items 1-9 and WMP provisions	1: Before construction 2 to 9: Implementation of WMP provisions: Monthly	DSC (IES/NES)	As above
Biological Impacts								

Environmental Issue/Project activity	Mitigation and/or Enhancement Measures				Monitoring Plan			
	Measures and Actions	**Responsible to Implement**	**Timing to Implement**	**Cost**	**Parameter to monitor**	**Frequency & Verification**	**Responsible to Monitor**	**Cost**
Loss of Forest Habitat and impacts on fauna	1. Use ABC and adjust alignment of grid expansion route to minimise need for removing or trimming trees. 2. Minimize width of vegetation clearance corridor and removal of large trees – only marked trees to be removed; 3. Mark boundary of clearance corridors with high visibility tape to ensure construction workers are aware of clearance boundaries; 4. Workers prohibited from poaching, hunting or fishing (sanctions to be imposed); 5. No timber or local materials to be cut or used other than specified under 1.	EPC contractor	Site surveying and vegetation clearance.	Cost included in contract	Visual observation of surveyed penstock alignment route Sanctions imposed on workers not adhering to item 3 and 4	1, 3 , 4: Before start of site works 2: Within one week of start of construction	DSC (IES & NES)	As above
Socioeconomic Impacts								
Operation of contractor site office and works yard	1. Location of site office/yard to be agreed with local community with facilities approved by VPMU VPMU/DSC and managed to minimize impacts; Protocols established as per CPP and GRM 2. Potable water, clean water for showers, hygienic sanitation facilities/toilets with sufficient water supply, worker canteen/rest area and first aid facilities will be provided onsite. 3. Separate toilets shall be provided for male and female workers. 4. As many local workers as possible will be hired and trained. 5. Adequate toilet facilities shall be installed and open defecation shall be prohibited and use of toilets encouraged by keeping toilet facilities clean at all times. 6. Wastewater effluent from contractors' workshops (if any) will be passed through gravel/sand beds and all oil/grease contaminants will be removed before discharging it into natural water courses. Oil	1:EPC contractor with VPMU/DSC approval 2-8: EPC contractor	1: One month before start of site works 2 to 8: Throughout construction phase	Cost included in contracts	Check implementation of items 1-8	1: Before construction 2 - 8: Monthly	DSC (IES/NES)	As above

Environmental Issue/Project activity	Mitigation and/or Enhancement Measures				Monitoring Plan			
	Measures and Actions	Responsible to Implement	Timing to Implement	Cost	Parameter to monitor	Frequency & Verification	Responsible to Monitor	Cost
	and grease residues shall be stored in drums awaiting disposal in line with an agreed WMP. 7. The Contractors facilities area will be cleaned up to the satisfaction of VPMU and local community after use. 8 All waste materials shall be removed and disposed to disposal sites approved by local authorities							
Occupational Health and Safety	1. Contractor to include health and safety porvisions in the CEMP and instruct workers in health and safety matters. CEMP to be approved in writing by VPMU/DSC one month prior to starting works. Contractor to implement all provisions. 2. Before construction commences the contractor will conduct of training for all workers on environmental, safety and environmental hygiene. The contractor will instruct workers in health and safety matters as required by good engineering practice and provide first aid facilities. 3. Workers shall be provided (before they start work) with appropriate PPE. 4. Fencing shall be installed at sides of temporary works. . 5. Provision of potable water supply in all work locations.	1:EPC contractor with VPMU/DSC approval 2-5: EPC contractor	1: One month before start of site works 2 to 5: Throughout construction phase	Cost included in contracts	Check implementation of items 1-5	1: Before construction 2 - 5: Monthly	DSC (IES/NES)	As above.
Community Health and Safety	1. Include in CEMP for barriers (e.g., temporary fence), shall be installed at construction areas to deter pedestrian access except at designated crossing points. 2. The general public/local residents shall not be allowed in high-risk areas, 3. Provide warning signs at periphery of site warning public not to enter 4. Strict imposition of speed limits along access through residential areas and where other	EPC contractor	At all times throughout construction phase	Cost included in contracts Cost for item 6 included in PSA	Check implementation of items 1-6	Monthly	DSC (IES/NES)	As above.

Environmental Issue/Project activity	Mitigation and/or Enhancement Measures				Monitoring Plan			
	Measures and Actions	Responsible to Implement	Timing to Implement	Cost	Parameter to monitor	Frequency & Verification	Responsible to Monitor	Cost
	sensitive receptors such as schools, hospitals and other populated area are located 5. Communication to the public through public consultation, SPC and notice boards regarding the scope and schedule of construction as well as certain construction activities causing disruptions and access restrictions. 6. Implementation of communicable diseases (incl. STIs and HIV) awareness and prevention measures (under overall project)							

VII.CONCLUSION AND RECOMMENDATION

161. The IEE concludes that the potential environmental impacts arising from design, construction, operation and maintenance of the project will be minor, localized and acceptable provided that the mitigation measures set out in the EMP are incorporated into the design and implemented properly. Key findings are summarized below:

- The project involves the expansion of the power distribution grid 60 km north of Luganville to Port Olry.

- The potential loss of less highly modified habitat of low ecological value within the route corridor, and any impact on terrestrial wildlife due to the project will be insignificant. Minor loss of vegetation can be further minimized through selection of pole location (to minimize tree removal) and use of ABC (to minimize need to trim or cut trees) and alignment of grid extension along existing roads to minimise need for removing or trimming trees; and

- Nearby communities consulted are happy for the project to be implemented and expressed their desire to benefit from both electricity generated and employment opportunities during construction and operation.

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

163. This IEE, including the EMP is considered sufficient to meet ADB's and government environmental safeguard requirements in respect of the expansion of the distribution grid on Santo. No further or additional impact assessment is considered necessary at this stage.

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ANNEX 1 - POLICY, LEGAL, AND ADMINISTRATIVE DOCUMENTS

ANNEX 1A - SECTORAL POLICIES, STRATEGIES AND ADMINISTRATIVE DOCUMENTS

National Biodiversity Strategy Action Plan 1999. Vanuatu completed its National Biodiversity Conservation Strategy in 1999. The strategy highlights six key objectives for effective management of biological resources: (a) Ensure sustainable management and conservation of Vanuatu's biodiversity; (b) Develop appropriate policy, planning and legal mechanisms for the management of biodiversity; (c) Improve knowledge about biodiversity in Vanuatu; (d) Improve the capacity of national, provincial, NGO and community organizations to manage biodiversity; (e) Increase local awareness of the importance and value of biodiversity; (f) Foster community participation in the management and conservation of biodiversity. The strategy identified 20 priority actions to meet the objectives mentioned above[1].

National Energy Policy Framework. The Vanuatu National Energy Policy Framework is focused in areas such as the promotion of energy efficiency and conservation, promotion of renewable energy sources and the provision of electricity to rural and remote areas.

The ultimate goal of the policy is to provide a long term development plan for the energy sector and the provision of reliable and affordable energy services to all people in Vanuatu.

National Rural Electrification Policy 2000. The National Rural Electrification Policy of Vanuatu is to provide electricity to all rural people in Vanuatu. Specifically the National Rural Electrification Policy has the following objectives:

- To address the electricity needs of the consumers in the rural areas both for social and economic development;
- Ensure the provision of electricity to rural consumers while clearly defining the overall level of Government subsidy;
- Incorporate the Government Station, medical institutions such as health centre/clinic/aid posts and education institutions such as secondary schools, primary schools and rural training centres within the rural electrification network;
- Be consistent with Government Policies.[2]

National Energy Road Map (2013-2020). The Government has developed a National Energy Road Map to put the sector on the path to achieving objectives shared by the Government, members of the public, development partners, and private energy sector operators. The Road Map provides a consistent basis for tracking energy sector challenges, recognizing that streamlining government policy, legislation, and investment is needed to enable Vanuatu to achieve its development objectives.

The vision for the National Energy Road Map is: "*To energize Vanuatu's growth and development through the provision of secure, affordable, widely accessible, high quality, clean energy services for an Educated, Healthy, and Wealthy nation*."[3]

The investments presented in the Road Map are expected to provide net environmental and social benefits. For example, investing in renewable energy sources will reduce local noise and air pollution near existing diesel generation plants, and will reduce Vanuatu's emission of greenhouse gases. Similarly, improving the petroleum supply chain between islands will reduce the incidences

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1 National Biodiversity Strategy Action Plan,1999
2 Government of Vanuatu. Revised Rural Electrification Policy, Port Vila, December 2000
3 Government of the Republic of Vanuatu, Vanuatu National Energy Road Map, 2013-2020, Port Vila, March 2013

of small spills. The Road Map identifies ways to ensure that environmental impacts are mitigated. Special consideration has also been given to groups with specific vulnerabilities, women and the poor, and to incorporate an element of equity. It also includes the provision of sustainable, affordable electricity supply that meets the needs of the poor and those living in remote areas.[4]

Priorities and Action Agenda of Government of Vanuatu (PAA) 2006. The Priorities and Action Agenda of the Government of Vanuatu published in 2006 introduced a long- term national vision - 'an educated, healthy and wealthy Vanuatu'. A recent review of the PAA of 2010 to 2012 identified the necessity to address Governance issues as a means to improve effectiveness and efficiency of the Public Sector.

The primary policy objective and strategies in the PAA 2006 have been re-organized to make policy directions clear and more focused on key issues facing the sector.

Strategies covering the Environment have been strengthened to include strengthening of the Department of Environmental Protection and Conservation (DEPC). New strategies have been introduced covering the Biodiversity Advisory Council, protected areas and pollution control measures and the Environmental Impact Assessment Regulation.

The Government of Vanuatu clearly states its objectives in the PAA (2003) as follows: *"The general objective of the Government is to contribute towards achieving balanced and mutual supportive policies in the economic, social and environmental dimensions of sustainable development. Specific objectives to achieve this goal are*:

- *To develop appropriate legal framework for the conservation and management of the environment;*
- *To promote sound and sustainable environmental management practices;*
- *To ensure ecosystems must be managed in an integrated manner and at appropriate scale;*
- *To ensure sustainable management and conservation of Vanuatu's biodiversity;*
- *To implement the Environmental Management and Conservation Act N°12 of 2002 and as amended in 2010 and the regulations of related activities, e.g. EIA Regulation; and*
- *To ensure that biodiversity must become an ever greater priority, with resources pooled and political will mobilised behind winning strategies to protect it."*

Productive Sector Policy (2012-2017). Under the Government's Overarching Productive Sector Policy (2012-2017), supporting policy statements on environment include the need to:

- enhance capacities to utilise natural resources in a sustainable manner; and
- Assess and take into consideration the competing demands on the environment and differentiated impacts in climate change when formulating strategies to address the development challenges that the productive sector faces.[5]

National Forest Policy 1997. One of the important sectorial policies is the national forest policy (NFP) of 1997, which sets minimum standards, which will allow selected forest areas in Vanuatu to be harvested with minimum adverse impacts. It balances the need for protection of

[4] Government of the Republic of Vanuatu. Vanuatu National Energy Road Map, 2013-2020, Port Vila, March 2013
[5] Government of Vanuatu ,Overarching Productive sector Policy (2012-2017)

environmental values with safety and commercial consideration. The objectives of the national forest policy include:

- Forest management objectives such as timber production, conservation and conversion and conserving ecosystems,
- Environment and conservation which deals with protection and conservation for the current and future generations, establishment and management of conservation areas with landowners.[6]

ANNEX 1B - LAWS

Public Health Act 1994. Under the Public Health Act, the Ministry of Health retains an important responsibility for many waste management activities. The Ministry acknowledges the need for minimum standards in the areas of Environmental Health: clinical waste, food, water, solid waste management, housing, pollution, and sanitation and port health. The Ministry recognizes that there are special stresses/ problems faced by the urban environment including: collection and disposal of large quantities of rubbish, sub-standard housing, water quality, water supply not keeping up with population growth, unhygienic conditions of food for sale, industrial pollution, and lack of proper drainage system.

With respect to the water sector, there is a chapter of the Act for the Provision and Protection of Water Supply. Other aspects relating to the water sector as defined by the Act are as follows:

- The administrative powers of the Minister (of Health) of supervision and inspection over local authorities in all matters relating to maintenance and promotion of public health;
- Obligation of provision of proper and sufficient supply of wholesome water to all buildings and premises and all inhabitants of the rural area within local government council Powers of Environmental Health Officers to enter any premises, land at all times for the purpose of, water sampling for examination of the source of water supply, and to inspect the appropriateness and adequacy of sanitation system Obligation of maintaining clean conditions and protection from contamination of any storage of water.
- Powers of local authorities to examine sanitation and water supply apparatus and facilities
- The right of the Minister to make regulations prescribing all matters that by the Act are required or convenient to be prescribed for giving effect to the Act, as the standard, quality and adequacy of water for domestic purposes and as — for the control and maintenance of general Environmental Health quality in matters such as to prevent soil, water, noise and air pollution. The Minister allocates responsibility to the relevant local authorities to take all lawful, necessary and practicable measures to maintain its respective areas free from nuisance. Nuisance is defined to include any…. River, stream, spring or other sources of water supply….which is likely to be used for human drinking or domestic purposes…which in the opinion of the environmental health officer polluted…[7]

In Vanuatu, both ground and surface water resources are utilised for domestic purposes. In rural areas, there are various sources of water such as wells, springs, rivers and rainwater are used. Water supply systems in rural areas vary from good to poor and some do not exist. Throughout

[6] Vanuatu National Forest Policy, 1997
[7] Public Health Act 1994, section 24(c)

Vanuatu no provincial government is responsible for the operation and maintenance of rural water supply systems.

Relevance for the project - No permit required. Project must comply with requirements of Act during all phases of project

Water Resources Management Act 2002. The Water Resources Management Act (2002) provides for the protection, management and use of water resources in Vanuatu. The Act is administered by the Minister of Lands and Natural Resources. In addition, the Public Health Act provides for general public health in Vanuatu including prohibition of pollution of water resources and the regulation of adequate sanitary systems. Vanuatu has not developed its own water quality standards to date and relies on the World Health Organization (WHO) standards as a reference.

The overall responsibilities for water resources management rest with the Department of Geology Mines and Water Resources (DGMWR) under the Ministry of Lands and Natural Resources. The Water Resources Act gives the Director of the DGMWR overall power to establish groundwater protection zones among other powers vested by the Act. The Act defines the following aspects:

- The rights and general rules in respect to the utilisation and protection of water resources
- Administrative aspects and the formation of a National Water Resources Advisory Committee
- Water resources planning, management and development plans, designation of water protection zones
- Access over adjoining lands
- Water utilities (formation of water utility board to facilitate the management, control and regulation of water utilities involved in water supply services)
- Water quality guidelines and criteria

Relevance for the project: The Act requires that if a land lease grants the right to use any water the lessee must apply to the Director of Water Resources for the right to use the water for any other purpose other than the customary rights or for domestic purposes. The Act also stipulates that works and uses undertaken prior to the commencement of the Act are lawful. In this respect the Sarakata hydropower project does not need to apply for the right to use the water. However, Wambu, Brenwe and Sarakata 2 projects are required to apply for and obtain water use rights from the Director of Water Resources.

Pollution Control Act 2013. The objectives of this Act are to minimize and manage the discharge and emission of pollution and encourage all levels of government to work together to control the discharge and emission of pollution.

Clause 8 imposes a requirement on owners and occupiers of premises to comply with prescribed standards for the discharge of pollution, wastewater and the emission of noise, odour or electromagnetic radiation and Clause 9 establishes a permit scheme for the discharge or emission of pollutants and creates offences for the discharge or emission of pollutants without a permit.

Clause 11 confers power on the Director to revoke or suspend a permit if a permit condition has been breached or if the discharge or emission of pollution is likely to endanger human health or cause excessive harm or damage to the environment.

If it appears to the Director that: (a) a pollutant is being or is likely to be discharged or emitted from the premises into the environment; or (b) a pollutant or matter is being discharged or emitted which does not comply with a prescribed standard; or (c) a pollutant, is causing or likely to cause

pollution, he or she may serve a pollution abatement notice to the owner or occupier of the premises.

Such a notice is to be issued in writing and is to: a).state the grounds upon which the notice is issued; and (b) require the person identified in the notice to take any measure that the Director considers necessary to prevent, control or reduce the discharge or emission of pollutants, in the manner specified in the notice.

The Director may in writing, vary or revoke a notice.

The Act does not have a regulation to enforce the provisions of the Act, including standards for waste water disposal from an operation or premises.

Relevance for the project: A permit is required from the Director of the Department of Environment Protection and Conservation (DEPC) for any discharge of pollution, wastewater and emission of noise or odour resulting from the project.

Draft Waste Management Bill 2012. Scheduled to go before parliament in 2014, this Bill provides for the protection of the environment through encouragement of effective waste services and operations. Once passed into law the Director of the DEPC will be responsible for the evelopment, coordination and, where appropriate, implementation of the Government's waste and litter minimization policies and programmes. In carrying out the functions, the director must carry out the following:

- administer the system the waste management system,
- in the absence of relevant regulations, prepare guidelines and standards for the purpose of giving effect to the Act;
- undertake environmental assessment, monitoring, and inspection generally; and
- undertake such other duties and responsibilities as may lawfully be required.

The Director may also assist the Provincial Government Councils to ensure that each Provincial Government Council develop a Waste Management Strategy. The Director will be responsible for the implementation of the Act.

The Bill covers local, regional and international waste issues under Vanuatu's commitments, for example, the Stockholm Convention and Montreal Protocol on Substances that Deplete Ozone Layer. The Director will be responsible for developing regulations under the Act.

At the national level the government has developed and endorsed its first ever-national waste management policy in 2001, which embraces the importance of managing waste at the national provincial and community level. The overall goal of the national waste policy is "prevent, protect and control the adverse effects of waste on human health, environment and the economy of the country"[8]

Relevance for the project: Once passed into law, any waste disposal on the project sites will require the approval of Director of DEPC.

Forestry Act 2001 The Forestry Act of 2001 provides for the protection, development and sustainable management of forests and the forest industry. The Act is administered by the Department of Forests under the Ministry of Agriculture, Quarantine, Forestry and Fisheries (MAQFF). The Forestry Act also establishes the Forests Board of Vanuatu whose main task is

[8] National Waste Management Policy, 2001

to supervise negotiations for timber rights agreements and advise the Minister on matters relating to forestry policy and administration.

The Forestry Act 2001 repealed the previous Act, but it kept in force the Regulations and Orders made under that Act, adapted as necessary. Licences, permits, etc., made under the previous Act were continued in force as if they were made under the new Act. The main features of the new Act are to establish structures and processes for administration, planning, resource access, environmental protection, and reforestation.

Relevance for the project: The project will involve removal of some secondary vegetation for various components of the hydropower projects. Such vegetation removal is not expected to involve tree species which have significance for timber

Quarry Act 2013. This Act provides for the regulation of quarries and for related purposes. A holder of a Quarry Permit granted by the Commissioner of Mines has the right to prospect for and extract building materials, which are defined as "mineral substances and rocks commonly used for building, road making or agricultural purposes." The Quarry Act N° 9 of 2013 has the following classes of quarry permits: (i) commercial permit; (ii) landscaping permit;(iii) public works department permit; and (iv) occasional permit.

The quarry permit is ranked into three categories as large, medium and small. For a large quarry, a permit issued must not exceed a period of 10 years and is renewable. The volume of materials extracted per annum may exceed 50,000 m^3 and the quarry operations must not exceed 100 hectares. A quarry permit issued for medium quarry operations must not exceed a period of 10 years and renewable with a volume of materials extracted per annum ranges from 20,000 to 49,999 m^3 and an operations area must not exceed 10 hectares. A quarry permit issued for small quarry operations must not exceed a period of 3 years and is renewable. The volume of materials extracted for small quarry operations ranges from 501 to 19,999 cubic metres and the area must not exceed 5 hectares.

Relevance for the project: If any construction material is sourced from quarries such quarries are required to have a Quarry Permit under the Act. Whilst legal responsibility for a Quarry Permit rests with the owner/operator of the quarry, as part of general duty of care it is necessary for the contractor to ensure that all suppliers have the necessary legal permits and approvals.

Control of Nocturnal Noise Act 1965. This Act prohibits excessive noise between 9pm and 5am particularly in the urban areas. This is mainly for the urban areas, but where noise is an issue in rural areas, the Act can also be applied.

Relevance for the project: No permit required. Unlikely to be an issue since night time construction work is most unlikely and noise during operation will not be a problem due to distance of powerhouse from nearby communities.

National Parks and Nature Reserves Act 1993. The National Parks and Nature Reserves Act N° 07 of 1993 provides for the declaration of national parks and nature reserves; for the protection and preservation of such areas and all related matters. The Minister responsible for environment and conservation regulates the provisions of this Act upon the advice of the National Parks Board. Legal declaration of national parks and nature reserves under the Act involves a set of community consultation procedures along within development of a park or reserves Management Plan that is approved by the Minister.

Currently there are six legally registered protected areas in Vanuatu along with a further four areas either in the process of being legalised or under consideration for legal designation. However, the focus of much present work in country is on resource use and management systems that are both applicable and practical at a local level and that are compatible with in-situ

conservation of biodiversity. This has led to the development of a number of community based protected areas. All in all there are 28 protected areas 14 of which have a terrestrial component.

Existing community based protected areas include Loru protected area, Vathhe Conservation Area, Ringhi te Suh (Maskelynes), Hideaway Island (Efate), Narong marine reserve (Uri Island), Mystery Island Reef (Aneityum), Nguna-Pele marine protected area, Epi, Central Pentecost, Lelepa marine protected area, Mangaliliu marine protected area, Spuaki conservation area (Nguna), and Wiawi (Malekula). Community based management practices and taboo areas are also widespread. One of the few efforts by the Government to create a publicly owned protected area, the Erromango Kauri Protected Area, has now lapsed as government funding of the lease could not be sustained.

Relevance for the project: Community consultations conducted during preparation of the IEE along with desk study on designated protected areas in Vanuatu indicates that no protected areas (legally protected or community based initiatives) will be affected by the proposed hydropower projects proposed under the the project.

A full list and breakdown of the of protected areas in Vanuatu is given in Table A.1

Table A.1 - Vanuatu Conservation Areas

Name	Location	Island	Terrestrial Marine/	Govt/NGO Community Initiative	Supporting Partners (NGOs or Govt	Size	Traditional Management	Management Plan	Proposed for Legal	Legally Recognised
Lake Letas CA	Top of island at foot of Mt. Garet	Gaua	Terrestrial	Govt in consultation with communities	DEPC & Dept. of Forestry	-	Yes	-	Will be developed through the FPAM	EMC Act & FPAM site
Mondoro CA	Mondoro Village	SE Gaua	Marine	Community Initiative	Dept.of Fisheries	-	Yes	Draft Management Plan	-	Draft Management Plan developed for legal registration
Vathe CA	Matantas	NE Santo	Both	Govt in consultation with communities	DEPC.SPREP, Lands Dept & Royal Forest & Bird Society of NZ	2,740 ha	-	Yes, currently updated and will be launched in June 2014	-	Legally recognised as of 2004
Loru Protected ea	Khole	East Santo	Both	NGO/VPAI/Live & Learn	VPAI/Live & Learn/DEPC	-	Yes	-	Yes	Legally registered in 2011
Panora CA	Panora Village	NW Santo	Terrestrial	Community initiative with government strengthening from	DEPC/LCIP	2,500 ha	-	-	Yes	Legally registered in 2011
Guyon Reef Marine CA	Melcoffee, Luganville	Santo	Marine	Community Initiative	DEPC/Department of Fisheries	-	-	-	-	Under consideration
Million Dollar Point	South	Santo	Marine	Government	Dept. of Fisheries	-	-	Yes	-	Legally recognised under the Fisheries Act and Maritime Zone
President Coolidge	South	Santo	Marine	Government	Dept. of Fisheries	-	-	-	-	Legally recognised under the Fisheries Act and Maritime Zone
Butmas CA	South	Santo	Terrestrial	Government in consultation with communities	DGMWR, DEPC, SOPAC	-	-	Yes	Draft Management Plan	In the process of being legalised
Nabauk CA	South	Santo	Terrestrial	Govt in consultation with communities	DGMWR, DEPC, SOPAC	-	-	Yes	Draft Man. Plan	In the process of being legalised

Name	Location	Island	Terrestrial Marine/	Govt/NGO Community Initiative	Supporting Partners (NGOs or Govt	Size	Traditional Management	Management Plan	Proposed for Legal	Legally Recognised
Edenhope Forest Reserve	West	Santo	Terrestrial	Lessor in consultation with the communities	DGMWR,DEPC, Dept. of Forestry	700 ha	-	Yes	In process	In process
Amal/Krab Bay Tabu Area	Northeast	Malekula	Marine and mangrove	Community Initiative	DEPC, Dept. of Fisheries, IUCN,SPREP	-	-	Yes	-	Legally registered under the EMC Act
Naron/Uri Marine Conservation Area	Northeast	Malekula	Marine	Community initiative	DEPC, Dept. of Fisheries	-	Yes	-	-	-
Wiawi CA	Northwest	Malekula	Both	Government in consultation with community	DEPC, Dept. of Forestry	-	Yes	-	-	-
Ringi Te Suh Maine Protece Area	South Malekula	Pelonk, Maskelye Island	Marine	Community Initiative	Dept. of Fisheries, FSP	-	Yes	-	-	-
Avok II Island CA	South Malekula	Avok Island	Marine	Community Initiative	DEPC	-	Yes	-	Explore the process for legal registration under the Act	-
Duviara	North	Ambae	Terrestrial	Community Initiative	-	-	Yes	-	-	-
Manaro Tourist CA	West	Ambae	Terrestrial	Community Initiative	-	Yes	-	Requested DEPC to assist with the Development of the Management Plan	-	-
Ranputor CA	South	Pentecost	Both	Community initiative with funding support from ADB-CTI	Live & Learn, ADB-CTI, DEPC, Dept of Fisheries	-	YES	DEPC will assist with drafting of Management Plan	-	-
Homo Bay	South	Pentecost	Terrestrial	Government in consultation with FPAM Project, FAO	-	-	Will draft man. Plan during the phase of FPAM Project	-	-	-
Proposed Marine Protected Areas	Around Island	Epi	Marine	Community Initiative	DEPC	-	Yes	-	Approved by DEPC for legal -registration	-
Nguna/Pele Marine PA	North Efate	Nguna & Pele	Marine	Community Initiative	Pearce Corp,GTZ-CCA Project with support from DEPC and Dept of Fisheries	-	Yes	-	Approved by DEPC for legal registration	-

Name	Location	Island	Terrestrial Marine/	Govt/NGO Community Initiative	Supporting Partners (NGOs or Govt	Size	Traditional Management	Management Plan	Proposed for Legal	Legally Recognised
Mere-Sauwia Conservation Area	Northeast Efate	Nguna	Both	Community Initiated	DEPC, Dept of Forests, UNDP Small Grant	-	Yes	Management Plan	-	-
Unakapa MPA	South Efate	Nguna	Marine	Community Initiated	Peace Corp and AYA	-	Yes	-	-	-
Epau Conservation Area	East Efate	Efate	Both	Community Initiated	DEPC	-	Yes	-	Draft Management Plan	-
Efate Land Management Area (ELMA)	Central Efate	Efate	Terrestrial	Community initiated through SHEFA province	SHEFA, DEPC & Dept of Forests	-	-	Provincial Bi-Law	-	Explore possibility of legal registration through EPC Act
Hide Away Island Sanctuary	Southwest Efate	Hide Away Island	Marine	Hideaway Island Resort Initiative	Dept. of Fisheries	-	-	Hide Away Island Resort Management	Hide Away Island Resort Management	-
Eruiti Marine Protected Area	South Efate	Eruiti	Marine	Lessor Initiated	DEPC	-	-	-	-	-
Lelepa Island Tours MPA	Northwest Efate	Lelepa Island	Marine	Community Initiative	DEPC	-	-	Draft Management Plan	-	-

Source: Donna Kalfatak, Biodiversity Officer, DEPC, March 2014

Preservation of Sites and Artifacts Act 1965. The Act provides for the preservation of sites and objects of historical, ethnological or artistic interest. The Minister responsible for Culture must inform the owners of the site classified and allow three months for representations to be made by the owners. Once a site is classified, the owner is obligated under the Act to prevent modification or deterioration of the site and must inform the Minister of the likelihood of modification or deterioration of the site.

Relevance for the project: No sites or objects of historical, ethnological or artistic interest have been declared or classified in the vicinity of the project sites. In the event that any suspected items are found during construction, this shall be reported to the Vanuatu Cultural Centre with immediate effect and physical activity on the site shall cease until assessment is done.

Wild Bird (Protection) Act 1989. This Act prohibits the destruction of certain bird species (which may occur through clearing of site vegetation) without a permit; Other major regulations that concern ecosystems and biodiversity conservation are: International Trade (Fauna and Flora) Act of 1989, Convention on Biological Diversity (Ratification) Act (1992), and the Animal Importation and Quarantine Act (1988) which regulates the control of animal importation including the importation of animal products and biological products.

Relevance for the project: Vegetation required to be cleared for the projects is relatively small in scale and involves removal of mainly secondary vegetation in areas that are currently modified by human activities. Such disturbance is most unlikely to result in any significant impact on protected or endangered bird species.

National Disaster Act 2000. The Department of Disaster under the Ministry of Climate Change and Natural Disaster is mandated to develop strategies for the prevention of, preparation for, response to and recover from natural disaster, ensure that strategies are implemented to counter the effect of natural disaster.

A National Disaster Plan has been developed to operationalise the national plan. The Plan has been very useful as it identifies the major risk that any health facility in Vanuatu is faced with such as earthquakes, droughts, tropical cyclones and it also identifies climate change and sea level rise.

The Government is promoting a Comprehensive Hazard And Risk Management (CHARM), Disaster Risk Reduction (DRR) and Disaster Management (DM) through the National Disaster Management Office (NDMO) with the overall objective that communities at all levels are aware of the hazards that exist to a vulnerable group as well as identifying adaptive or mitigation measures to reduce the impact lives, property and socio-economic development.

Pesticides Control) Act 1998. The Pesticides Control Act makes provision for the regulation and control of the importation, manufacture, sale, distribution and use of pesticides, including persistent organic pollutants. The Act provides for the (i) registration of all pesticides for import, manufacture, packaging or export purposes maintained by the Registrar of Pesticides, and (ii) setting out minimum standards when dealing with pesticides in Vanuatu.

Relevance for the project: Any use of pesticides during project implementation will be undertaken in accordance with the Act.

ANNEX 1C - International Treaties and Agreements

Multilateral environmental agreements supported by Vanuatu are listed in Table A.2 below.

Table A.2 Multilateral Environment Agreements Supported by Vanuatu Government

International Treaties	Status
United Nations Convention on Biological Diversity (UNCBD)	Ratified 1993
United Nations Convention to Combat Desertification (UNCCD)	Ratified 1999
United Nations Convention on Law of the Sea (UNCLOS)	Ratified 1999
United Nations Framework Convention on Climate Change (UNFCCC)	Ratified 1992
Kyoto Protocol to the UNFCCC	Acceded 2001
Montreal Protocol on Substances that Deplete the Ozone Layer	Acceded 1994
Vienna Convention for Protection of the Ozone Layer	Acceded 1994
London Amendment	Ratified 1994
Copenhagen Amendment	Ratified 1994
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	Ratified 1989
International Convention on the Establishment of an International Fund for the Compensation for Oil Pollution Damage	Ratified 1989
International Convention on Civil Liability for Oil Pollution Damage	Ratified 1983
International Convention for the Prevention of Pollution of the Sea by Oil	Ratified 1983
Treaty on the Non-Proliferation of Nuclear Weapons	Ratified 1995
Plant Protection Agreement for South East Asia and the Pacific	Ratified 1997
Agreement on the International Dolphin Conservation Programme	Ratified 2003
Millennium Development Goals	Adopted 2000
Stockholm Convention of Persistent Organic Pollutants (POPs)	Adopted 2010
Protocol of 1978 Relating to the International Convention for the Prevention of Pollution from Ships	Ratified 1989
Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal	Acceded 2002
Nagoya Protocol on Access to Genetic Resources and Benefit Sharing	In progress for accession
Bio-Safeti Cartagena Protocol	In progress for accession

ANNEX 2 - STAKEHOLDER CONSULTATIONS

Consultations at the national level were undertaken on a one on one basis. Key relevant institutions and their responsible personnel were identified by the environmental safeguards team and meetings arranged accordingly. The main purpose of the meetings was to:

- briefly outline the key features of the the project projects (location, indicative lay out/footprint etc);
- ascertain key stakeholders views and concerns in relation to the proposed developments; and
- obtain information from the stakeholders on environmental and social characteristics of the sites that would assist in the preparation of the IEEs including any constraints that need to be addressed.

A list of key national stakeholders consulted including summary of information obtained and significant comments made is provided in Table A2.1.

Table A2.1 Key National Stakeholders Consulted during PPTA

Agency	Name & Position	Date (2014)	Information Obtained / Comments made
DEPC	Albert Williams Director of Environment and Conservation Department and Acting Director General of Ministry of Climate Change Adaptation, Meteorology, Geohazards, Energy, Environment and Disaster Management.	15 May	• General discussion on institutional set up, function and capacity of DEPC. • Provided copy of DEPC Annual Report 2013. • Advised that ADB approved IEE for the project shall be deemed as meeting EIA requirements of executing agency Act and shall therefore be the basis for issuing a Development Consent.
DEPC	Donna Kalfatak Biodiversity Officer	18 Mar 24 Mar	• Inventory of protected areas in Santo and Malekula • Recent research and publications on Freshwater fauna of Vanuatu provided. • Commented on need to ensure aquatic biodiversity of project areas surveyed and adequate mitigations implemented as necessary to protect any vulnerable species. • Provided list of conservation areas in Vanuatu
DEPC	Trinison Tari Environment Education & Information Officer (EEIO)	28 Mar 14 Apr	• Provided information about the structure for the DEPC. Concern that there was not enough staff for the department to enforce the laws with new project initiatives • Advised that the Waste Management Bill for Vanuatu is not yet law. • Also advised that Pollution Control Act is enforced but without a Regulation. A draft Regulation was prepared but it has not yet been approved.
DOF	Hanington Tate Director Phyllis Berry GIS Mapping Officer	18 Mar	• Provided latest vegetation maps of Malekula and Santo • Provided species lists of trees that are known to be found in project areas

Agency	Name & Position	Date (2014)	Information Obtained / Comments made
			• Identified history of passed logging activities (or not) in project areas.
Sanma Provincial Government	Anaclet Philip Environment Extension Officer	27 Mar	• Advised there were two community based protected areas in Santo including Nambauk and Butmas. Both areas are outside proposed project areas in Santo • Community awareness activities undertaken at Fanafo on need for watershed protection above existing Sarakata HP scheme, namely to avoid tree cutting and limit fishing activities. • Advised that Sarakata catchment was logged during 1990s along with some parts of Wambu catchment. Most large trees were taken. • Had no concerns about endangered or endemic species in Sarakata or Wambu project areas.
Ministry of Lands, Sanma Province	Benuel Tabi Officer in Charge	27 Mar	• Provided advice on water use rights in respect of existing Sarakata hydropower plant
DoE	Leo Moli Officer Manager	24 Mar	• Provided structure of the DoE as approved by the Public Service Commission • Also provided vegetation study report for the Sarakata Hydropower • Provided information on the Energy Roadmap for Vanuatu
DoE	Chris Simelum Power Off-grid Officer	24 Mar	• General information on energy issues and needs in Vanuatu. Also referred to the Energy Roadmap
DGMWR	Brooks Rakau Geologist	7 Apr	• Provided information on the new Quarry Act. Advised that the Regulation has not yet been approved and confirmed that the Director can approve a Quarry Application in writing in the absence of a Quarry Permit Application Form
DGMWR	Benjamin Titus Geologist Christopher Ioan Director	17 Mar 9 Apr	• Provided geological maps and associated geology reports of the project areas • Advised that due to the absence of a Regulation for the Water Resources Management Act to grant approval for Right of Use of Water, the Director has powers to approve in writing.
Malampa Provincial Council	Palen Arthur Planner	11 Apr	• General information on the project and the Provincial commitment to support the project. Information on Provincial By-Law was lacking for the province in environmental issues
DoMG, VPMU	Brian Philips Manager	16 Apr	• Provided information on the role of the National Advisory Board (NAB) on Climate Change and Disaster Risk Reduction
VUI	Jun Fernandez Operations Supervisor Sarakata Hydropower Scheme	25 Mar	• Provided information on VUI's current environmental health and safety procedures and protocols in respect of the Due Diligence Review undertaken for Sarakata Hydropower Scheme
VPMU	Tony Telford Project Management Advisor	28 May	• Provided information on VPMU's current portfolio, staffing and capacity.

Table A2.2 List of Attendees at Consultation Meeting with Sanma Provincial Council Luganville 20 March 2014

Name	Responsibility	Summary of Comments made
Sakaraia Daniel	Secretary General (SG) of the Sanma Provincial Council	• The SPC were very aware of what the hydroproject would involve and supported the project • The SG remarked to visitors as ' bringing blessings to the Islands of Espiritu Santos'. • The SG welcome the SMEC team and stated that Sanma province would be ready to assist in any activity that is associated with the Vanuatu Energy Access Project. • On the environmental questions, the President of Sanma province said there is plenty of bushland and villagers live far away from the project sites. • The Consultant was referred to Mr Anaclet Philip SPC Environment Extension Officer to discuss environment issues. He was unable to attend the meeting due to involvement in disaster response in relation to cyclone Lusi. • *Refer to summary of discussion with SPC Environment Extension Officer Table A5.1.*
William Mallon	President, Sanma Provincial Council, Luganville	
Prosper Buletare	Provincial Planner, Sanma	
Juliet Sumbe	Sanma Provincial Council Women's affairs	