Initial Environmental Examination

October 2021

Tonga: 6 Megawatt Hihifo Solar Power Project

Prepared by Sunergise New Zealand for the Asian Development Bank. This is an updated version of the draft originally posted in June 2021 available on https://www.adb.org/projects/53258-001/documents.

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LIST OF ABBREVIATIONS

ADB	-	Asian Development Bank
BESS	-	battery energy storage system
CCP	-	communication and consultation plan (of the project)
COEP	-	Codes of Environmental Practice
CO_2	-	carbon dioxide
CSS	-	country safeguards system
DOE	-	Department of Environment (within MEIDECC)
EHSG	-	Environmental Health and Safety Guidelines (of the World Bank)
EIA	-	environmental impact assessment
ESIA	-	environmental and social impact assessment
ESMP	-	environmental and social management plan
GCF	-	Green Climate Fund
GDP	-	gross domestic product
GOT	-	Government of Tonga
GRM	-	grievance redress mechanism
HSEQ		Health, Safety, Environment and Quality system (of the contractor)
IEE	-	initial environmental examination
IPP	-	independent power producer
MAFFF	-	Ministry of Agriculture and Food, Forests and Fisheries
MEIDECC	-	Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications
MFNP	-	Ministry of Finance and National Planning
MLSNR	-	Ministry of Lands, Survey and Natural Resources
OIREP	-	Outer Island Renewable Energy Project
PCCSP	-	Pacific Climate Change Science Program
PPE	-	personal protective equipment
PV	-	photovoltaic
QPR	-	quarterly progress report (of the project)
SPS	-	Safeguard Policy Statement 2009
TERM	-	Tonga Energy Road Map 2010 – 2020
TOP	-	Tongan pa'anga (see currency equivalents below)
TPL	-	Tonga Power Limited
TREP		Tonga Renewable Energy Project (funded by ADB)

MEASURES AND WEIGHTS

m = meter
m^2 = square meter
km = kilometer
km^2 = square kilometer
ha = hectare
MW = megawatt
MWh = megawatt hour
kW = kilowatt
kWh = kilowatt hour

CURRENCY EQUIVALENTS

(as of 27 May 2019)

Currency units	–	Australian dollar/s (A$)/pa'anga (T$)	
	A$1.00	=	US$0.69
	A$1.00	=	T$1.63
	T$1.00	=	US$0.61
	US$1.00	=	T$2.36

NOTES

(i) The fiscal year (FY) of the Government of Tonga ends on 31 December. FY before a calendar year denotes the year in which the fiscal year ends, e.g., FY2017 ends on 31 December 2017.

(ii) In this report, '$' refers to US dollars.

QUICK REFERENCE GUIDE – TONGAN EIA REQUIREMENTS

Requirement	Subject	Section
1	Title, abstract and executive summary	ES.
2a	Purpose	C.1. and C.2.
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EXECUTIVE SUMMARY

1. **Background**. Historically, Tonga has almost exclusively relied on the import of diesel for generating its electricity needs. An estimated 14 million liters of diesel are consumed each year to generate over 89% of the grid-supplied electricity. This cost burden (equivalent to approximately 10% of total gross domestic product), along with vulnerability to price fluctuations and increased consciousness of environmental impacts; led to the development of the Tonga Energy Road Map 2010 – 2020 (TERM). This established the Government of Tonga (GOT) targets to generate 50% of all electricity from renewables by 2020.

2. **The Project.** Sunergise New Zealand and Tonga Power Limited (TPL) are proposing three 2MW solar plants on the island of Tongatapu in the Kingdom of Tonga to contribute to the GOT meeting its renewable energy target by 2020.

3. **Associated facilities**. Associated facilities for this Project are being funded by TPL separately and include:

- **Line upgrades** – The solar plants will be connected to the electricity grid in Tongatapu. This requires TPL to upgrade the existing 11kV electricity lines at Fualu and extend the electricity lines by 1.2km to the site at Ha'utu within the road reserve.

- **Road upgrade at Fualu** – The solar plant site at Fualu does not currently allow for adequate access to site. TPL will fund an upgrade to one rural road to enable the electricity line upgrades and materials to be delivered to site during the pre-construction and construction phase. The road is 1,075m in length from Hihifo Road and has a road reserve of up to 5m (1.33 acres in total area). No land acquisition is required as the road reserve already exists and TPL will work with residents living along the road well in advance of construction to reinstate the road reserve with minimal disruption.

4. This IEE covers the three solar PV plants and associated facilities proposed on Tongatapu. The IEE was based on the concept designs and site visits undertaken during the feasibility study. The fieldwork, consultations and site visits for the IEE were undertaken in March - June 2019.

5. **Project Proponent**. Sunergise New Zealand is the proponent for this Project. Sunergise New Zealand ("Sunergise") is an Independent Power Producer (IPP) that has signed a Power Purchasing Agreement (PPA) with Tonga Power Limited (TPL). TPL is a government-owned, public enterprise under the oversight of the Ministry of Public Enterprises and the Cabinet. TPL has the concession for, and operates, four independent grids for on-grid electricity services on the main islands of Tongatapu (Tongatapu and Eua) and Vava'u and Ha'apai island groups, where it generates, distributes, and retails electricity, and provides operation and maintenance (O&M) services. TPL will assist with community consultation and grievance redress as per Tongan protocols and requirements. Sunergise is a member of the Sustainable Energy Industry Association of the Pacific Islands (SEIAPI) and Pacific Power Association.

6. **Project sites**. The three proposed solar plant sites under the PPA are located at Liukava in Kolovai District, Ha'utu also in the Kolovai District and Fualu in the Nukunuku District on Tongatapu Island, Tonga. The sites proposed have been approved by Cabinet and are modified and/or highly disturbed sites (refer to Table ES.1).

7. **Key impacts**. Approximately 24.7 acres will be required for the three solar plants to be developed through the IPP (Sunergise). The sites do not contain vegetation of high conservation,

ecological or habitat value or significance. Most environmental risks and impacts will occur during the construction stage, which will largely be site-specific, temporary and localized and can be managed and/or mitigated through implementation of measures identified in the Project's Environmental and Social Management Plan (ESMP). There are no unmanageable risks during the operational phase. The main environmental risks of the solar plants are associated with the end of life cycle for batteries and solar cells. The Project's ESMP requires proper handling and storage/disposal of spent batteries to ensure there is no residual environmental impact.

8. **Key benefits**. The Project will provide substantial environmental and social benefits including: (i) greater energy security and resilience for Tongatapu (the most densely populated island in Tonga); (ii) less dependency on diesel and associated price fluctuations, (iii) a significant reduction on CO_2 and greenhouse gas emissions (GHG), and (iv) the creation of approximately 30 jobs during construction phase. It is estimated that the Project will result in a 5,377 tonnes reduction in CO_2 emissions and savings of approximately 1.9 million liters of fuel per annum. The impact of the project will be a transformational shift away from the traditional reliance on fossil fuels toward a greater emphasis on climate-resilient renewable energy systems and reduced GHG. The Project is also likely to result in indirect, long-term benefits such as improved air quality, decreased risk of contamination from hydrocarbon spills, and reduced cost of electricity for consumers.

9. **Environmental and social safeguards**. The project is prepared, and will be implemented, in such a way to comply with the ADB's Safeguard Policy Statement 2009 (SPS) and the country safeguard systems (CSS), namely the Tongan Environmental Impact Assessment (EIA) Act 2003 and EIA Regulations 2010. The Project has been screened as Category B for environmental safeguards under ABD's criteria and a 'Major' Project in accordance with Tongan regulations. It is classified Category C for both involuntary resettlement and indigenous people's safeguards. Land due diligence has been undertaken to address site-specific social safeguards.

10. **Environmental and social management plan**. Tonga's Codes of Environmental Practice (COEP) for the renewable energy sector reflect internationally recognized good practice and form the basis of the Project's ESMP which covers issues such as erosion, noise and air quality, material sourcing, waste, and worker and community health and safety (Section G). The ESMP has been developed to outline the measures that are to be implemented to avoid, minimize and mitigate adverse environmental impacts and serves as a guide for the proponent, contractor(s) and the workforce on their roles and responsibilities concerning potential impacts, mitigation measures, monitoring and reporting in the pre-construction, construction and operational phases of the project.

11. **Consultations and information disclosure**. Consultation for the Project occurred in three stages: (i) during the feasibility study for the Tonga Renewable Energy Project (TREP) funded by ADB, (ii) during the environmental assesment process for TREP, and (iii) during the feasibility and due diligence processes for this Project. The public raised queries in relation to community safety, environmental protection and the impact on the energy tariff in Tongatapu.

12. **Grievance and complaints management**. The Project will use TPL's grievance redress mechanism (GRM) as modelled under TREP to identify any implementation issues or concerns. TPL, Sunergise and contractor(s) will work collaboratively to record and resolve complaints that arise. A complaints register will be maintained by TPL on behalf of all parties.

13. **Monitoring**. Sunergise will have Site Managers stationed at each solar plant site as a key focal point during pre-construction and construction phases to monitor issues on a daily basis. Sunergise will also engage an Environmental, Health and Safety Officer (EHS) to monitor all sites

and Community Liaison Officer (CLO) to monitor safeguard issues across all sites on a daily basis during pre-construction, construction and early operations phases.

14. **Reporting.** The Site Manager will report to Sunergise management on a weekly basis. Sunergise will report to TPL on a fortnightly basis (as per the PPA) and to ADB on a bi-annual basis during construction then on annual basis during operations. Reports will contain a summary of compliance checks, health and safety issues, complaints or safeguard issues and any corrective actions.

Table ES.1: Summary of Project Components in Tongatapu

Site	Nearest village	District	Site/existing use	Associated facilities	Additional solar capacity proposed			
					MW	MWh	kW	kWh
Ha'utu	Fahefa	Kolovai	Proposed IPP solar	New line connection	2			
Fualu	Matafonua	Nukunuku	Proposed IPP solar	Upgrade line connection/ Access road upgrade of 1075m*	2			
Liukava	Kolovai	Kolovai	Proposed IPP solar		2			

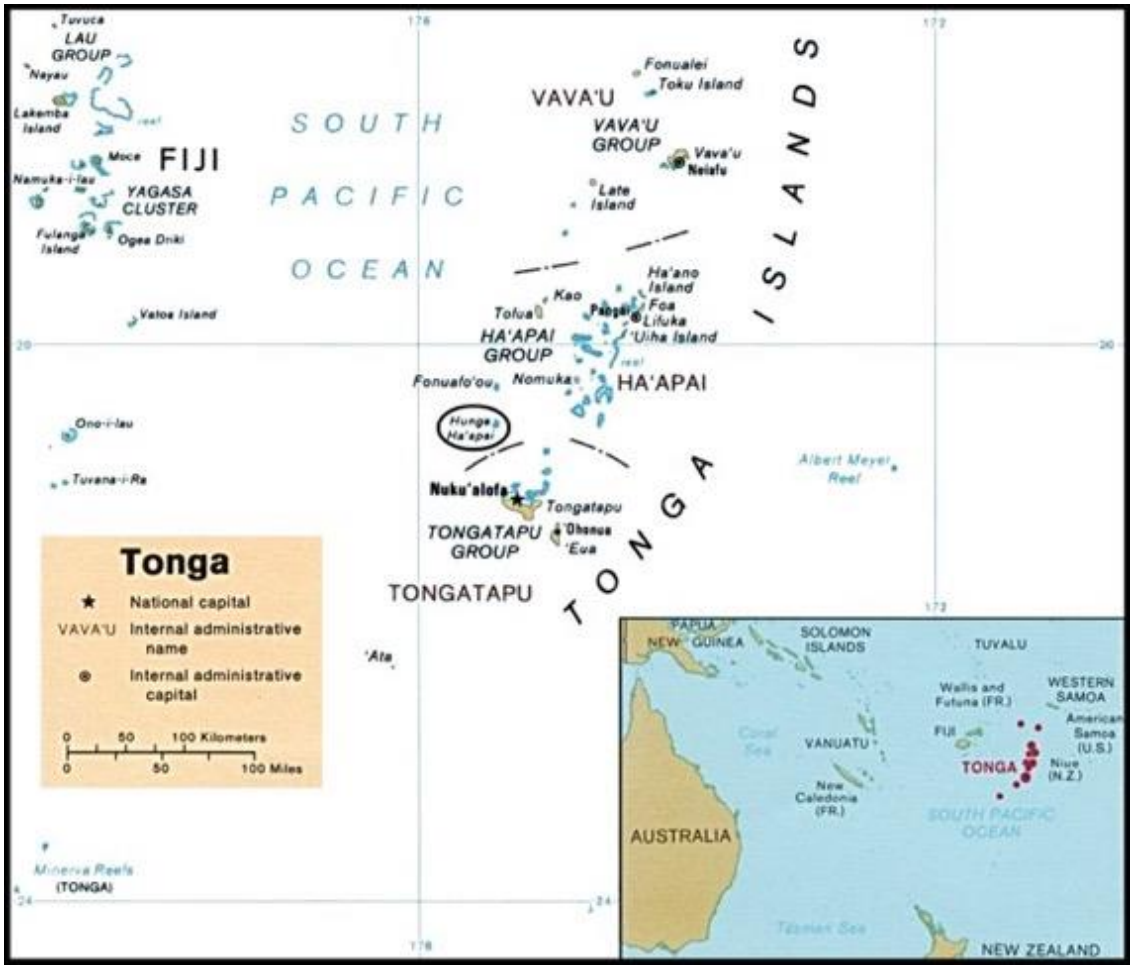
*Note: Road upgrade within 5m road reserve to be funded and completed by TPL.

A. INTRODUCTION

1. **Background**. The Kingdom of Tonga (Tonga) is a small island developing state consisting of 177 islands with a total area of 748 km^2 (Figure 1.1). Tonga's population is approximately 103,000, of which almost three-quarters live on the island of Tongatapu. Tonga is remote from markets and most resources. Despite this, approximately 89% of households have access to electricity, increasing to 97% in urban areas.

2. The Pacific Islands are challenged by both the high costs of fossil fuel imports and numerous climate-related disasters (Weir 2018). Tonga's electricity production relied almost exclusively on diesel generation. Until recently, over 95% of electricity in Tonga was generated using imported diesel fuel. An estimated 14 million liters of diesel were consumed to generate electricity in 2012, at a cost equivalent to approximately 10% of total gross domestic product (GDP) and 15% of national imports. In 2017, about 11% of electricity consumption was being met by renewables. This high dependency on imported fuels, not only contributes to high electricity costs, but also climate change.

Figure 1.1: Location of Tonga's island groups in the Pacific



3. **Purpose**. Tonga has a greater potential for renewable energy generation, most notably from solar, wind and biomass. The Government of Tonga (GOT) issued the Renewable Energy Act in 2008 and then formulated the Tonga Energy Road Map 2010 – 2020 (TERM).[1] TERM includes the following targets:

- by 2020, 50% of all electricity to be generated from renewables; and
- by 2030, 70% of all electricity to be generated from renewables.

4. GOT has been implementing the TERM in three phases[2]. The first two phases of TERM are under implementation. The Asian Development Bank (ADB) is supporting the GOT to meet its renewable energy targets as set out in the TERM, through the Outer Island Renewable Energy Project (OIREP[3]) and the Tonga Renewable Energy Project (TREP[4]). When TERM is complete, approximately 27% of Tonga's electricity will be generated from renewable energy (an increase of 16%). The proposed project aims to enable GOT to meet its targets for renewable energy generation.

5. An Independent Power Producer (IPP) – Sunergise – has signed a Power Purchasing Agreement (PPA) with Tonga Power Ltd (TPL) to produce energy from solar for twenty-five years. The scope of the Project includes:

- Installing three 2 megawatt (MW) solar PV plants on Tongatapu financed and run by Sunergise.

6. Associated facilities of the project include:

- Upgrade of a small rural road of 1km and electricity lines to allow for delivery of materials and construction equipment at Fualu, and installation of a new line connection to the main grid at Ha'utu.

7. **Direct Benefits**. There are multiple benefits expected to arise as a result of the Project. Transitioning Tonga from fossil fuel towards more renewable energy sources like solar will result in: (i) greater energy security and resilience for Tongatapu (the most densely populated island in Tonga); (ii) less dependency on diesel[5] and associated price fluctuations, (iii) a significant reduction on CO_2 and greenhouse gas emissions (GHG), and (iv) the creation of approximately

[1] GOT. June 2010. Tonga Energy Road Map 2010 – 2020: A 10-year road map to reduce Tonga's vulnerability to oil price shocks and achieve an increase in quality access to modern energy services in an environmentally sustainable manner.

[2] Phase One (2014-19) is the the Outer Islands Renewable Energy Project (OIREP), which aims to (i) optimize the use of on-grid and off-grid generation systems, (ii) increase consumer access to electricity generated by solar power on nine outer islands, and (iii) rehabilitee the existing grid network on 'Eua and Vava'u. Phase Two (2017 – 2019) includes solar farms to be funded and built by an IPP, and one wind farm to be funded by the Japan International Cooperation Agency (JICA).

[3] The scope of OIREP includes; (i) grid connected solar PV and grid rehabilitation on 'Eua island, (ii) grid rehabilitation on Vava'u island, (iii) installation of mini-grid renewable energy hybrid systems with solar PV and BESS in 4 outer islands of Ha'apai and Niuatoputapu, and (iv) strengthening capacity of GOT/TPL and project management.

[4] The scope of TREP includes: (i) multiple Battery Energy Storage Systems (BESS) on Tongatapu with a capacity of 10.1MW, (ii) grid-connected solar photovoltaic (PV) plants with 650kW capacity and BESS with 1.3MW capacity on 'Eua and Vava'u islands, (iii) installation of mini-grid renewable energy hybrid systems with 501kW solar PV and 4.3MWh BESS in four outer islands of Ha'apai and Niuafo'ou, and (iv) strengthening capacity of GOT/TPL and project management.

[5] In 2011, TPL purchased over 13 million liters of fuel at a cost of over US$19 million.

30 jobs during construction phase. It is estimated that the Project will result in a 5,377 tonnes reduction in CO_2 emissions and savings of approximately 1.9 million liters of fuel per annum. The impact of the project will be a transformational shift away from the traditional reliance on fossil fuels toward a greater emphasis on climate-resilient renewable energy systems and reduced GHG. The Project is also likely to result in indirect, long-term benefits such as improved air quality, decreased risk of contamination from hydrocarbon spills, and reduced cost of electricity for consumers.

8. **Environmental assessment rating.** The project has been prepared, and will be implemented, in such a way to comply with the environmental safeguard requirements of ADB's Safeguard Policy Statement 2009 (SPS) and the laws of Tonga. The field investigations confirmed the screening conclusion that the project is Category B for environment, based on findings that the project will have site-specific and localized impacts, most of which are construction-related, and which can be readily mitigated and managed. The three solar plant sites have been grouped for the purpose of this initial environmental examination (IEE), referred to in Tonga as an Environmental Impact Assessment (EIA). For completeness, this IEE considers associated facilities as the existing rural road upgrade at Fualu and the upgrade of transmission lines (financed by TPL) as necessary to commission the solar plants.

9. This IEE is based on detailed designs prepared in June 2019. The fieldwork, consultations and site visits for the IEE were undertaken in March - June 2019.

B. ADMINISTRATIVE, POLICY AND LEGAL FRAMEWORK

1. Implementation Arrangements

10. The proponent of this Project is Tonga Power Limited (TPL) and Sunergise, an Independent Power Producer (IPP) registered in Tonga. Sunergise has a Power Purchase Agreement (PPA) with TPL who will assist in the areas of community consultation, permitting and land access as required. TPL is a government-owned, public enterprise under the oversight of the Ministry of Public Enterprises and the Cabinet. TPL has the concession for, and operates, four independent grids for on-grid electricity services on the main islands of Tongatapu (Tongatapu and Eua) and Vava'u and Ha'apai island groups, where it generates, distributes, and retails electricity, and provides operation and maintenance (O&M) services.

11. Sunergise will contract Clay Energy, an Engineering, Procurement and Construction (EPC) firm based in Fiji, to construct the IPP solar plants. Each Site Manager and the EHS Officer is responsible for oversight of environmental, health and safety aspects of the development and compliance with detailed design, permitting approval conditions, and the Project's Environmental and Social Management Plan (ESMP).

2. National Framework

12. **Tonga Strategic Development Framework 2015-2025.** TSDF II outlines seven national outcomes for the development of Tonga. These are (a) dynamic knowledge-based economy, (b) urban and rural development, (c) human development with gender equality, (d) good governance strengthening rule of law, (e) infrastructure and technology, (f) land, environment and climate, (g) external interests and sovereignty (MFNP 2015). The Project contributes towards three key priorities for the energy sector listed in TSDF II, including: (i) more reliable, safe, affordable and widely available energy services built on an appropriate energy mix moving towards increased use of renewable energy, (ii) further develop technically reliable, economically affordable and environmentally sound alternative energy production and distribution systems and (iii) enhance the capabilities of local energy experts to build their expertise through appropriately involving local energy consultancies and professional works.

13. **Tonga National Investment Plan 2013-2023** acknowledges the transformation the energy sector in Tonga has recently undergone (PRIF 2013). The Plan outlines the need for investment in additional solar generation capacity for Tongatapu and outer islands, with reference to the Tonga Energy Road Map (TERM).

14. **Tonga Energy Road Map 2010-2020**. The objective of the TERM is to lay out a least-cost approach and implementation plan to reduce Tonga's vulnerability to oil price shocks and achieve an increase in quality access to modern energy services in a financially and environmentally sustainable manner. While on-grid renewable energy is a major component of the TERM, it requires assessment of the full range of opportunities to determine the least-cost combination of interventions to achieve the objective. These include: (i) improvements in petroleum supply chain to reduce the price and price fluctuation of imported petroleum products; (ii) efficiency of conversion of petroleum to electricity (i.e. increases in efficiency and reduced losses at TPL); (iii) efficiency of conversion of electricity into consumer electricity services (demand-side management; and (iv) replacing a portion of current or future grid-based generation with renewable energy. In addition, the TERM includes recommendations for a new approach to meeting the needs of consumers too remote to be connected to a grid-based supply.

15. The Energy Department within the Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications (MEIDECC) is the primary body responsible for policy formulation, as well as for implementation of rural electrification and demand management projects for off-grid electricity services.

3. Country safeguards system

16. The Department of Environment (DOE) within MEIDECC has the mandate to ensure protection and proper management of the environment and the promotion of sustainable development. The vision of MEIDECC is sustainable development for Tonga's present and future generations through coordinated environmental management and protection, and climate change mitigation and adaptation and its mission is to effectively monitor and sustainably manage lands, natural resources and environment to increase resilience to climate change and geohazard impacts in Tonga.

17. The DOE administers various programs and supports implementation of the MEIDECC Corporate Plan to meet the GOT national priorities. The DOE's core functions include implementing the Environmental Impact Assessment (EIA) Act 2003 and EIA Regulations 2010 which provide the process and procedures for applying EIA to the planning of development projects. The DOE also provides advice to GOT on environmental and climate change issues and statutes, regional and international obligations.

4. Policy, Law and Regulations

18. In response to dependency on fuel imports and the associated environmental costs, the GOT issued the Renewable Energy Act in 2008 and developed the TERM 2010-2020 to guide the transition to a more sustainable energy sector.

19. The *Renewable Energy Act* applies to the production, storage or distribution of any form of energy derived from a renewable source and: (i) provides a legal framework to promote the utilization of renewable energy in Tonga[6]; (ii) creates the Renewable Energy Authority and empowers the Authority to regulate all matters relating to renewable energy; promotes the implementation of commercially sustainable renewable energy-based electrification services by encouraging economically efficient investment in the use of and infrastructure to provide electrification services; and (iv) promotes access to renewable energy services to the extent that it is reasonably and commercially practicable to provide such services by people resident in the remote areas of Tonga.

20. With support from the World Bank and Secretariat of Pacific Community – Energy Division, the GOT is preparing a National Energy Bill. The aim of the Bill is to create further institutional, regulatory and policy reforms and lead to streamlined policy and decision making. The objectives of the Bill are:

- to create a centralized oversight function on energy matters within the MEIDECC;

[6] The Act seeks to do this through: (i) researching and developing opportunities of renewable energy (RE); (ii) encouraging commercially sustainable RE technology for both grid connected and stand-alone power supply systems; (iii) regulating the technical and safety standards for RE technologies; (iv) regulating the licensing of persons involved in the design, research, installation and management of RE projects; (v) regulating RE operators; (vi) regulating the feed-in tariffs for RE-generated electricity; and (vii) supporting the engagement of the private sector in RE projects.

- to legalize the mandate of the Energy Department (within MEIDECC);
- to transition and centralize the function of energy-related regulators; and
- to ensure harmonization and coordination of initiatives within the energy sector.

21. Table 2.1 outlines relevant laws, regulations, policies and international conventions to which Tonga has accepted or is a signatory for.

Table 2.1: Summary of Environmental Laws and Regulations of Tonga

Legislation	Objective	Applicability to Project
Environment Management (Litter and Waste Control) Regulations 2016	To provide environment, health, police and waste officers with powers to issue notifications or on the spot fines for poor waste management practices; such as dumping, burning and littering.	
Seabed Minerals Act 2014	To provide for the management of Tonga's seabed minerals and the regulation of exploration and mining activities within Tonga's jurisdiction or under Tonga's control outside of national jurisdiction in line with responsibilities under international law	
EIA Act 2003	To establish and implement environmental impact assessment procedures for developments in Tonga.	✓
Environment Management Act 2010	To establish the Ministry of Environment (now MEIDECC) to protect and properly manage the environment and promote sustainable development.	✓
EIA Regulations 2010	Regulations for implementation of EIA Act, delineating major development projects and the processes required for development consent.	✓
Hazardous Wastes and Chemicals Act 2010	To regulate and effectively manage hazardous wastes and chemicals in accordance with accepted international practices and the International Conventions applying to the use, trans-boundary movement and disposal of hazardous substances.	✓
Ozone Layer Protection Act 2010	To regulate the use of ozone depleting substances and to implement the provisions of the Convention for the Protection of the Ozone Layer and the Protocol on substances that deplete the ozone layer.	
Biosafety Act 2009	To regulate living modified organisms and the applications of modern biotechnology consistent with Tonga's obligations and rights under the Convention on Biological Diversity and the Cartegena Protocol.	
Renewable Energy Act 2008	To regulate the development and use of renewable energy in Tonga	✓
Waste Management Act 2005	To manage and oversee the function of the Waste Management Board.	
Birds & Fish Preservation Act 1988	To protect listed bird and fish species, establish protected areas and describe powers of police and fisheries officers under this Act.	
Parks and Reserves Act 1976	To provide for the establishment of Parks and Reserves Authority and for the establishment, preservation and administration of Parks and Reserves.	

Source: Tonga Crown Law Site (www.crownlaw.gov.to)

22. In addition to Table 2.1 above, Tonga is also a signatory to the following International Conventions:

- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal
- Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade
- Vienna Convention for the Protection of the Ozone Layer (1985) and the Montreal Protocol on Substances that Deplete the Ozone Layer (1987).

23. The Basel Convention sets the conditions whereby the transboundary movement of hazardous wastes would be acceptable. The Rotterdam Convention lists hazardous chemicals and stipulates responsibilities associated with the importation of such chemicals. The Montreal Protocol set a binding phase-out of major ozone depleting substances such as chlorofluorocarbons (CFCs), halons, hydrochlorofluorocarbons (HCHCs) etc. Under the conventions, Tonga cannot export wastes to Fiji or other Pacific Islands, but can export to Australia and New Zealand.

5. Environmental Assessment Process in Tonga

24. The EIA Act 2003 contains a schedule identifying 'major projects' for which EIA must be conducted. Table 2.2 outlines applicable activities classified as major projects[7]:

Table 2.2: Classification of 'major' project

Scheduled development or activity	Applicable to the project
(i) electricity generating stations	✓
(k) mining, being an activity that disturbs the surface of the land > 1 hectare	✓
(l) sand or gravel extraction from any beach within 50 meters of the high tide mark	TBC
(q) removal of trees (incl. mangroves) or natural vegetation of any area > 0.5 hectare	✓

25. Regarding the above: (i) measures will be included in the project ESMP to ensure that any sand or gravel extracted for use as construction materials for the project will not be obtained from an area within 50 meters of the high tide mark and will only be sourced from registered suppliers; and (ii) during detailed design the area of vegetation removal and type of vegetation to be removed will be confirmed.

26. Section 9 further defines major projects if any of the following are likely to occur to a significant degree:

i. result in or increase pollution;

ii. result in the occurrence, or increase the chances of occurrence, of natural hazards such as soil erosion, flooding, tidal inundation, or hazardous substances;

iii. result in the introduction of species of types not previously present that might adversely affect the environment and biodiversity;

iv. have features, the environmental effects of which are not certain, and the potential impact of which is such as to warrant further investigation;

[7] Renewable energy generation is not identified in the Major Projects Schedule. MEIDECC is in the process of reviewing the EIA legislation and this will include amending the Schedule to be more specific to developments and projects that have been undertaken since 2003 and were not necessarily envisaged when the EIA Act was passed.

v. result in the allocation or depletion of any natural and physical resources in a way or at a rate that will prevent the renewal by natural processes of the resources or will not enable an orderly transition to other materials; or

vi. whether utility services are available and adequate for that activity.

27. Approval of a development project or activity requires following the steps set out in the EIA Act and the EIA regulations.

28. Submission of Form 1 - Determination of Category of Assessment. This provides an overview of the proposed development along with a description of the existing environment and assessment of identified environmental risks and mitigation measures proposed. The project proponent will also pay the required registration fee. The Minister will determine whether the proposed development is a minor or major project or if additional information is required and advises the proponent within 30 days.

29. If it is a minor project, it may be approved (with or without conditions) based on the information provided on Form 1. The DOE advises the proponent of the decision using Form 2: Minor Environmental Impact Assessment.

30. If the development or activity is deemed to be a major project, a 'thorough assessment or environmental impacts' is required as per Form 3: Major Environmental Impact Assessment. The proponent is required to seek advice from the Secretariat of the Environmental Assessment Committee (Secretariat) and DOE Director as to the level and depth of assessment required. The EIA is submitted by the proponent along with the accompanying fee. The Secretariat will review the EIA and prepare a report. The Environmental Assessment Committee reviews the application, EIA, Secretariat report, and any additional relevant reports provided before making its recommendation. The recommendation will state: (a) whether to approve, reject, defer or modify the development application; (b) the reasons for that recommendation; and (c) any conditions that shall be attached to any approval.

31. **Codes of environmental practice**. Through the World Bank supported New Renewable Electricity Generation and Electricity Infrastructure in Tonga Program, Codes of Environmental Practice (COEP) for the renewable energy sector were developed in 2016. The COEP and accompanying guidelines identify good practice in undertaking safeguards due diligence and developing supporting documentation for the clearance process under the CSS. Both documents were developed to help stakeholders to understand and navigate through the approvals process relating to land and the environment, and they were commissioned under the auspices of the TERM.[8]

32. The COEP have been integrated into the project impact assessment and used as the basis for the Project's ESMP. Appendix 1 provides the list of the COEP.

6. ADB Safeguard Requirements

33. The ADB's Safeguard Policy Statement (SPS 2009) covers three focus areas: environment, involuntary resettlement, and indigenous people. The SPS has the objectives to (i) avoid adverse impacts of projects on the environment and affected people; (ii) minimize, mitigate, and/or

[8] World Bank. 2016. COEP: Managing Environmental and Social Impacts and Guidelines for Land Acquisition Approvals, Environmental Permits and Building Permits.

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.

34. SPS safeguard requirement 1 (SR1) 'environment' involves due diligence commencing with screening, scoping and addressing environmental concerns, if any, of a proposed activity from the initial stages of project preparation. The SPS requires that due diligence commences with a screening of project activities and impacts to categorize the project (A, B or C) to determine the level of environmental assessment required to address the potential impacts. The Project is deemed Category B according to ADB's SPS and Form 3 (Major) according to Tongan environmental regulations. The project will create short-term, site-specific or localized, small-scale, but nevertheless potential adverse environmental impacts. Most, if not all, impacts are manageable for which mitigation measures are identified in the Project's ESMP (Section G).

35. ADB's SPS applies pollution prevention and control technologies and guidelines consistent with international best practices as reflected in internationally recognized standards such as the World Bank Group's Environmental Health and Safety Guidelines (EHSG). The EHSG provide the context of international best practice and contribute to establishing targets for environmental performance.

36. **Associated facilities**. The SPS requires identification and review of impacts of associated facilities. Associated facilities include those that are not funded as part of the project (funding may be provided separately by the borrower/client or by third parties), and whose viability and existence depend exclusively on the project and whose goods or services are essential for successful operation of the project.

37. The impacts and mitigation measures from the development of associated facilities have been included in this assessment. The power line upgrade and rural road upgrade are associated facilities given that the project requires these in order to be successful and expand electrical capacity.

38. **Involuntary resettlement**. For SPS safeguard requirement 2 (SR2) 'involuntary resettlement', the Project will not result in displacement or involuntary resettlement. As assurance, a social due diligence report details the processes involved in the land leases for solar plant sites and access road upgrade.

39. **Indigenous People**. For SPS safeguard requirement 3 (SR3) 'indigenous people' is not applied in Tonga as not all of the four criteria for IP are met[9]. As such, an Indigenous Peoples Plan is not required.

[9] Criteria are listed in the SPS Appendix 3, paragraph 6, page 56.

C. DESCRIPTION OF THE PROJECT

1. Project Rationale

40. **National energy consumption.** Tongatapu's current installed energy generation and storage capacity is shown in Table 3.1. Nationally, installed energy capacity was 20.53 MW as at June 2019, of which 18% is from solar PV. The national electricity consumption was 57.9 GWh in 2018, with estimates that electricity consumption will increase to 66 GWh by 2020 and 107 GWh by 2030.[10]

41. **Tongatapu Electricity Network**. Two-thirds of the population of Tonga live on the main island of Tongatapu (GOT and SPC 2011). Most installed electricity capacity (conventional, solar and battery energy storage system [BESS]) is also on Tongatapu with a total capacity of 19.6MW (TPL 2016). The existing main power generation site is located adjacent to Fanga'uta Lagoon within Popua, comprising eight diesel generator sets with a capacity of 14 MW (Table 3.1). There are three solar plants with a combined capacity of 5.7MW. Peak demand sits around 9.5 MW. Proposed energy projects are discussed in Section E.9. Cumulative Impacts.

Table 3.1: Status of Generation and Storage Capacities in Tongatapu

#	Item Names/Site Names	Details	Locations/Town	Installed Capacity
1	Diesel Generation	6 x 1.4MW 2 x 2.8MW	Popua Main Power Centre	14.93MW
2	Maama Mai Solar Farm	Solar 1.3MW BESS 0.5MW	Popua Main Power Centre	1.3MW
3	Matatoa Solar Farm	PPA	Tofoa, near TPL headquarters	2MW
4	Mata 'o e La'aa Solar Farm	Solar 1MW BESS 0.5MW	Vaini	1MW
5	Wind Farm	1.3MW	Niutoua[11]	1.3MW

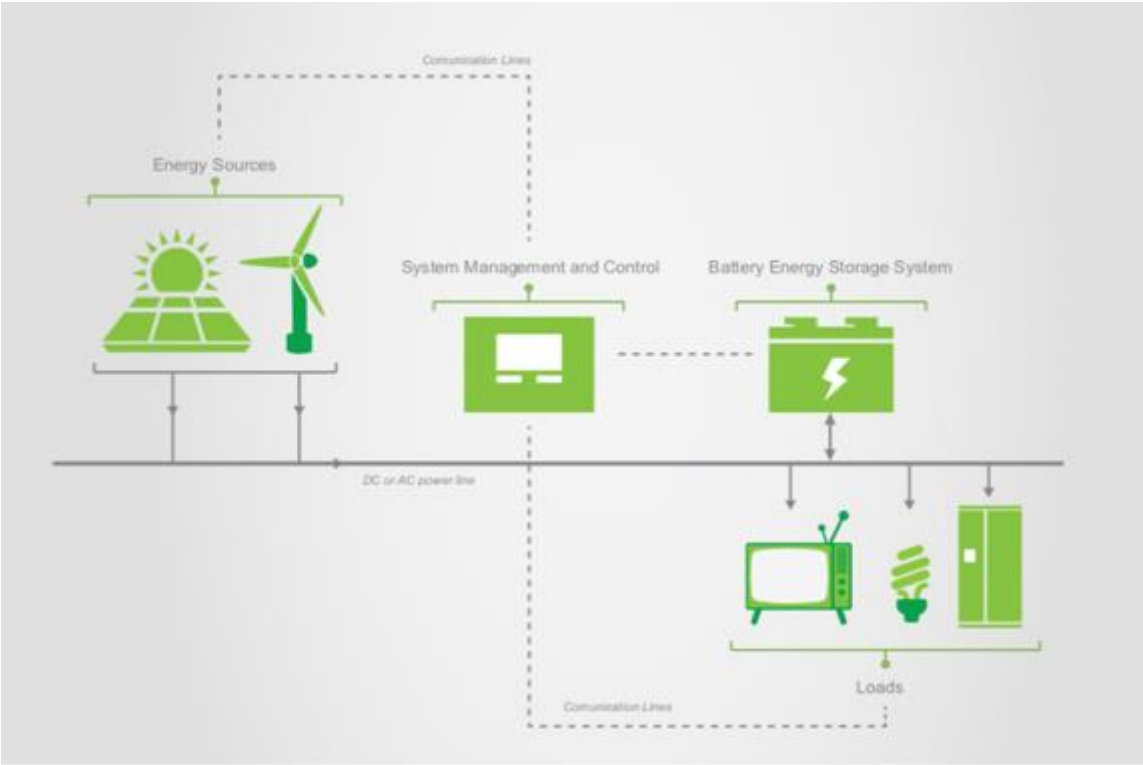
Source: Tonga Power Limited (2019)

42. **Grid-connected renewable energy generation**. Figure 3.1 illustrates a grid-connected system that incorporates both solar PV and BESS. Mini-grid systems using BESS are the most efficient and sustainable mode to electrify rural or island settings, especially where electricity is expensive in peak periods (Eurobat 2013). BESS is an effective energy storage technology and can be used to improve the reliability and efficiency of diesel systems by ensuring continuity of supply as one generator ramps up and one ramps down.

[10] This estimate is based on the Feasibility Report for TREP, ongoing projects and energy efficiency measures including (i) BESS under the proposed project; (ii) distribution network upgrades under the Tonga Village Network Upgrade Project on Tongatapau and Outer Islands Renewable Energy Project (OIREP) on Ha'apai, 'Eua and Vava'u; (iii) Others (e.g. smart meter installation, Interconnection Upgrades and Energy Efficiency Programmes for residential and commercial customers, etc).

[11] JICA funded wind farm is due for completion June 2019.

Figure 3.1: Grid-connected solar PV and BESS



(Source: EuroBat 2013, p10)

2. Project Overview

43. **The Project**. Sunergise and Tonga Power Limited (TPL) are proposing three 2MW solar plants on the island of Tongatapu in the Kingdom of Tonga to contribute to the GOT meeting its renewable energy target by 2020 (Figure 3.2). An additional 6 MW of solar power generation capacity in Tongatapu will result in an estimated saving of 47.5 million liters of diesel fuel and a reduction in CO_2 emissions of 134,425 ton over the Project's twenty-five-year lifespan. The proposed sites are Ha'utu, Fualu and Liukava.

44. **Associated facilities**. Associated facilities[12] for this Project are being funded by TPL separately and include:

- **Line upgrades** – The solar plants will be connected to the electricity grid in Tongatapu. This requires TPL to upgrade the existing 11kV electricity lines at Fualu and extend the electricity lines by 1.2km to the site at Ha'utu. The 11kV electricity lines are situated within the road reserve with a minimum ground clearance of 5.5m[13] (see Plate 3.1 a and 3.1b).

- **Road upgrade at Fualu** – The solar plant site at Fualu does not currently allow for adequate access to site. TPL will fund an upgrade to one existing rural road to enable the

[12] Associated facilities are defined as those that are not funded as part of the project, and whose viability and existence depend exclusively on the project and whose goods or services are essential for successful operation of the project.

[13] In accordance with distances set out in NZECP34:2001 Electrical Code of Practice for Electrical Safe Distances.

electricity line upgrades and materials to be delivered to site during the pre-construction and construction phase. The road is 1,075m in length from Hihifo Road and has a road reserve of to 5m[14] (1.33 acres in total area). No land acquisition is required as the road reserve already exists and TPL will work with residents living along the road well in advance of construction to reinstate the road reserve with minimal disruption.

45. **Proponent.** Sunergise is the proponent for this Project. Sunergise is an Independent Power Producer (IPP) that has signed a Power Purchasing Agreement (PPA) with TPL. TPL is a government-owned, public enterprise under the oversight of the Ministry of Public Enterprises and the Cabinet. TPL has the concession for, and operates, four independent grids for on-grid electricity services on the main islands of Tongatapu (Tongatapu and Eua) and Vava'u and Ha'apai, where it generates, distributes, and retails electricity, and provides operation and maintenance (O&M) services. TPL will assist with permitting, community consultation and grievance redress as per Tongan protocols and requirements. Sunergise is a member of the Sustainable Energy Industry Association of the Pacific Islands (SEIAPI) and Pacific Power Association. Sunergise Tonga will be one of three independent power producers operating under a PPA with TPL.

46. **Technology**. Across the three sites, Sunergise will use 17,472 Trina Solar[15] Photovoltaic (PV) modules that meet industry standards. The detailed design and equipment selected meet the design guidelines of SEIAPI, AS/NZS, building codes and Tonga Grid Operation Code. A total of 5,824 solar PV modules, 11 ABB PVS 175kW Inverters will be installed at each of the three sites (Table 3.2). The solar array will be ground-mounted with 1.9m spacing between each row. The inverters will be mounted underneath the solar array. The perimeter of the property will have 2.4m high security fencing, night lighting and CCTV for security purposes.

Table 3.2: IPP Solar Plant Equipment

Site	Land parcel	No. solar PVs modules	Size & capacity of PV module	No. 150kW Invertors
Ha'utu	8 acres	5,824	2024x1004x35mm/ 395W	11
Fualu	8.25 acres	5,824	2024x1004x35mm/ 395W	11
Liukava	8 acres	5,824	2024x1004x35mm/ 395W	11

47. Plate 3.1a and 3.1b below illustrate the difference between grid-integrated power lines and overhead power lines. These have a clearance height of 5.5m and there are no houses underneath the existing electricity lines or power line extension.

[14] Confirmed by Head of Land Survey Department, Ministry of Land and Natural Resources (MLNR), 10 May 2019.

[15] An award-winning solar brand, Trina, is manufactured in Changzhou, China to Chinese national and International Electrotechnical Commission (IEC) electrical safety standards. Trina is approved by the Chinese Government as a Tier 1 manufacturer. See http://www.solarscorecard.com/2016-17/index.php for details.

Plate 3.1a: Invertors, transformer and Power lines at Vaini Solar Plant

Plate 3.1b: Existing Powerlines, Liukava

3. Project Location and Area of Influence

48. Figure 3.2 provides an overview of each of the proposed project sites at Ha'utu, Fualu and Liukava on Tongatapu. The sites have been selected based on land availability and approval by Cabinet, and technical requirements for the power generation infrastructure to maximize the energy generation potential.[16] Approximately 26 acres of rural land over three parcels (8-10 acres each) will be leased for thirty years (as per Tongan legislation) to enable the development of the solar plants. The electricity lines will be located in the existing road reserve and not require any additional land.

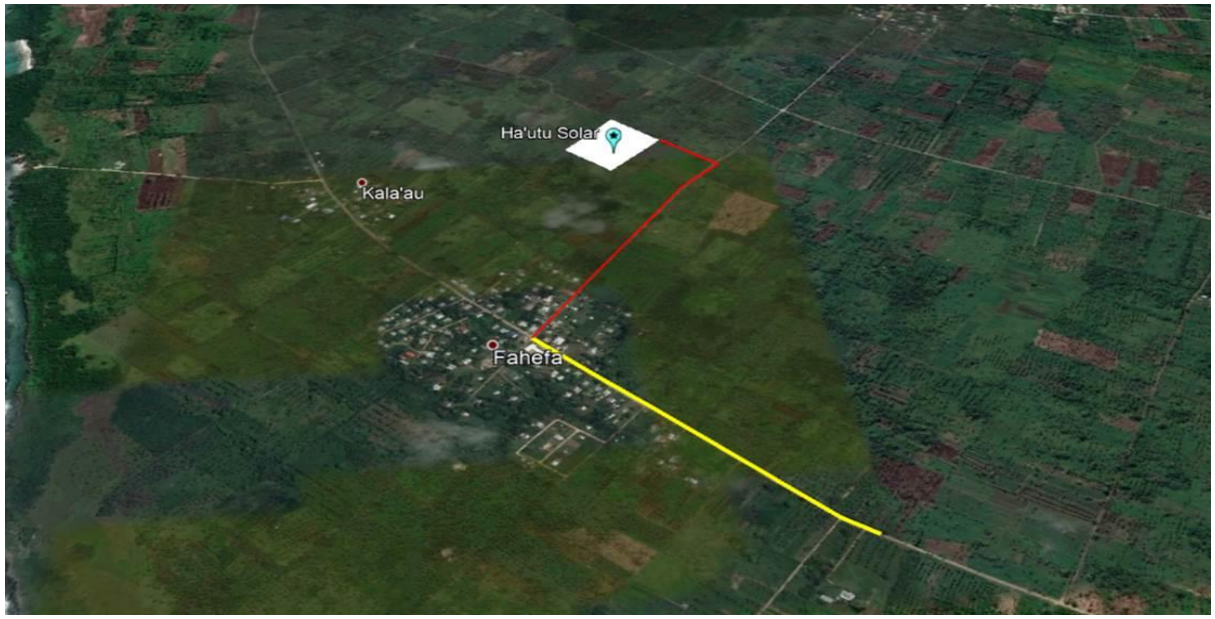
49. The Project's Area of Influence is considered to be from the Port in Nuku'alofa along Hihifo Road to Kolovai in the north-west of Tongatapu.

[16] Aecom. 2016. Tonga Renewable Energy Master Plan. This document provides a roadmap for TPL to increase renewables, and recommendations for technical and siting options.

Figure 3.2: Locations of proposed Solar sites and key Power generation sites on Tongatapu

50. **Ha'utu**. In the south-west of Tongatapu, 880 m north of the village of Fahefa (21°08'05.39"S; 175°19'42.73"W) is the site proposed for one of the new 2 MW PV solar facilities. The land parcel is approximately 8 acres situated between Liku and Loto Roads in a rural setting (Figure 3.3a). It is underutilized agricultural land with mature mango trees, coconut trees and a variety of introduced low trees and grasses. The site is sometimes used for grazing and ranges from 9 to 10m above sea level. The project requires an extension of overhead lines of approximately 1.2km from the existing 11kV electricity line to the prosed solar plant site (Figure 3.3b). The proposed layout for the solar plant is illustrated in Figure 3.3c.

Figure 3.3a: Proposed location of Transmission line extension at Ha'utu (in red)



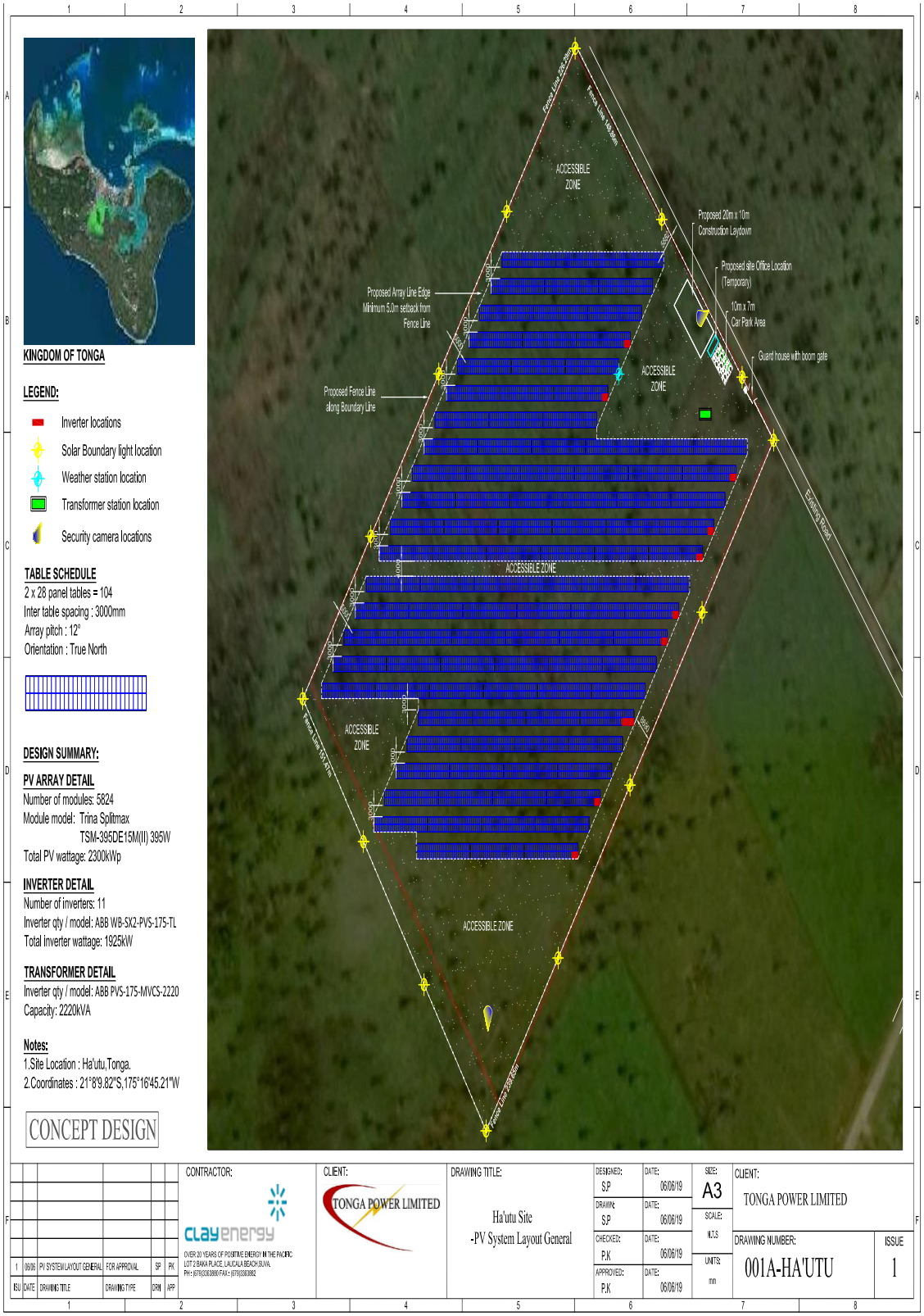


Figure 3.3bc Proposed layout of Solar plant at Ha'utu

51. **Fualu.** This site is 1.4 km east of the village of Lakepa, near Matafonua, west of Nuku'alofa, Tongatapu (Figure 3.4a). The site is 3.339 hectares (8.25 acres) with an elevation of 7m (above sea level) and longtitude and latitude of 21°08'37.29"S/175°16'02.42"W. The only suitable access is from Hihifo Road. The Fualu site is unproductive agricultural land with senile coconut trees. There are also panicum grassland, mango trees, papaya trees, and introduced grasses and weeds present. For Fualu, it will also require and upgrade of the existing 11kV electricity line along the 1km access road to the solar plant site (Figure 3.4b).

Figure 3.4a: Location of existing Transmission line for upgrade (in red) at Fualu

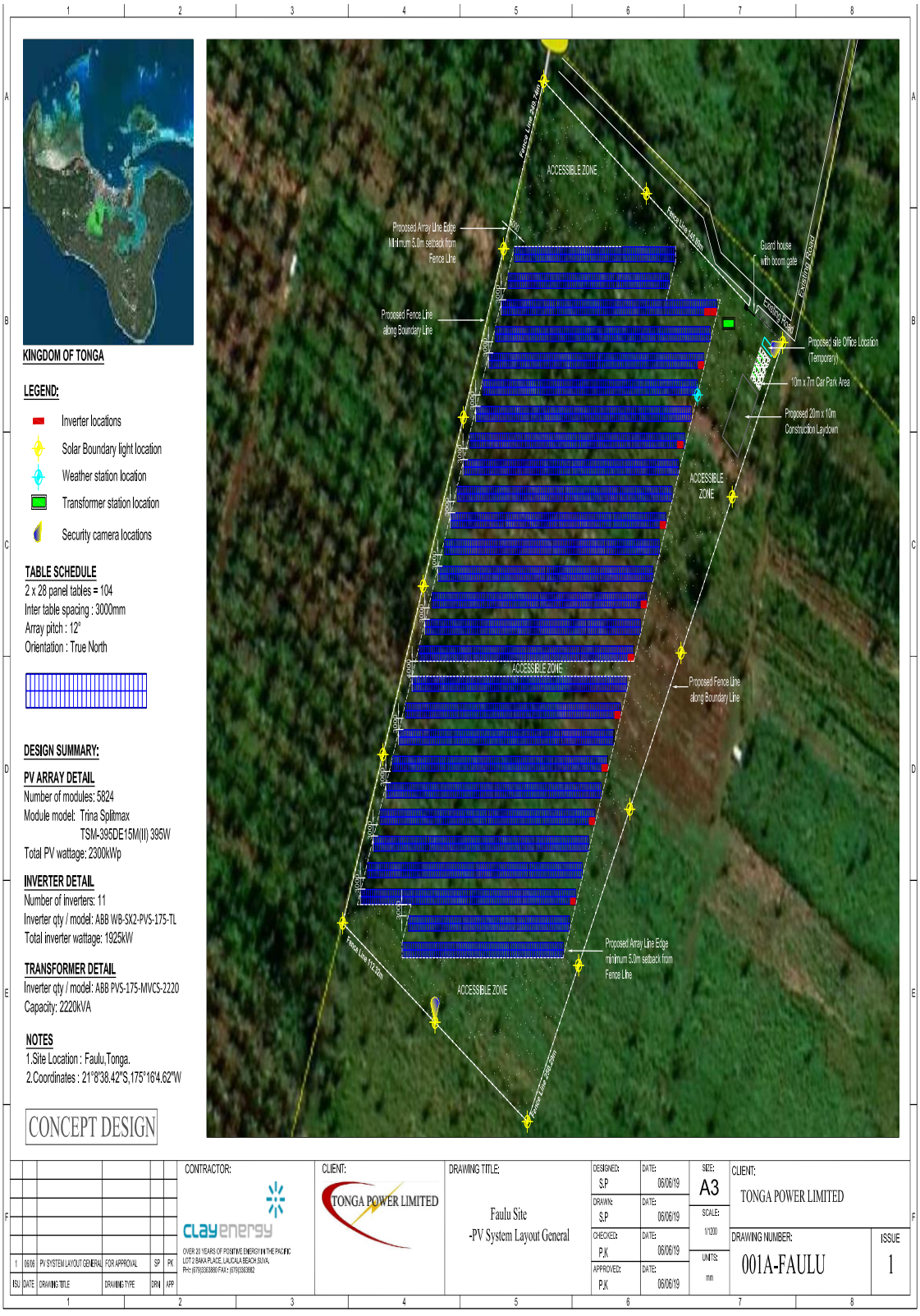


Figure 3.4b: Proposed layout of Solar plant at Fualu

52. **Liukava**. This site is located 870 m to the east of Kolovai village in the far north-west of Tongatapu (Figure 3.5a). The land parcel is approximately an 8 acre allotment and has access to town water (21°05'57/74"S/175°20'53.63"W). The access road is sealed with a telecommunications towers on a nearby hill. The highest point on the land parcel is 9.6m above sea level. The proposed layout for the solar plant is in Figure 3.5b.

Figure 3.5a: Proposed location of Solar plant and existing TL at Liukava

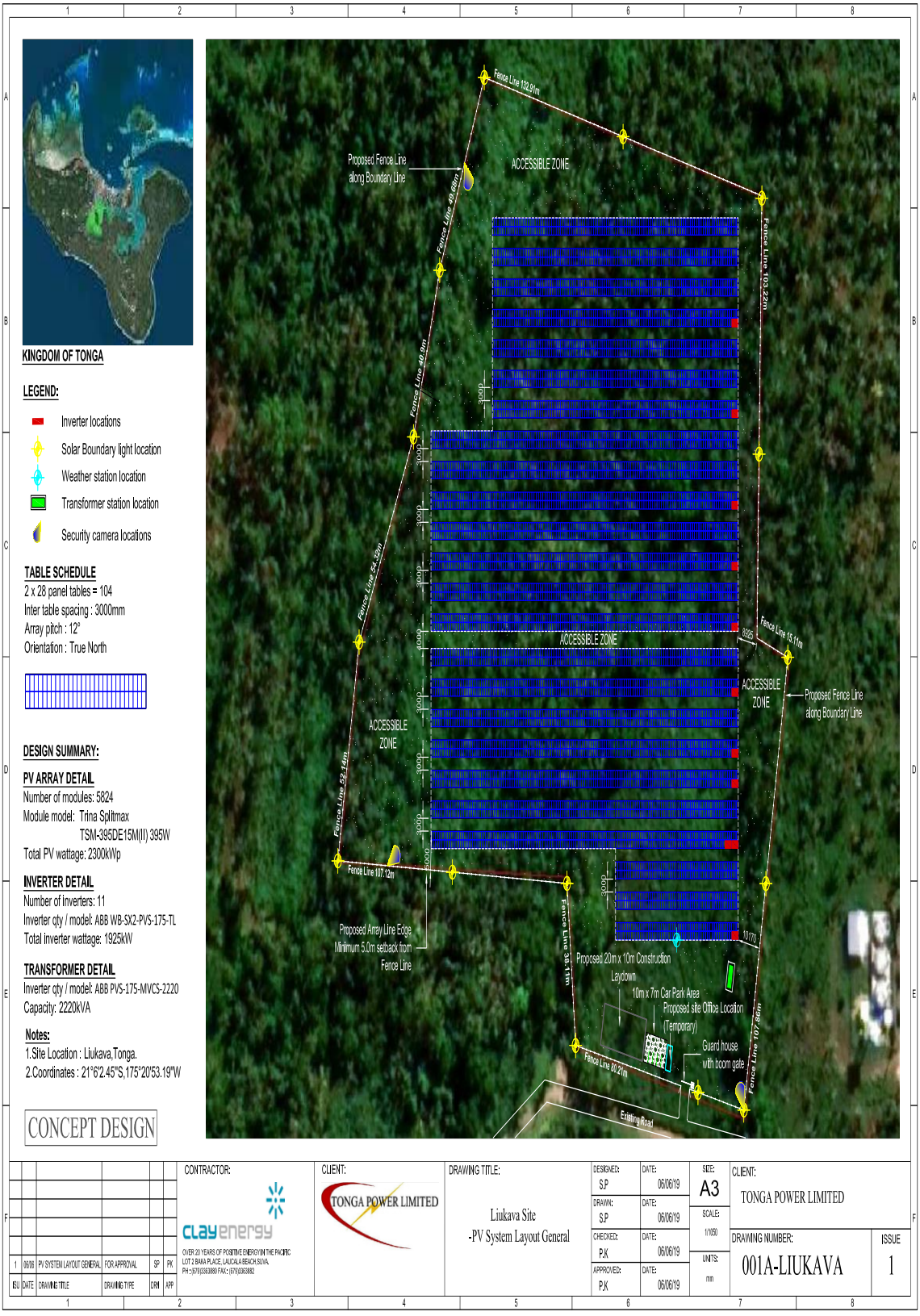


Figure 3.5b: Proposed Layout of Solar Plant at Liukava

4. Project Activities per Phase

53. The life of the Project is 25 years. It is comprised of pre-construction, construction, commissioning, operations and decommissioning phases. The activities for each phase are outlined below.

54. **Pre-construction.** Pre-construction phase of all three solar plants will involve:

- Obtaining government approvals for land, environmental, building and road permits
- Awarding of contracts
- Contractor site induction
- Training on Environment and Social Management Plan (ESMP) and contractor's Health, Safety, Environment and Quality (HSEQ)
- Vegetation clearance (grasses, weeds, trees) by local sub-contractor
- Earthworks, site leveling, compaction, and in-filling where required.

55. At Fualu, upgrading the rural road to be a main access road is also required. This will essentially involve accurate surveying of the five-metre road reserve which on its current alignment encroaches to parallel properties at certain points. Re-alignment, infilling and leveling of the road ensures that traffic no longer impedes onto these properties.. This will occur concurrently with the upgrading of electricity lines to absorb the additional load. Although the road reserve is government land, land due diligence has been undertaken for the Project and details are captured in the due diligence report.

56. At Ha'utu, existing power lines will be extended to the site. This will involve erecting power poles parallel to the road carriageway within the government's road reserve.

57. **Construction**. Construction of all three solar plants will involve:

- Vegetation clearance (grasses, weeds, trees).
- Earthworks, site leveling, compaction, and in-filling where required.
- Site drainage measures, erosion and run-off controls.
- Security fencing surrounding new facilities.
- Installation of solar PV panels, inverters, transmission lines, etc.
- Associated connection works into the grid, requiring a mixture of overhead lines and trenches for underground cabling.
- Site landscaping where required.

58. **Commissioning.** Once the construction phase is completed and all equipment is installed, the plant will be commissioned by the EPC contractor, supervised by TPL. This will be done in accordance with the technical specifications of the Tonga Grid Operating Code, SEIAPI guidelines, relevant AS/NZS and Tongan Building Code and Standards Act 2002 and the Building Code Regulations 2007.

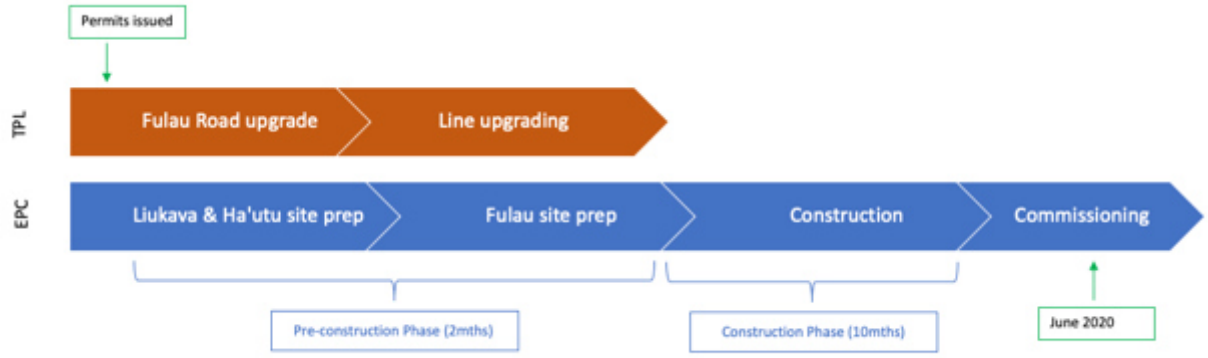
59. **Operations.** The additional solar generation facilities will work in an integrated system to supply the maximum amount of energy from renewable sources in Tongatapu. This phase will

involve a full-time technician to monitor each solar plant site on a daily basis to ensure sites are functioning at the required capacity and there are no malfunctions or equipment breakdowns. The PPA details time allowed for annual maintenance works by TPL and Sunergise. There are no environmental impacts other than visual amenity and land use change expected during the operations phase.

60. **Decommissioning**. The expected lifespan of the solar plants is 25 years. Although there is potential for the solar plants to be refurbished and upgraded at the end of life or transferred ownership to TPL, the assumption is that the solar plants will be decommissioned. Activities include dismantling of solar array panels, inverter, transformers and all equipment, and reuse, recycling or disposal of equipment.

61. **Implementation schedule.** The approximate timeframe for pre-construction and construction phases are outlined in Figure 3.6. Once environmental and building permits are issued by GOT, site preparation by civil works contractors will take place to do earthworks for approximately two months. The construction for each site will be slightly staggered, with TPL undertaking Fualu access road upgrade concurrently with site preparation for Liukava and Ha'utu. The construction phase is ten months. The deadline to commission all three solar plants agreed to in the PPA is June 2020

Figure 3.6: Implementation Timeframe



62. The following is the processing and implementation proposed for the project:

- Topographic surveys and detailed design Q2 2019
- Environmental Permit and land negotiations Q2 2019
- Award contract for civil works Q3 2019
- Construction Q3 2019-Q2 2020
- Commissioning June 2020

63. **Workforce**. Each site will require a Site Manager, six to ten certified electrical technicians, and up to 30 skilled and unskilled labourers at the peak of construction. Labour will be sourced locally as much as possible, depending on skills, experience and qualifications required.

D. DESCRIPTION OF EXISTING ENVIRONMENT

1. Physical Environment

64. Tonga is a group of small islands located in the central South Pacific. Located between 15º and 23º30º south, and 173º and 177º west; Tonga consists of four clusters of islands extending over a north-south axis: Tongatapu (347 km^2) in the south (Figure 4.1 a and b); Ha'apai (109 km^2) in the centre; Vava'u (121 km^2) in the north; and Niua (72 km^2) in the far north. Tonga's archipelago is situated at the subduction zone of the Indian-Australian and the Pacific tectonic plates and within the Ring of Fire where intense seismic activities occur.

Figure 4.1a: Location of Tongatapu within Island Group

Figure 4.1b: Tongatapu Island

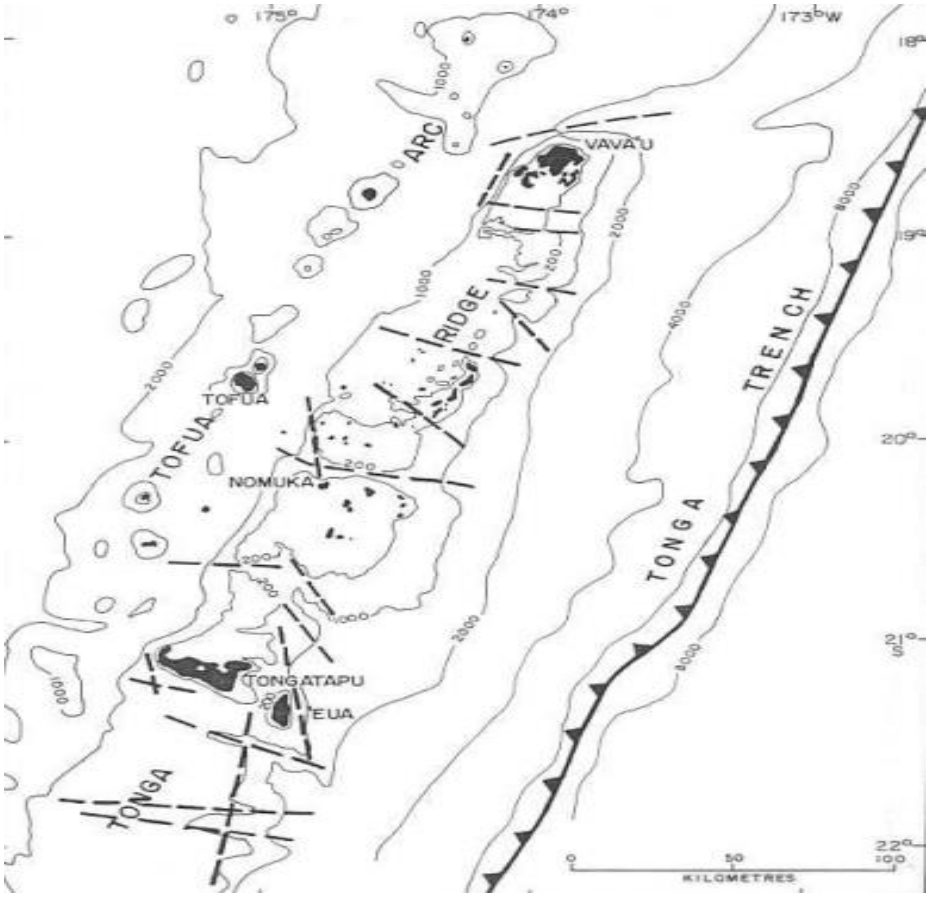
65. Tongatapu itself is a raised coral island. Uneven uplift has resulted in a pronounced tilt from south-east to north-west. The maximum elevation on the south-east side is 65 m above mean sea level. The island is generally flat, apart from some small localized slopes. The most rugged topography on the island is associated with near-vertical sea cliffs up to 30 m high on the windward coasts. In most areas, these are fringed by a narrow reef flat with a well-developed algal rim. Typically, the land surface is flat to gently undulating with occasional steep-sided hills 10-25 m high and linear, scarp-like features. The dimensions of the hills range from a few hundred meters to 1 km in diameter.

66. **Geology and soils**. The Tongan Ridge (Figure 4.2) separates the relatively shallow north-east trending Lau Basin from the very deep and narrow north-east trending Tongan Trench. Both the Tongan ridge and trench turn north-westwards at their northern end to form a convex arc facing the Samoan chain of islands to the north. Tonga is comprised of a mixture of island types; in the west, islands are generally of volcanic origin with associated steep topography and high elevations, and in the east, the islands are more typically low-lying atolls formed with uplifted coral limestone with deep-pile sediment of volcanic origin.

67. Tongatapu is made up of Pliocene and Pleistocene limestone 130-250 m thick overlying lower Pliocene and older volcaniclastics. The limestone is elevated above present sea level and reaches a maximum height of 65-70 m at the southern end of the island. This forms the high point

of a narrow and irregular ridge (0.5-1.25 km wide and mostly rising more than 20 m above sea level) that extends to the northeast and northwest along the windward coasts. The ridge encompasses a broad, low area in the central and northern part of the island that rises gently to the south. The sea bed on the island's windward coast slopes steeply to depths of 200 m but the northern part of the Tongatapu block comprises a shallow lagoon (mostly < 50m in water depth) about 600 km in area. Soils were formed from a thick deposit of volcanic ash covering most of Tongatapu and ranging in thickness from about 5 meters in the west of the island to just 1 meter in the east.[17]

Figure 4.2: Location of Central Tonga Ridge and Main Islands



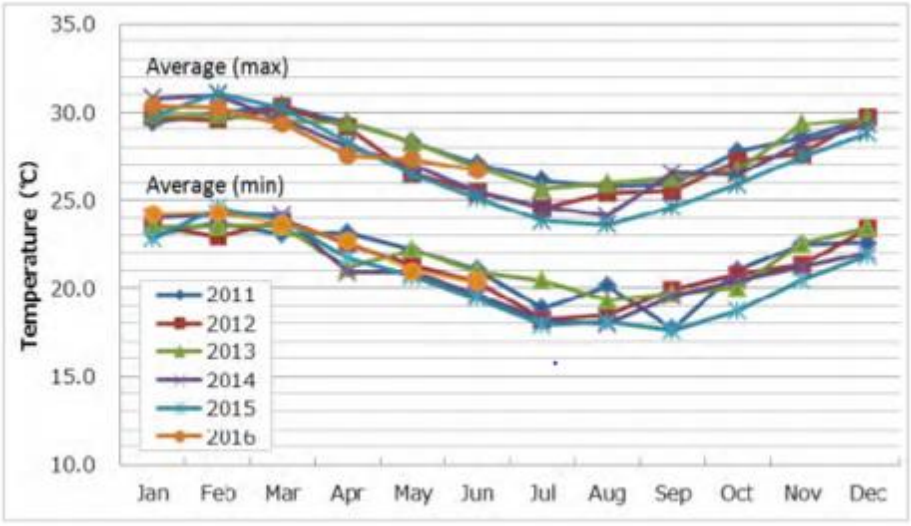
68. **Climate**. The climate of Tonga is categorized as sub-tropical. The climate is influenced by the trade winds of the South Pacific and characterized by a hot humid wet season (November to April) and a slightly cooler season (May to October). Mean annual temperatures in Tonga vary from 27^0C in the northern islands to 24^0C on Tongatapu; diurnal and seasonal variations can reach as high as 6^0C throughout the island group. The average temperature during the wet season in Tongatapu is 28^0C and during the dry season is 26^0C with the warmest months being January - March and coolest months being July-September (Figure 4.3).

[17] Furness, L. & Helu, S. 1993: The Hydrology and Water Supply of the Kingdom of Tonga. Ministry of Lands, Survey and Natural Resources. Tonga.

69. Tongatapu has an overall average rainfall of 2,032 mm per annum with the highest rainfall months occurring December – July (Figure 4.4). Monthly average rainfall is 236 mm and varies from 215 mm in January to 104 mm in June and 115 mm in July. In 2016, the period April to June received uncharacteristically high rainfall (238 mm, 276 mm and 564 mm respectively).

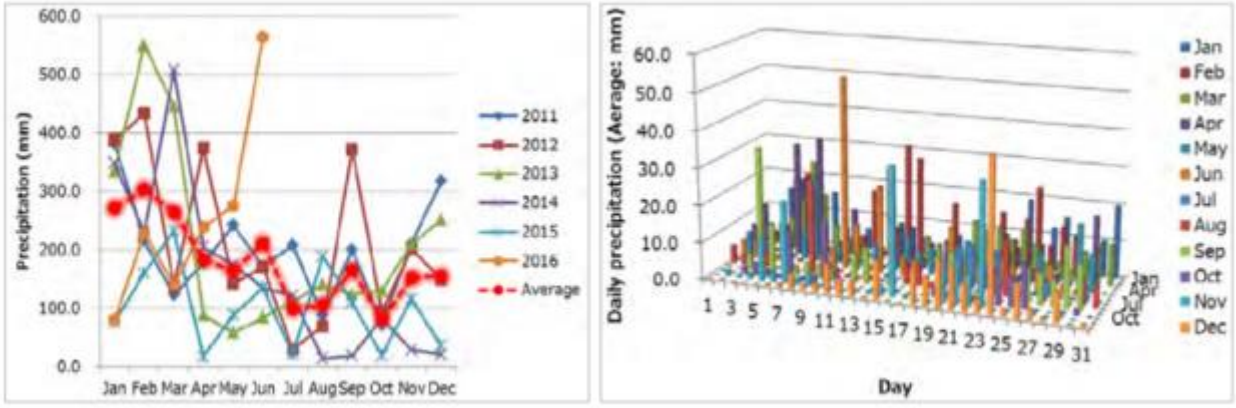
70. Tonga's prevailing winds blow from the east and the southeast and average 12 knots throughout the year. Its location in the Southwest Pacific makes Tonga vulnerable to cyclones and severe weather systems, with an average of 1.3 tropical cyclones per year. Tropical cyclones affect Tonga between November and April. In the 41-year period between 1969 and 2010, 71 tropical cyclones passed within 400 km of Nuku'alofa, an average of one to two cyclones per season. Over the period 1969–2010 cyclones occurred more frequently in El Niño years. The longest daylight hours are December-January with 13.5 hours (the rainy season), decreasing to 11 hours across months May – July.

Figure 4.3: Maximum and Minimum Average Annual Temperature 2011 – 2016



Source: Tonga Meteorological Service (2017)

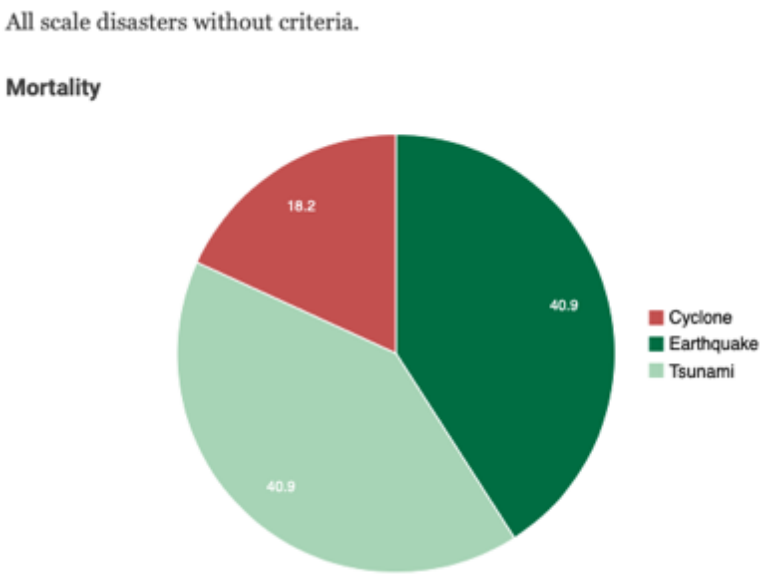
Figure 4.4: Average Annual and Daily Rainfall 2011 – 2016



Source: Tonga Meteorological Service (2017)

71. **Natural hazards.** Tonga is located at the convergence of the Australian Tectonic Plate and the Pacific Tectonic Plate, one of the most seismically active areas in the Pacific (NEMO 2012). The country lies 200km west of the Tonga Trench, a potential source of tsunami's (Figure 4.2), and with an average altitude of 2-5m, there is high vulnerability to storm surge and tsunamis. Since 1997, Tonga has experience 14 natural disasters damaging over 1,500 homes (PCRAFI 2011). In January 2014 Tropical Cyclone Ian caused extensive damage in Ha'apai and Vava'u. In 2009, an 8.3 earthquake near Niuatoputapu caused a 6-meter tsunami to hit the island. Flow heights were between 4-7m above mean sea level along the western coastline near Hihifo, Vaipoa and Falehau (NEMO 2012). Cyclones, tsunami's and earthquakes are the most probable and damaging natural hazards the country experiences, however flooding and droughts are also of concern (Figure 4.5).

Figure 4.5: Losses from Natural Hazard Events 1990-2014



Source: PreventionWeb (2018)

72. Figure 4.6-4.8 below illustrate that the sites selected are located 7 to 9.6m above sea level and are not located in low-lying areas, susceptible to storm surge or sea level rise.

73. **Climate change**. The climate projections for Tonga are based on three IPCC emissions scenarios: low (B1), medium (A1B) and high (A2), for time periods around 2030, 2055 and 2090[18].

74. Climate projections for Tonga include:[19]

- Temperatures will continue to increase - projections for all emissions scenarios indicate that the annual average air temperature and sea surface temperature will

[18] Scientists from the Pacific Climate Change Science Program (PCCSP) have evaluated 24 models from around the world and found that 18 best represent the climate of the western tropical Pacific region. These 18 models have been used to develop climate projections for Tonga.

[19] PCCSP. 2011. International Climate Change Initiative. Volume 2 - Climate Change in the Pacific: Scientific Assessment and New Research and Climate Projections Tool – Pacific Climate Futures.

increase in the future in Tonga. By 2030, under a high emissions scenario, this increase in temperature is projected to be in the range of 0.3–1.1°C;

- More very hot days - increases in average temperatures will also result in a rise in the number of hot days and warm nights and a decline in cooler weather;
- Changing rainfall patterns - projections generally suggest a decrease in dry season rainfall and an increase in wet season rainfall over the course of the 21st century. Wet season increases are consistent with the expected intensification of the South Pacific Convergence Zone. Drought projections are inconsistent across Tonga. Model projections show extreme rainfall days are likely to occur more often;
- Less frequent but more intense tropical cyclones – projections indicate there is likely to be a decrease in the number of tropical cyclones by the end of the 21st century and an increase in the average maximum wind speed of cyclones by between 2% and 11%, as well as an increase in rainfall intensity of about 20% within 100 km of the cyclone center;
- Sea level will continue to rise - sea level is expected to continue to rise and by 2030, under a high emissions scenario, the increase is projected to be in the range of 3-17 cm. The sea-level rise combined with natural year-to-year changes will increase the impact of storm surges and coastal flooding; and
- Ocean acidification will continue - under all three emissions scenarios (low, medium and high), the acidity level of sea waters in the Tonga region will continue to increase over the 21st century, with the greatest change under the high emissions scenario. The impact of increased acidification on the health of reef ecosystems is likely to be compounded by other stressors including coral bleaching, storm damage and fishing pressure.

75. **Water resources**. Fanga'utu and Fanga Kakau Lagoons are shallow water bodies in the interior of Tongatapu island and occupy an irregular depression bounded by the 5 m scarp. Tongatapu has no surface water resources, with the water supplied from groundwater, stored in a freshwater lens. This lens varies in depth from 1.0 - 2.5 m below sea level in the west, and approximately 5 - 8 m below sea level in the central and eastern part of the island. There is a well-field at Mataki'eua that extracts water to supply the capital city, Nuku'alofa.

76. **Rural water sources**. Each rural village outside Nuku'alofa has a borehole supplying water for that village. Access to the supply is managed by the local community '*komiti vai*' committees whom are in charge of reticulation lines within the village settlement area.

77. In order to maximise the capacity of the solar plants, solar PV arrays may require cleaning from time to time. Although rainfall will be adequate most of the time, the array may need additional cleaning. Liukava is the only site that has access to town water. Fulalu and Ha'utu sites are quite far from local village reticulation lines, and hence, rainwater tanks will be required on-site.

Figure 4.6: Proposed location of Solar plant at Ha'utu with elevation

Figure 4.7: Proposed location of Solar plant at Fualu with elevation and sea level rise

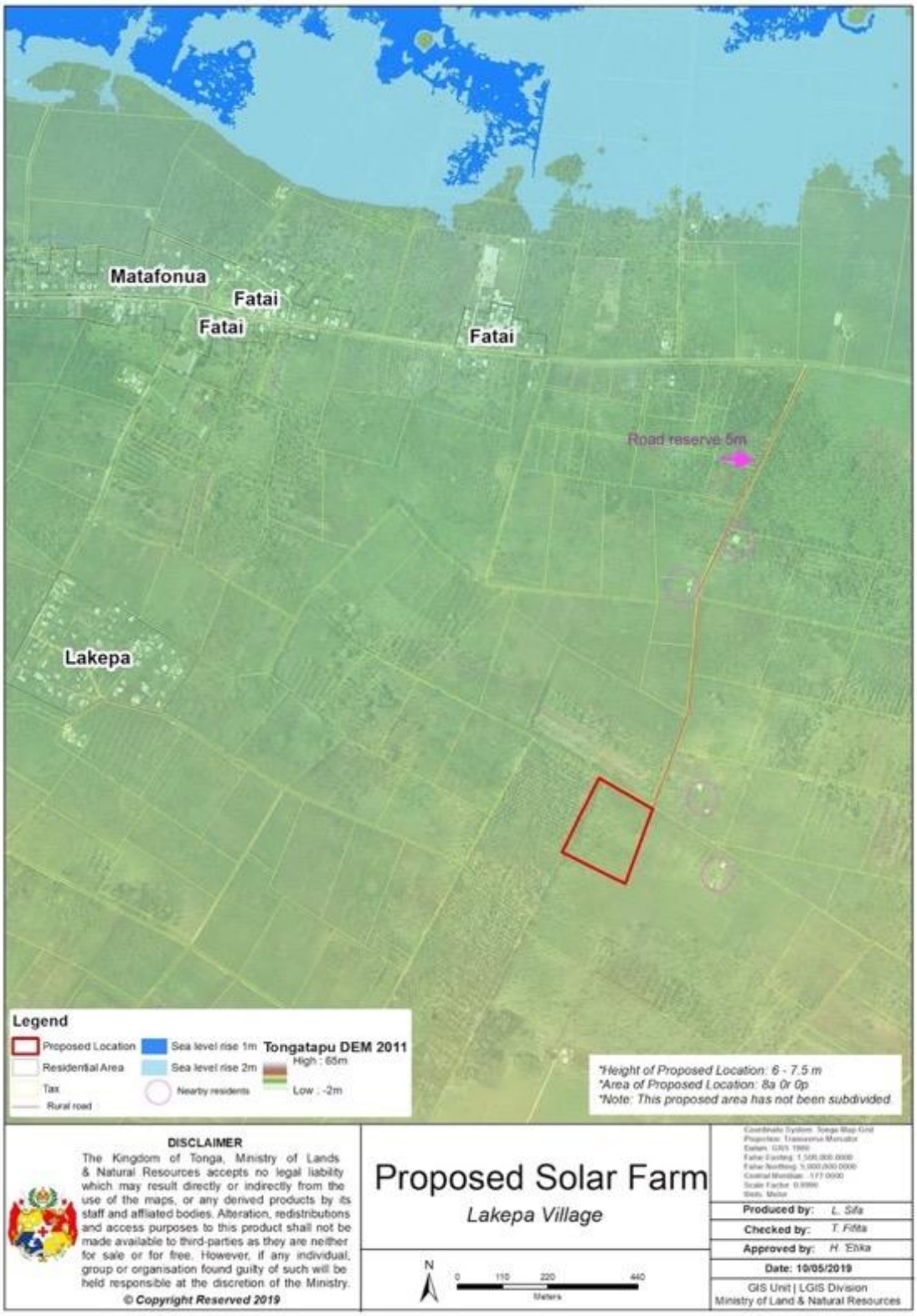
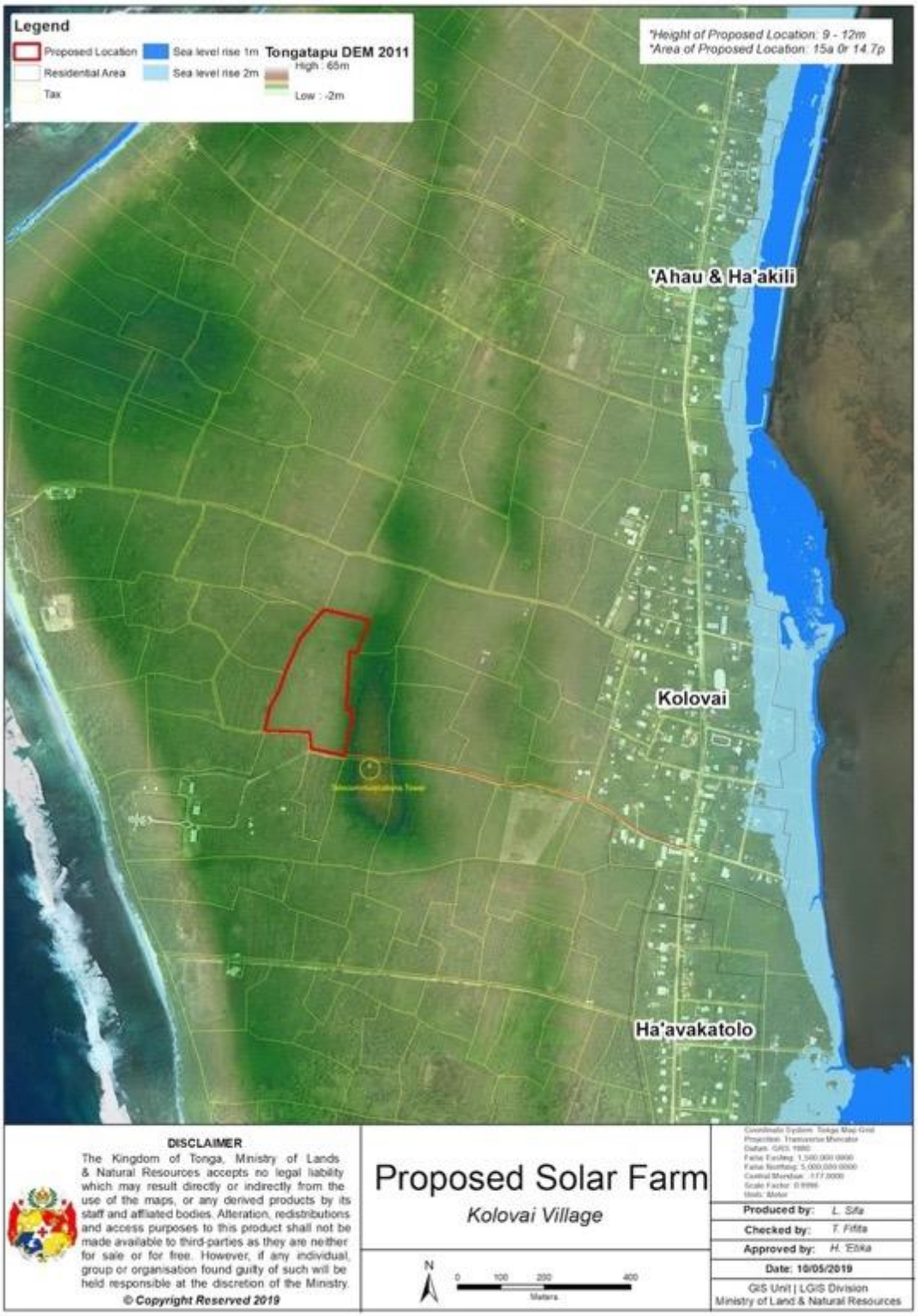


Figure 4.8: Proposed location of Solar plant at Liukava with elevation and sea level rise



2. Biological Environment

78. **Project Sites**. The sites are predominantly agricultural land, with patches of scrub and sporatic trees. None of the proposed sites contain any areas of habitat value or vegetation of conservation of significance (see Plates 4.1- 4.6 on next page). All sites have been idle for some time. The ecology at all sites is considered highly disturbed from previous agricultural use and therefore are considered to have little or no conservation value.

79. **Terrestrial flora**. Tonga's flora is limited in diversity, particularly in populated areas of Tongatapu where extensive land clearance occurred for settlement and agriculture. Twelve plant species are endemic to Tonga, however none of these are found on Tongatapu or at project sites.

80. **Terrestrial fauna**. With the loss of habitat over a long historical period, there are no specific terrestrial species in Tonga that are known to be rare or endangered. The highest diversity is found in bird species. Other fauna includes 20 species of skinks/lizards, ten species of butterfly, two species of jumping spider that are endemic to Tonga, two fruit bats including Pacific or insular flying fox (*Pteropus tonganus)*[20] and *Pteropus samoensus*, Pacific or Polynesian sheath-tailed bat (*Emballonura semicaudata*), and the common northern palm squirrel (*Funambulus pennantii*) a species of rodent in the family Sciuridae. There are no endemic fauna species on Tongatapu.

81. The most comprehensive study of birds in Tonga was undertaken in 2001, which reported a total of 74 species.[21] Of these species, 51 are resident breeding species and include 22 native land birds, 23 sea bird species, and six introduced bird species. The other 23 species were identified as migrant or vagrant (including six shore birds, 13 seabirds and three land-wetland species). Endemism is low, with one species Hengahenga or Tongan whistler (*Pachycephala jacquinoti*) being endemic to Tonga and another the Polynesian Megapode (*Megapodius pritchardii*) is known to also exist in Vanuatu. No bird conservation areas or migratory corridors have been identified at any of the project sites or the wider project area.

[20] Geographically this is the most widespread flying fox in the Pacific.

[21] Watling, D. 2003. A Guide to the Birds of Fiji and Western Polynesia; and 1982. The Birds of Fiji, Samoa and Tonga.

Plate 4.1: Fualu vegetation

Plate 4.2: Fualu access road

Plate 4.3 Ha'utu vegetation

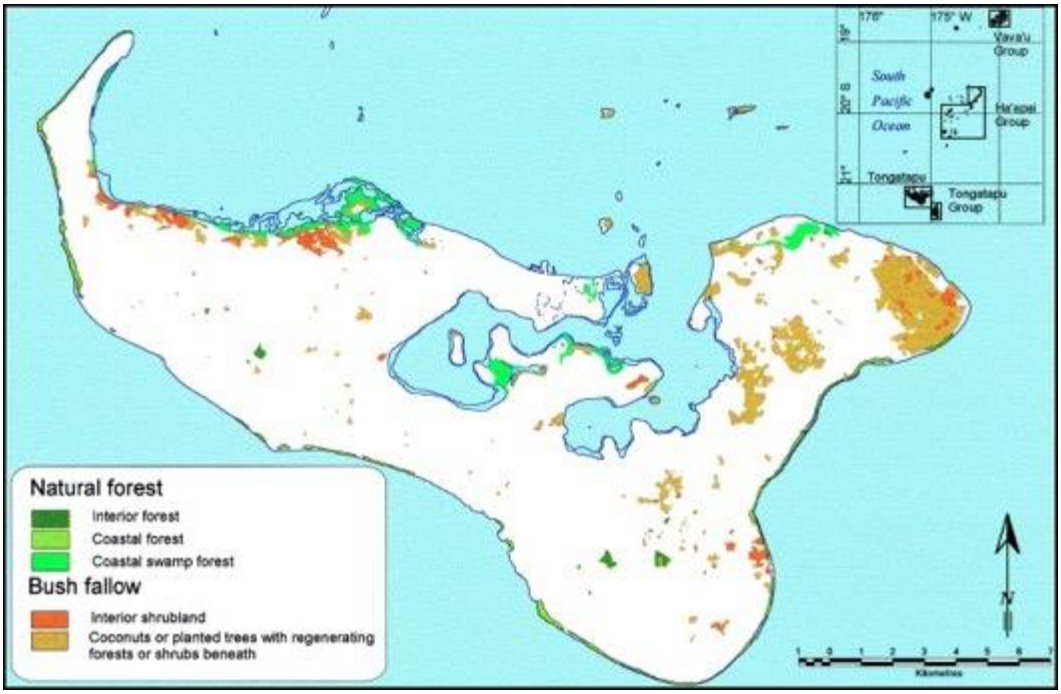
Plate 4.4 Ha'utu access road

Plate 4.5 Liukava vegetation

Plate 4.6 Liukava access road

82. **Forests.** The original vegetation on Tongatapu was lowland rainforest. However, this was extensively cleared for settlements and cultivation activities, and there is little of conservation value remaining as shown in Figure 4.9 and Plates 4.1 to 4.6 above.

Figure 4.9: Remaining Forest by Type on Tongatapu



83. **Protected areas**. Tonga has a system of terrestrial and marine protected areas with 15.9% of land and 1.5% of its marine territory designated as protected (SPREP 2018). Table 4.1 shows the existing network of protected areas in Tonga. The closest national park is 'Eua National Park on the neighboring island.

Table 4.1: Protected Areas in Tonga

Type of Protected Area	Management Authority	IUCN Category	No.	Area (ha)
Marine protected area	MEIDECC	IV - VI	8	1,003,729
National parks, managed protected area – terrestrial	MAFFF, MEIDECC	II, V, VI	6	2,100
Managed resource / special management area – community based	MAFFF	VI	6	9,256.5
Strict nature reserve / special management area – community based	MAFFF	IA	6	1,104.5

Source: MEIDECC

84. The protected area network focuses on marine reserves includes Tongatapu's Fanga'uta Lagoon Reserve, which is also a key ecological feature of the island but is increasingly threatened by the pressures of poorly planned urban development. The Va'epopua National Park was designated in 2016 on the site of the former Tukutonga rubbish dump in Popua (4.05 ha). None of the project activities will occur in proximity to this reserve.

3. Socio-economic Environment

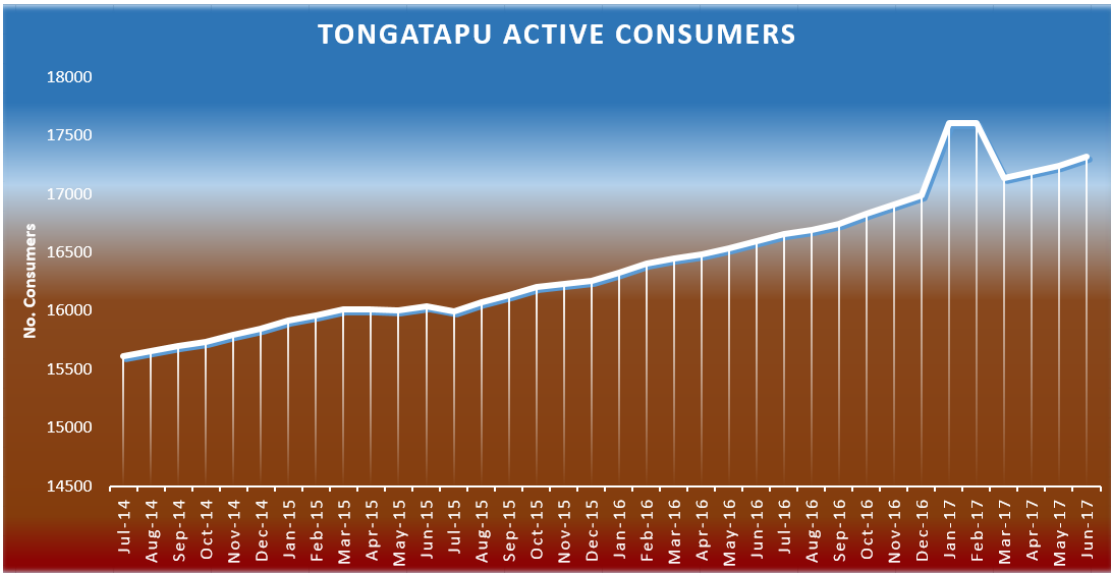
85. **Population**. The 2016 census recorded a total population of 100,745 for Tonga, distributed over 36 of its 172 islands. Compared with 103,036 recorded in the 2011 census, the population has decreased by 0.03% in five years (TSD 2017). This decrease is due to the high rates of emigration from Tonga, as the diaspora community continues to grow, particularly in New Zealand, Australia and the USA.

86. Some 74% of the national population resides on the largest island of Tongatapu. The population of Tongatapu increased by 4.7% between 2011 and 2016. In 2016, the total population on Tongatapu was 74,611 persons with 49.8% males and 50.2% females. Over the last three decades, population density in Nuku'alofa has increased from 184 persons/km^2 to 245.1 persons/km^2, almost double the national average of 150.5 persons/km^2. Figure 4.10 shows Tongatapu island's population density divided into administrative wards.

Figure 4.10: Tongatapu Population Density

87. **Electricity access**. Despite the national population declining slightly, the population density in Tongatapu has increased overall. This is reflected in the increasing number of TPL customers, as well as electricity grid expansion to rural areas (Figure 4.11). In 2017, the total number of TPL customer accounts increased by 9.2% to 22,929 people.

Figure 4.11 TPL number of customers, 2014-2017



Source: Entura 2018.

88. Table 4.2 provides the population data for villages closest to project sites and villages along key transport routes. The smallest population is in Ha'utu with 39 households. There are approximately 635 households living in the project's area of influence. Overall, three-quarters of the population are under the age of 40.

Table 4.2: Population of Villages in Proximity to Project Sites

Population centre	District	Population (2016 Census)	Proportion 39yrs & under
Ha'utu - in proximity to Ha'utu site	Kolovai	268 persons / 39 households	77.2%
Fahefa - village in proximity to Ha'utu site	Kolovai	415 persons / 72 households	70.6%
Te'ekiu – on main road to access Ha'utu site	Kolovai	570 persons / 104 households	72.6%
Matahau – on main road to access Ha'utu site	Nukunuku	581 persons / 105 households	78.8%
Matafonua - village in proximity to Fualu site	Nukunuku	233 persons / 45 households	72.1%
Sia'atoutai - on main road to access Fualu site	Kolomotu'a	460 persons / 98 households	69.8%
Lakepa – village in proximity to Fualu site	Nukunuku	313 persons / 54 households	76.4%
Kolovai - village in proximity to Liukava site	Kolovai	618 persons / 118 households	68%
	TOTAL	2,901 persons	635 households

Source: Tonga Statistics Department 2017.

89. **Poverty**. The official poverty line in Tonga was established at $2,586 per person per year in 2009 and approximately 22-23% of population were identified as living below the poverty line.[22] Tonga did not meet its Millennium Development Goals targets for poverty. Although there is no

[22] Asian Development Bank - ERCD. 2016. Basic 2016 Statistics. Manila, Philippines (p. 2)

absolute poverty in Tonga, due in part to a high level of remittances and subsistence farming and fishing, there is a high level of income disparity. Notably, per capita revenue on Tongatapu is approximately 15% above the national GDP per capita, while on outer islands it is approximately 40% below the national average.[23] Further, households headed by women account for 24.6% of those falling below the basic needs poverty line and 29.5% of children living in households headed by women fall below the basic needs poverty line.[24]

90. Statistics for infant mortality rate also show that for every 1,000 babies born in Tonga, 14 die before their first birthday. While most, if not all Tongans have access to an improved drinking water source, the high cost of living affects people who are having difficulty in meeting basic needs. In addition are the lack of access to basic infrastructure, services and utilities and the lack of employment or income generating opportunities.

91. **Economy**. As a small island economy and lower middle-income country, Tonga is geographically isolated and has limited human resources. Its economy is dependent on imports. Tonga has mostly experienced low and volatile growth, and its economy is dominated by the service sector and by the public sector. High levels of remittances sent from relatives working abroad are necessary to boost the economy and household revenue. Tonga's economy is vulnerable, with limited local opportunities, a steady outflow of skilled persons moving overseas for opportunities, and a dependence (70%) on rural livelihoods of agriculture and fisheries, where access to markets can be limited. Subsistence agriculture plays an important role for many families, contributing to food production for the family, as well as additional income. Production focuses on a range of traditional root crops such as yams, taro, sweet potato and cassava.

92. Agriculture, industry and services are the main contributors to Tonga's GDP. When the GDP data is aggregated to the sector level, the services sector is the largest contributor to the GDP. This indicates a change in the economy, with gradual diversification from agriculture to services. It is expected that this sector will continue to strengthen, particularly with opportunities in the tourism market. GDP data for 2014 – 2017 period is provided in Table 4.3.

Table 4.3: Tonga GDP Data 2014 – 2017

Year	GDP growth (%)	GDP per capita growth (%)	Inflation (%)
2014	2.1	2.0	2.5
2015	3.7	3.7	-1.0
2016	3.1	3.2	2.0
2017	2.8	2.7	2.5

Source: ADB Development Outlook 2017

93. Tonga's economy is vulnerable to inflation and economic shocks. Using the Economic Vulnerability Index (EVI)[25], Tonga is categorized as 'extremely vulnerable'.

94. **Cultural Heritage**. Tongatapu has two sites on the tentative list for UNESCO World Heritage. These are (i) Ha'amonga 'a Mau'i Historic Park at Heketã near Niutoua and (ii) the Ancient Royal Tombs at Lapaha in Mu'a village, which are not in proximity to the solar plant sites

[23] Government of Tonga. 2015. Millennium Development Goals Final Report. Nuku'alofa

[24] Government of Tonga. 2015. Tonga Strategic Development Framework 2015–2025. Nuku'alofa (p.30)

[25] The EVI is calculated using 50 indicators across economic, environmental and social aspects (see Kaly et al 2004).

or key transport corridors (UNESCO 2007 and Clarke et al 2012). There are also unidentified Lapita pottery sites on the tentative list.

E. ANTICIPATED ENVIRONMENTAL AND SOCIAL IMPACTS

95. The assessment of impacts considers the nature, type and duration of project activities on the environment and nearby communities in the Project's area of influence. It covers the three solar plants and associated activities.

1. Design standards

96. **Solar PV**. The design for grid-connected solar plants follow specific industry standards and guidelines and are tailored to site conditions. These include the Sustainable Energy Industry of the Pacific Islands (SEIPAI) Design and Installation Guidelines for Grid-connected Systems[26], AS/NZS5033:2014[27] Installation and safety requirements for photovoltaic (PV) arrays, AS/NZS4777.2:2015[28] Grid-connection of energy systems via invertors (Invertor requirements) which align to Australian legislation[29], amongst others. In addition, Tongan Building Code and Standards Act 2002, the Tongan Building Code Regulations 2007 will also be applied to project design.

97. **Site selection**. The climate risk profile for Tonga indicates sea level rise, extreme wind events, more intense cyclones and increased air and water temperatures. The solar plants and rural road upgrade are located away from the coastal zone and will not be impacted by sea level rise (Figure 4.6 to 4.8).

98. **Vulnerability to natural hazards.** Cyclone occurrence is a significant risk[30]. The solar PV array are designed according to AS-NZS1170.2 Wind actions/structural design[31] and 'Region D' design wind speeds for Asia-Pacific (80m/1sec). There is also risk of earthquake owing to Tonga's proximity to tectonic plates in the 'Ring of Fire'. The solar PV array will be designed in accordance with AS1170.4:2007 Part 4 Earthquake actions[32] or NSZ1170.5 Structural design actions Part 5 Earthquake actions. To mitigate the effects of any potential site flooding, electrical equipment (including PV modules and inverters) is mounted at 700 mm above ground level, which will be confirmed after the geotechnical study is completed. Equipment will be positioned taking into account site drainage, flood risk and water flows.

99. **Technology**. Solar PVs and materials will be sourced from China and Germany and contain rare metals (silver), as well as lead and chromium. The solar plants will *not* have any nickel cadmium (Ni-Cad) and lead acid batteries (LAB) in use.

100. **Power line upgrade.** Power lines will be upgraded in accordance with the Tongan Grid Operational Code, NZECP 34:2001 New Zealand Electrical Code of Practice for Safe Electrical Distances also adopted by the ongoing ADB funded Cyclone Ian (2014) and Cyclone Gita (2018) grid rehabilitation projects implemented by TPL.

[26] Available at https://www.ppa.org.fj/publications/#1492545323963-45e62993-dfcb
[27] Amended in 2018 and available at https://infostore.saiglobal.com/en-au/Standards/AS-NZS-5033-2014-Amdt-2-2018-111520_SAIG_AS_AS_281633/
[28] Available at https://infostore.saiglobal.com/en-au/Standards/AS-NZS-4777-2-2015-101208_SAIG_AS_AS_212627/
[29] Renewable Energy (Electricity) Act 2000 Australia Government
[30] Aurecon (2015): *Phase 2 Feasibility Report.*
[31] Available at https://www.standards.org.au/standards-catalogue/others/sa-slash-snz/as-slash-nzs--1170-dot-2-2002
[32] Available at https://www.saiglobal.com/PDFTemp/Previews/OSH/AS/AS1000/1100/1170.4-2007.pdf

101. **Road upgrade**. Road will be re-aligned to the existing ROW and upgrade will be consistent with basic rural road standards of MOI entailing in-fill, compaction and leveling of quarry materials from licensed quarries.

2. 6MW Solar Plants (The Project)

a. Pre-construction and Construction Impacts

102. **Importation of materials**. Solar PVs and materials will be sourced from China and Germany and require importation to Tonga. Imported plant, equipment and materials and the vessels that import them will be subject to clearance procedures under the Quarantine Act and Quarantine Regulations and may require issue of phytosanitary certificates from Quarantine and Quality Management Division of the Ministry of Agriculture and Food, Forests and Fisheries (MAFFF).

103. **Sourcing of materials**. Materials will be required for site levelling. Registered quarries that can supply the aggregate required in Tongatapu include Malapo Quarry (Malapo), Royco Quarry (Fualu), 'Ahononou Quarry (Fua'amotu).

104. **Transport to site.** Since the solar plant materials will be imported, heavy vehicles will be required to transport all materials from the port in Nuku'alofa to each site. It is estimated that each plant will expected a delivery of 25 x 40ft containers plus 4 x 20ft containers to site, plus additional truck movement related to earthworks and delivery of miscellaneous items over a six-month period. During construction, additional loads of materials haulage (particularly at Fualu site) will also be required. Hihifo Road will be the main corridor which have an additional 90 heavy vehicle movements as a direct result of the Project.

105. **Land use change**. Approximately 24.7 acres of rural land for the solar PV over three parcels will be leased for 30 years. A lease agreement will be signed by TPL, who will sub-lease the site to the IPP, Sunergise. It is likely that 90% of the land parcel will be converted from rural use to solar plant for a minimum of 25 years. A due diligence report has been prepared for the Project, which provides due diligence on land selection and leasing processes, including informal land use.

106. **Site preparation.** Prior to land clearance works, all boundaries on each site will be demarcated by Government surveyors in accordance with the relevant Survey Plan (known as the Boundary Redefinition Survey). This will clearly mark the area to be cleared, trees to be removed and trees to be retained. Some trees on adjacent allotments may need to be trimmed or cut down so they do not cast shadows over the solar plant. MAFFF (Forestry Division) evaluates the valuation of the affected trees and rightful landowner(s) will be notified and compensated as per Tongan legislation and regulations. A due diligence report has been prepared for the Project, which provides details on any affected trees or structures and how they will be managed.

107. **Air quality**. Land clearing and earthworks are likely to generate noise and dust from heavy machinery to remove vegetation, establish laydown areas, install fencing, footing excavation and site levelling. The movement of fill and materials on-site and transportation of materials, plant equipment and workers to and from sites will also generate dust and noise (especially along unsealed roads). Earthworks may also involve sand/aggregate quarrying from registered quarries on Tongatapu. As a result, air quality in these areas is likely to be affected for the duration of pre-construction and construction phases. Impacts will be sporadic, temporary, subject to weather conditions, restricted to the construction phase and will be managed as per COEP 5.

108. **Noise**. Solar arrays frames will be a ground-mounted, pile-driven system with concrete foundations. The ramming machine will generate noise during daylight hours over a period of three

weeks at each site (construction phase only). All three sites are off main roads and a reasonable distance away from populated areas. At Liukava, the closest residence is 260m away. At Ha'utu the closest residence is 700m away. There are five residents in proximity to the Fualu solar plant, two of whom are 145m and 200m away from the site (the others are further away). These residents will face temporary disruption with up to 55dBA at their location during daytime construction phase (see socioeconomic impacts below).

109. **Erosion and stormwater run-off**. Soil erosion may be caused by exposure of soil surfaces to rain and wind during site clearing, earth moving and excavation activities. Sites at Liukava and Ha'utu range from 9-10m above sea level, and Fualu is 7m above sea level, away from water bodies. Owing to the relatively flat landscape and distance from water bodies and tributaries, erosion and stormwater runoff impacts during construction will be minimal, unless in the instance of heavy rainfall. Being adjacent to a hill, the Liukava site will require earthworks to level it in order to avoid erosion during construction and the operations phase. Drainage, erosion and stormwater run-off will be managed as per the requirements of COEP 5.

110. **Waste and waste management**. Construction activities will generate waste that will need to be disposed of by the contractor and sub-contractors. There are three waste collection companies in Tongatapu. Bingo Ltd and Waste Management Ltd are privately owned and Waste Authority Limited (WAL) is a state-owned enterprise that manages the Tapuhia landfill site. Waste likely to be generated during the construction phase includes packaging waste such as cardboard, styrofoam, plastic film, offcuts of cables with copper and PVC insulation, concrete timber form work that cannot be reused. Waste will be managed as per the requirements of COEP 11 and standard industry practice.

111. **Storage, use and disposal of hazardous substances**. Use of hazardous substances during construction, such as oils, lubricants and petrochemicals can cause significant impacts if uncontrolled or if waste is not disposed of correctly. Hazardous substances will be managed as per the requirements of COEP 12 and standard industry practice.

112. **Water resources**. There are no water bodies in proximity to project sites that would be impacted by sedimentation during construction phase. There is potential for spillage of hazardous substances to cause groundwater contamination and for this reason COEP 9 and 12 applies.

113. **Ecology, flora and fauna**. The three solar plants will be sited on predominantly under-utilized agricultural land, partially cleared with scattered palm trees, coconut trees, and small remnants of bush. The most heavily vegetated site is Liukava with secondary vegetation. Land clearance and tree removal at the solar sites are not expected to impact endemic and threatened flora and fauna due to the highly-disturbed nature of the sites. Trees on-site do not have significant conservation or habitat value.

114. **Natural habitats**. There are no terrestrial protected species or protected areas within or adjacent to the project areas of influence. Overall, terrestrial habitat and resource impacts will be minor.

115. **Socio-economic impacts**. Communities along the transport corridor and nearby residents will be affected by noise and dust from additional vehicles and civil works, and increased traffic due to heavy vehicles bringing equipment to site and earthworks. During the pre-construction and construction phases, there is potential for health and safety risks for residents with additional traffic, especially for pedestrians in congested areas (such as Fualu). COEP 6, 7 and 13 will apply. COEP 13 Noise and NZS 6803:1999 Acoustics- Construction Noise stipulate that 75dBA at source and IFC EHS guidelines stipulate 55dBA is the nominal daytime construction noise level.

116. At the peak of construction, a workforce of approximately 30 people will be required for a period of three to four months at each site. This is less than 2.5% of the District population and as such, is not considered to be a significant influx. There is no worker accommodation as the majority of the worker's (>90%) will be sourced locally. Approximately seven qualified electrical engineers will be involved in construction to develop and commission the solar plants safely in accordance with the design. The contractor will provide work opportunities for skilled and unskilled locals and select a portion of labor from nearby areas wherever this is feasible.

117. **Health and safety.** There is potential for worker health and safety issues during pre-construction and construction phases, such as injury, electric shock etc. These will be managed by Sunergise's Health, Safety, Environment and Quality (HSEQ) system in accordance with World Bank Group EHS Guidelines.

118. **Cultural heritage**. Though unlikely given the distance inland, there is potential for Lapita pottery to be unearthed during the pre-construction and construction phases of the Project. For this reason, COEP 4 will apply.

b. Operational Impacts

119. Unlike diesel generation, solar power plants have negligible environmental impacts during operation. The invertor and transformer will be housed in a containerized module on-site that will mitigate any noise.

120. **Dust and flora**. Grass will be laid between solar arrays to minimize dust generation and keep solar PVs clean. Mowing and weeding will undertaken to control the growth of plants that may cause shading on the solar arrays. Pesticides may be used as a last resort to control the growth of weeds and any vegetation which may compromise solar PVs operating at optimal capacity. In this context, the list of pesticides subject to phaseout or bans will be avoided.[33]

121. **Flora and fauna**. There is potential for birds to use solar arrays as nesting grounds or there to be habitat loss due to vegetation clearance (Harrison et al 2016). None of the sites will create bird or bat habitat impacts or barrier effects given already highly modified environments. There will be limited, if any, avifauna impacts are anticipated due to operation of solar PV sites.

122. **Security and visual amenity**. There will be CCT cameras with remote monitoring and motion sensors with perimeter solar lighting and grid powered lighting on the transformer stations and access ways and night lighting for security during the operation phase. Any night lighting will be directed away from nearby residents to mitigate disturbance and light pollution impacts. On visual impact from the solar panel arrays, including the possibility of some glare from the panels, even though they are designed to absorb the incident solar radiation. The arrays will be less than 3 m high at their peak and will be on a fixed 20-degree angle facing due north. The proposed sites for the arrays are kept away from the residential areas for this purpose, therefore impacts from glare and the visual impact from the proposed power plants will be insignificant.

123. **Hazardous materials and waste.** Use of hazardous substances during construction, such as oils, lubricants and petrochemicals can cause significant impacts if uncontrolled or if waste is not disposed of correctly. Secure storage for hazardous substances will be necessary to avoid

[33] http://www.pic.int.

improper handling or accidental spillage. Hazardous substances will be managed as per the requirements of COEP 12 and standard industry practice.

124. The solar plants will not have any nickel cadmium (Ni-Cad) and lead acid batteries (LAB) in use but will use lithium ion batteries which have an approximate lifespan of ten years. This means that batteries will be disposed of every decade.

125. **Socio-economic benefits**. Positive short-term socio-economic impacts of the project include:

- Improved access to, and reliability of, power supply;
- Reduction in national budget expenditure on fuel imports;
- Increased energy security for Tonga.

126. Positive long-term socio-economic impacts of the project include:

- More affordable energy tariff for residents of Tongatapu;
- Reduction in reliance on kerosene for lighting and fire wood for cooking, and associated fire hazard risks;
- Growth of the renewable energy sector in Tonga;
- Positive international reputation of Tonga given the level of investment in renewables;
- Improved resilience to natural disaster events given reduced dependency on importation of diesel.

127. **Water resources**. Rainfall is expected to be adequate for the cleaning of solar PV arrays most of the time. Liukava is the only site with access to town water, and Ha'utu and Fualu will require rainwater tanks on-site for cleaning during the dry season or drought periods. Sunergise with consult with rural *komiti vai* committee regarding water management in Liukava. Impacts on water resources are expected to be short-term and seasonal, and these are readily mitigated through use of rainwater tanks and water conservation measures.

c. Decommissioning Impacts

128. **Site rehabilitation.** Decommissioning will involve the removal of solar PV arrays, invertors, containerized transformers, and disconnection from the electricity grid. This will generate noise, dust and traffic impacts similar to the construction phase, but for a shorter period (2-3 months). Once equipment has been removed, the site will be revegetated to avoid erosion or proliferation of weed growth.

129. **Waste and recycling**. The Trina Solar PVs will be at the end of their life after 25 years. Solar PVs contain chemicals and compound toxic to human health and the environment such as lead, therefore are not suitable for disposal in landfill on Tongatapu. The Trina Solar PVs will be sent to the closest 'PV Cycle' facility for recycling. At present, this facility is in Europe, but it is likely there will be a facility in the Asia-Pacific region in 25 years' time.

130. Inverters, transformers and other equipment may be able to be reused but are likely to be superseded by new technologies. With the significant surge in production and use of these technologies on a global scale, it is assumed that the recyclability of materials (solar PV panels, lead acid batteries, lithium ion batteries) will improve in the coming two decades. It is likely the

materials will be exported to certified recyclers in New Zealand or Australia. Currently, lead acid batteries can be recycled with local recycling company, GIO Recycling, who package and export batteries off-shore. COEP 15 includes a procedure for decommissioning faulty batteries. A decommission plan will identify how and where batteries, PV modules, inverters and other electronics will be disposed of, or recycled, prior to decommissioning.

3. Associated facilities

a. Pre construction and Construction Impacts

131. **Sourcing of materials**. Materials will be required for road upgrade. Registered quarries that can supply the aggregate required in Tongatapu include Malapo Quarry (Malapo), Royco Quarry (Fualu), 'Ahononou Quarry (Fua'amotu).

132. **Transport to site.** Heavy vehicles will be used to deliver aggregate to site and conduct earthworks over a three-month period. Hihifo Road will be the main corridor which will have an increased number of heavy vehicle movements as a direct result of the Project. Due to the phased nature of construction of the 3 sites, it is estimated that transportation of construction materials and project equipment will require on average about 10 truck trips per day during the working period of 8 hours. It will mean there is more traffic, particularly heavy traffic, on the Hihifo road than usual. Traffic level however will return to normal after the construction of the solar plants. Considering the nature and scope of the construction works, it is certain that only minor and manageable social and environmental disturbances will be created during this period, such as dust, noise, incremental traffic loads on the roads, and emissions created by trucks and heavy construction equipment.

133. **Site preparation**. Prior to civil works, road reserve boundaries will be demarcated by Government surveyors in accordance with the relevant Survey Plan (known as the Boundary Redefinition Survey). This will clearly mark the center line or crown of the road from upon which re-alignment of the road sides will be based. At the moment the road encroaches onto adjoining properties. A due diligence report has been prepared for the Project, which provides details for any un-anticipated affected trees or structures and how these will be managed under the country safeguard system.

134. **Noise**. The movement of fill and materials on-site and transportation of materials, plant equipment and workers to and from sites will generate dust and noise (especially along unsealed roads). Earthworks may also involve sand/aggregate quarrying from registered quarries on Tongatapu. As a result, air quality in these areas is likely to be affected for the duration of pre-construction and construction phases. There are four households in proximity to the Fualu solar plant whom will face disruption during construction of the road upgrade, however they will also be beneficiaries of the new road. Impacts will be sporadic, temporary, subject to weather conditions, restricted to the construction phase and will be managed as per COEP 5.

135. **Air quality**. The movement of fill and materials on-site to the existing road at Fualu, earthworks to level the road and removal of vegetation will generate dust and noise. Earthworks will also involve sand/aggregate quarrying from registered quarries on Tongatapu. As a result, air quality is likely to be affected for the duration of pre-construction and construction phases. Impacts will be sporadic, temporary, subject to weather conditions, restricted to the construction phase and will be managed as per COEP 5.

136. **Hazardous materials and waste.** Use of hazardous substances during construction, such as oils, lubricants and petrochemicals can cause significant impacts if uncontrolled or if waste is not disposed of correctly. Secure storage for hazardous substances will be necessary to avoid improper handling or accidental spillage. Hazardous substances will be managed as per the requirements of COEP 12 and standard industry practice.

137. **Water resources**. There are no water bodies in proximity that would be impacted by sedimentation during construction phase.

138. **Ecology, flora and fauna**. The road upgrade at Fualu and transmission line upgrades will occur within the road reserves. Tree removal at this site does not constitute an ecological impact as this is an existing road corridor. Trees may be trimmed or removed to reinstate the road reserve, however these do not have significant conservation or habitat value.

139. **Socio-economic impacts**. Communities along the transport corridor and nearby residents will be affected by noise and dust from additional vehicles and civil works, and increased traffic due to heavy vehicles bringing equipment to site and earthworks. During the pre-construction and construction phases, there is potential for health and safety risks for residents with additional traffic, especially for pedestrians in congested areas (such as Fualu). COEP 6, 7 and 13 will apply. COEP 13 Noise stipulates 75dBA is the nominal daytime construction noise level.

b. Operation Impacts

140. There will be minor, short-term disruptions for GOT to conduct the required maintenance work on the transmission line and rural road. No other operational impacts are expected.

4. Cumulative Impacts

141. There are no known projects in proximity to the Project sites selected that would cause cumulative environmental or social impacts.

142. In Tongatapu, there are a number of renewable energy projects that are either in progress or planning stages managed by TPL as outlined in Table 6.1. By 2021, the total generation capacity from solar energy will be 17.65 MW[34]. The cumulative environmental or social impacts of these projects will be minimal.

143.

Table 6.1: Proposed Renewable Energy Projects in Tongatapu

	Project Name	Location	Capacity	Status	Sponsor
1	Stabilisation BESS	Popua Power Station	5.1MW/2.5MWh	Planning	TREP, ADB
2	Load shifting BESS	Matatoa	5MW/17.4MWh	Planning	TREP, ADB
3	This Project	Tongatapu	6MW PPA	Planning	PPA
4	Wind Farm	Niutoua	3.8MW	Planning	PPA
5	Wind Farm	Lapaha	2.25MW	Planning	Chinese Government

144. **Energy security and air quality.** Investment in renewable energy in Tonga will mean that: (i) additional energy demand is likely to be sourced from clean energy sources rather than diesel, and (ii) the portion of energy sourced from diesel generation will plateau once renewable energy

[34] Excludes distributed generation (TPL 2019).

projects are commissioned. This is likely to have a positive flow-on effect to the air quality on Tongatapu as diesel consumption reduces.

145. **Land use change**. The Project will result in the conversion of rural, agricultural land to solar plants. A total of 24.7 acres will be required for this Project and will result in an estimated saving of 47.5 million liters of diesel fuel and a reduction in CO_2 emissions of 134,425 ton over the Project's twenty-five-year lifespan.

F. ANALYSIS OF ALTERNATIVES

146. GOT and ADB undertook a feasibility study for renewable energy generation in Tonga in 2018 (Entura 2018). It considered solar PV, wind and BESS as key renewable energy sources for islands across the Tongan archipelago. Additionally, the use of coconut husks and shells to produce energy was considered for Tongatapu and 'Eua but were excluded due to high production costs. The findings were that Tonga's wind resource (average 7.4 m/s wind speed at hub height) and solar resource (average global horizontal irradiance of 5.0 kWh/m^2/day) were suitable for the technologies funded under TREP.

147. **Solar energy**. Solar resource[35] is critical to the performance of the proposed solar PV plants. Solar PV cells use incident irradiance within a particular wavelength spectrum to create and maintain a DC voltage under load. The average global horizontal irradiance (GHI) for Tongatapu was assessed as 5.0 kWh/m^2/day, which is suitable for the selected technology. Each plant is expected to yield over 3,000MWh per year (Entura 2018).

148. **Site selection**. Two sites near the villages of Fahefa and Matafonua were considered based on technical appraisal, land availability, existing land use, and predicted environmental impacts. These were closer to populated areas and a cemetery and hence more suitable sites were selected (i.e. Ha'utu and Fualu). A site to the south of the Liukava site was previously considered but would have caused more disturbance to residents and had more difficult access than the selected site. All three sites were adjusted based on these considerations and the land lease approval by Cabinet.

149. **Without project scenario**. Without the proposed Project, Tonga will continue to rely upon diesel generation to meet its electricity. This will result in high costs to import diesel to fuel generators at Popua power station, increasing air pollution and increased energy tariffs for residents in Tongatapu.

[35] S*olar resource* is a general term referring to the irradiance falling on a unit area over a given period.

G. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

1. Management Framework

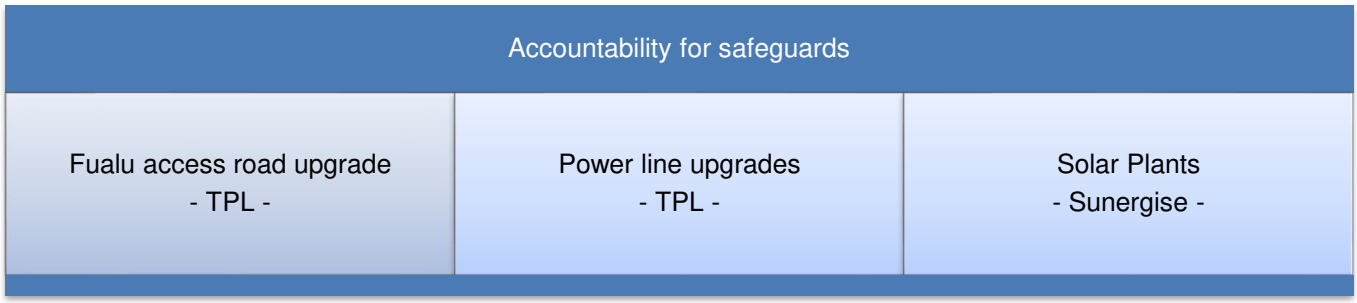
150. **Project management**. Figure 8.1 illustrates the proponent's involvement in, and responsible for, safeguards in relation to the Project and its associated facilities. Sunergise will be responsible for the project management of the three solar plants. This involves detailed design, ordering and importation of equipment, procurement of local civil works contractors (vetted by TPL), contract management, supervision of civil works and commissioning of solar plants. Sunergise will engage an Environmental, Health and Safety Officer (EHS) and Community Liaison Officer (CLO) during pre-construction, construction and early operations phases.

151. TPL will be responsible for the project management of Fualu access road upgrade and the power line upgrades in readiness for the commissioning of the three 2MW solar plants. This involves detailed design, land surveying of road reserve and confirmation of land boundaries, supervision of linesmen and civil works contractors, community consultation and liaison with relevant government agencies for permits and sign-off/completion.

152. MEIDECC DOE have mandate to ensure the ESMP and conditions of environmental permit(s) are complied with.

153. Ministry of Infrastructure (MOI) have a mandate to ensure quality Building Codes and Standards and engineering standards and approval, as well as enforcement of planning policy and regulation such as compliance with building and road permits.

Figure 7.1: Safeguard responsibilities



154. **Procurement and budget**. Sunergise, and any contractors involved in implementing the Project, have responsibility for meeting the costs associated with implementing and adhering to this ESMP, any relevant environmental and social mitigation measures, occupational health and safety (OHS) requirements, and GOT's COEPs for renewable energy projects in Tonga. The costs for these shall be identified in the bill of quantities (BOQ) for the Project. Compliance with safeguards and permit conditions are the responsibility of the parties outlined in Figure 7.1.

2. Environmental and Social Management Plan

155. The ESMP provides guidance for addressing the environmental and social impacts as outlined in Section E of this report. It details mitigation, management and monitoring activities that will be undertaken by Sunergise, TPL and contractors to avoid, minimise or manage environmental and social impacts. The objectives of the ESMP are to:

- encourage and commit to good management practices;
- provide practical management measures to avoid or minimize adverse impacts;
- outline management responsibilities;
- demonstrate compliance with applicable laws, regulations, standards and guidelines;
- describe the safeguards monitoring and reporting obligations for the project; and
- ensure the Project remains in compliance for the life of the project.

156. The ESMP includes actions required for: (i) pre-construction (detailed design and contractor procurement requirements); (ii) construction; (iii) operational; and (iv) decommissioning phases of the project.

157. The ESMP summarizes potential impacts that may occur during each phase and identifies suitable mitigation measures, as well as roles and responsibilities for on-site management and timescales for implementation. Throughout the life of the Project, actions will be monitored to track compliance and effectiveness of the mitigation measures.

158. **Monitoring.** Sunergise will have Site Managers stationed at each solar plant site as a key focal point during pre-construction, construction and operational phases to monitor issues on a daily basis. They have responsibility for ensuring the ESMP is complied with. Sunergise will also engage an Environmental, Health and Safety Officer (EHS) and Community Liaison Officer (CLO) to monitor and resolve safeguard issues across all sites on a daily basis. Monitoring activities are also outlined in Table 7.1. During operations the site technical engineer will monitor each site on a daily basis.

159. **Reporting.** The Site Manager will report to Sunergise management on a weekly basis. Sunergise will report to TPL on a fortnightly basis (as per the PPA) and to ADB on a bi-annual basis during construction then on annual basis during operations. Reports will contain a summary of compliance checks, health and safety issues, complaints or safeguard issues and corrective action.

Table 7.1 6MW Solar Project: Environmental and Social Management and Monitoring Plan

Project activity	Potential impact	Management and Mitigation			Monitoring and Reporting		
		Proposed measures	Guideline / Reg.	Responsibility	Frequency	Method	Responsibility
Pre-construction Phase							
Land boundary survey and lease finalisation	Encroachment by residents onto government or leased land; encroachment by contractors onto private land; and aggrieved parties related to land lease	1. Follow Tongan process of land lease 2. Get Cabinet approval for identified land parcels 3. Consultation with residents, landowners and nearby communities as due diligence 4. Demarcation of land boundary including laydown areas 5. Demarcation of road reserve 6. Consultation with adjacent residents and involvement of Town Officer	COEP 2 COEP 3	TPL; MLSNR Surveyor	Weekly	Cabinet approval; Lease agreement; Meeting minutes; Land surveys; Land due diligence report	TPL
Detailed design and equipment selection	Equipment does not meet necessary design standards; equipment is not suitable for Tongan conditions	1. Adhere to Tongan, Pacific and International Standards 2. Follow SEIPAI guidelines for grid-connected systems 3. Adhere to specifications in Tonga Electricity Grid Code	COEP 19 Building Codes Tonga Electricity Grid Code SEIPAI Guidelines	TPL; Sunergise	Finalisation of detailed design	Sign-off by Contractor's Managing Director and TPL Director	Contractor
Pre-construction community consultation	Misinformation or inadequate notification of Project and works schedule to nearby residents and communities	1. Conduct information sessions with nearby residents and communities about the Project 2. Conduct meetings with directly affected parties in proximity to the sites	COEP 2	TPL; ESIA Consultant	Monthly (to inform District meetings)	Consultation minutes; District Development Committee Meetings; Bi-annual report	TPL
Import of solar plant equipment and machinery	Potential for biosecurity risk	1. All materials, plant and equipment imported for the project to follow Quarantine Act and Quarantine regulations 2. Phytosanitary certificates obtained as required	Tongan Quarantine Act and Quarantine regulations	Sunergise	When equipment arrives in Nuku'alofa	Sign-off by Customs in Tonga	Sunergise
Vegetation clearance	Unanticipated loss of productive trees,	1. Affected people will be compensated as per MAFFF procedure 2. Nearby residents will be notified twice: one month then one week prior to commencement of works 3. Consultation will be ongoing and transparent.	COEP 3	MLSNR; MAFFF; TPL	As needed	Land due diligence report Fortnightly progress reports Bi-annual report	TPL
Health and Safety	Injury or electric shock to workers	1. Staff and contractor site induction	Contractor's HSEQ system	TPL Sunergise	Daily	Staff induction forms;	Sunergise TPL

Project activity	Potential impact	Management and Mitigation			Monitoring and Reporting		
		Proposed measures	**Guideline / Reg.**	**Responsibility**	**Frequency**	**Method**	**Responsibility**
	Injury or near miss to member of public	2. HSEQ training 3. Restricted entry and signage at construction sites 4. Safe walkway for pedestrians 5. Traffic control for vehicles	OHS laws COEP 6: Community health and safety	Contractor		Incidence reports. Daily and weekly reporting	
Construction Phase							
Community consultation and notification of works schedule	Misinformation or inadequate notification of Project and works schedule to nearby residents and communities	1. Conduct information sessions with nearby residents and communities about the Project 2. Conduct meetings with directly affected parties in proximity to the sites	COEP 2: Stakeholder engagement	TPL	Monthly	Consultation minutes; District Development Committee Meetings; Bi-annual report	TPL Project Manager
Material sourcing	Uncontrolled sourcing of materials for construction leads to habitat destruction or erosion and sedimentation	1. Locally sourced materials to Obtain permits and consent as per GOT laws. 2. Materials to be sourced from registered quarries and businesses. 3. Avoidance of riparian or coastal areas (within 50m of high tide mark). 4. No coral rock or beach sand to be used	COEP 5: Construction and decommissioning	Sunergise TPL Contractor	Pre-construction & construction only	Evidence of permits; Bi-annual report	TPL Project Manager; Contractor's Site Manager
Machine operation and vehicle movements	Air quality, fugitive emissions, dust, noise, worker health & safety, public health & safety, increased traffic	1. Public notification of works schedule 2. Civil works in daylight hours only 3. Site induction of all labourers enforcing code of conduct, emergency procedures and banned areas 4. Site access restrictions and signage to enforce this 5. Demarcation of temporary hazards (trenches etc) with traffic cones, flagging tape etc 6. Water as dust suppressant 7. First aid kit and trained personnel on site	COEP 5: Construction and decommissioning COEP 6: Community health and safety COEP 13: Noise	Sunergise TPL Contractor	Daily	Staff Induction form; Signage; Daily and weekly reporting; Bi-annual report	Contractor's Site Manager; TPL Project Manager
Earthworks, stockpiling and site levelling	Erosion, drainage issues and stormwater run-off	1. Avoid clearing near riparian areas 2. Avoid land clearance in wet season as much as possible 3. Install catch drains to prevent scouring or instability	COEP 5: Construction and decommissioning COEP 11: Solid waste	Sunergise TPL Contractor	Daily	Daily and weekly reporting; Bi-annual report	Contractor's Site Manager; TPL Project Manager

Project activity	Potential impact	Management and Mitigation			Monitoring and Reporting		
		Proposed measures	**Guideline / Reg.**	**Responsibility**	**Frequency**	**Method**	**Responsibility**
		4. Use silt traps or retention ponds where necessary. Discharge location protected against scour. 5. Use silt fences to prevent silt laden water (if applicable). 6. Revegetate the site as soon as possible 7. Berns/plastic sheeting fencing surrounding earthworks					
	Unexpected discovery of cultural artifacts	8. Stop works procedure and chance finds protocol.	COEP 4: Cultural heritage	Sunergise TPL Contractor	Daily	Daily and weekly reporting; Bi-annual report	Contractor's Site Manager TPL Project Manager
Storage, use and disposal of hazardous substances	Pollution, contamination and health and safety risks	1. Locked storage of hazardous materials (fluids, oils etc) 2. Handling of hazardous materials and equipment by qualified persons only 3. Emergency spill kit on-site	COEP 12: Hazardous substances	Sunergise	Daily	Daily and weekly reporting; Bi-annual report	Contractor's Site Manager
Haulage of plant equipment and materials to and from site	Pedestrian safety, traffic congestion, waste generation	1. Traffic management plan with road permits 2. Adequate signage and diversion/detours where necessary 3. Disposal of waste in landfill	COEP 7: Traffic management	Sunergise TPL Contractor	Daily	Daily and weekly reporting; Bi-annual report	Contractor's Site Manager; TPL Project Manager
Workforce influx	Conflict with local people, job creation	1. Prioritize use of local persons for skilled and unskilled labour where possible 2. Provide portable sanitation facilities on-site	COEP 6: Community health and safety	Sunergise TPL Contractor	Daily	Daily and weekly reporting; Bi-annual report	Contractor's Site Manager; TPL Project Manager
Ramming	Noise	1. Noise does not exceed 75dBA at sources and 55dBA during daytime hours 2. No civil works during hours of 5pm to 7:30am 3. Maintain equipment in proper working order 4. Use noise control measures for machinery (mufflers, barriers, deflectors) where possible. 5. Machinery turned off when not in use	NZS 6803:1999 COEP 13: Noise	Sunergise	Daily	Daily and weekly reporting; Bi-annual report	Contractor's Site Manager
Operation Phase							

Project activity	Potential impact	Management and Mitigation			Monitoring and Reporting		
		Proposed measures	**Guideline / Reg.**	**Responsibility**	**Frequency**	**Method**	**Responsibility**
Operation of solar plant	Potential for oil or fuel spill, health and safety risks	1. Locked storage of hazardous materials (fluids, oils etc) 2. Handling of hazardous materials and equipment by qualified persons only 3. Emergency spill kit on-site	COEP 11: Solid waste COEP 12: Hazardous substances COEP 13: Noise COEP 14: Landscape and visual impacts COEP 15: Battery disposal COEP 19: Network upgrades/maintenance COEP 20: Monitoring and management	Sunergise	As required	Weekly reporting; Annual report	Site Technician
	Maintenance activities	4. Restriction to site by IPP staff and TPL only 5. Personnel wear PPE 6. Signage to advise of works if necessary	Tongan Grid Operation Code PPA	Sunergise	As required	Weekly reporting; Annual report	Site Technician
	Pesticide use - Runoff and contamination	7. Only trained personnel to use pesticides as necessary to control growth on solar plant site as a last resort. 8. Contained to site boundaries 9. Employ pesticides not subject to phase out or bans such as those listed on http:www.pic.int	COEP 9: Water quality	Sunergise	As required	Weekly reporting; Annual report	Site Technician
	Disposal of batteries	10. Nickel cadmium (Ni-Cad) and lead acid batteries (LAB) are not used 11. Ensure that Lithium ion, nickel metal hydride and standard batteries can be disposed of in landfill or will be shipped overseas for appropriate disposal	COEP 15: Battery disposal	Sunergise	As required	Weekly reporting; Annual report	Site Technician
Decommissioning							
Dismantling of PV panels	Waste generation.	1. Contract agreements with replacement PV panel suppliers to include dismantling and recycling/disposal	COEP 19: Network upgrades/maintenance	Sunergise	As required – end of life	As per COEP	MEIDECC; Sunergise

Project activity	Potential impact	Management and Mitigation			Monitoring and Reporting		
		Proposed measures	**Guideline / Reg.**	**Responsibility**	**Frequency**	**Method**	**Responsibility**
Disposal of used batteries, including lithium ion.	Waste generation.	1. Contract agreements with replacement battery suppliers to include recycling/disposal. Interim storage to take place at designated area which has floor and roof to prevent degradation and contamination.	COEP15: Battery disposal	Sunergise	As required – end of life	As per COEP	MEIDECC; Sunergise

H. CONSULTATIONS, INFORMATION DISCLOSURE AND GRIEVANCE REDRESS

3. Public Involvement and Stakeholder Consultation

160. The ADB Access to Information Policy 2018, SPS and COEP 2 set out consultation requirements for projects. In order to meet these requirements, consultation has occurred in three stages: (i) during the feasibility study for TREP, (ii) during the environmental assessment process for TREP, and (iii) during the feasibility and environmental assessment process for this Project. Consultation during feasibility included consultation with government agencies regarding options to achieve GOT renewable energy targets by 2020. Consultation during EIA process for TREP were undertaken in April 2017 and August 2018 for the BESS installation.

161. Consultation specific to this Project was undertaken between March and June 2019 (Appendix 2) and involved TPL and MEIDECC staff, local community leaders (Town Officers), community members from the three project areas. Given the recent solar farm projects commissioned on Tongatapu, the public were informed about the solar technology to better understand the likely scale of the project.

162. In total, 87 stakeholders were met during the field work in Tongatapu in early 2019. Three key findings of the community engagement were:

- Community Safety – There was some concerns about the solar technology and whether people would be exposed to new, harmful effects from the solar technology proposed.
- Environmental Protection – People were concerned about the environmental impact of solar technology on the local environment, such as the contents of solar panels. There were informed that most of the issues come from the production of PVs and that international standards have been adhered too and pose no threat to the environment during operations and that a decommissioning plan will be in place at the end-of-life.
- Impact on electricity tariff – The audience was informed that solar is less expensive than diesel generated electricity, and that in time, as Tonga transitions toward greater source from renewable energy, that the electricity tariff will decrease.

4. Information Disclosure

163. All environmental documents are subject to disclosure, and therefore will be made available to the public. Adhering to the ADB Access to Information Policy 2018, this IEE will be disclosed on ADB's website. TPL will also disclose this report and project information locally and provide a one-page summary in the Tongan language.

5. Grievance Redress Mechanism

164. People may perceive or experience negative impacts of the Project and have a right to have their complaint heard and acted on in a timely manner. It is an ADB requirement to establish a grievance redress mechanism (GRM) for the life of the Project.

165. TPL have an existing complaints procedure given their standing as a key utility company for the majority of the population. The GRM is for those who have concerns about project-specific issues. It is (i) easily accessible and free from repercussions for those making a complaint and (ii) sensitive to culture and gender and reflects local traditions for conflict resolution. The process will

not incur costs or retributions and will not impede access to Tonga's judicial or administrative remedies.

166. **Access to GRM**. Concerned persons can either raise their grievance to Sunergise in person to the Site Manager, CLO or EHS Officer on-site, as well as to TPL via (i) email to powerbillstbu@tongapower.to or feedback@tongapower.to; (ii) phone call to the fault line (phone 944 at any time day or night), or (iii) in person at the TPL office where they can lodge a verbal complaint or written complaint into the feedback box. TPL customer service personnel direct the issue to the correct division in TPL, where divisional managers are responsible for resolving the issue and providing feedback to the complainant within the regulated timeframe. Each complaint is recorded in TPL's Complaints Register which is monitored by the Risk and Compliance Division on a monthly basis. The Risk and Compliance Manager reports progress and performance on complaints and queries to the Board and Ministry each month.

167. For site-related concerns, the CLO will maintain a grievance log and discuss grievances appropriate for TPL's resolve with them. TPL and Sunergise will report grievances at the time they arise, and through the fortnightly reporting process.

168. **Grievance procedures**. Project stakeholders have been informed that they can ask any questions or discuss grievances with Project staff, TPL representatives or district/town officers by phone or in person. A complaints register will be maintained by TPL on behalf of all parties. Response times are five working days for customer queries/complaints and two days for electrical faults or outage. This process is governed by TPL and the Electricity Commission.

169. If the complaints are not responded to in the timeframe above, the Risk and Compliance Manager will respond or delegate staff for a response.

170. Table 8.1 outlines the GRM process and escalation if a satisfactory solution cannot be found.

Table 8.1: Grievance Resolution Process

GRM	Steps	Timeframe
Site managers or District Officer / Town Officer	Complaints made to DO, TO or site manager. Questions and/or complaints recorded in site register. Parties seek mutually satisfactory solution. If no solution is possible or response is unsatisfactory, complaint raised to next level.	ASAP 5 days
TPL	TPL proposes solution to complainant and meeting with relevant parties takes place to resolve the issue.	5 days
TPL	If the issue cannot be resolved within the timeframe it is raised to the TPL's Risk and Compliance Manager for resolution.	5 days
Minister - MEIDECC	If the issue is still not resolved it is escalated to the Minister for a decision.	1 month
Court	If the decision is still unacceptable to the complainant, they may take it before the Court (Land Court or other relevant court). The complainant has the right to take the issue to court if they are not satisfied with the outcome or solution. Court makes a final decision that is binding on all parties.	Court procedural timeframes

I. CONCLUSION

171. The Project will directly contribute towards the GOT's target of 50% of all electricity from renewable energy by 2020. There will be short-term impacts and disturbance in and around the solar plant sites and access roads during pre-construction and construction phase, which are manageable through the ESMP. Key transport corridors will experience an increase in traffic over a few months until all equipment is on-site. Overall, the project will have a positive influence and contribute to a sustainable future for Tonga.

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APPENDIX 1: CODES OF ENVIRONMENTAL PRACTICE FOR RENEWABLE ENERGY

COEP 1 – Site Selection and Project design

COEP 2 – Stakeholder Engagement

COEP 3 – Land Acquisition, Resettlement and Compensation for Lost Assets

COEP 4 – Cultural Heritage

COEP 5 – Construction and Decommissioning

COEP 6 – Community Health and Safety

COEP 7 – Traffic Management

COEP 8 – Biodiversity

COEP 9 – Water Quality

COEP 10 – Working in Coastal Marine Areas

COEP 11 – Solid Waste

COEP 12 – Hazardous Substances

COEP 13 – Noise

COEP 14 – Landscape and Visual Impacts

COEP 15 – Battery Disposal

COEP 16 – Shadow Flicker

COEP 17 – Interaction with Aviation Operations

COEP 18 – Electric and Magnetic Fields

COEP 19 – Network Upgrades/Maintenance

COEP 20 – Monitoring and Management

Source: World Bank. 2016. New Renewable Electricity Generation and Electricity Infrastructure in Tonga: Code of Environmental Practice - Managing Environmental and Social Impacts; and Guidelines for Land Acquisition Approvals, Environmental Permits and Building Permits.

Note: Not all COEPs apply to this Project.

APPENDIX 2: SUMMARY OF PERSONS CONSULTED IN TONGATAPU

STAKEHOLDER CONSULTATIONS

Fahefa, Kolovai & Fualu-Si'atoutai, March-April 2019

BRIEF

This is a record of the initial stakeholder consultations conducted for the proposed 6MW solar farms to be built on Tongatapu under a power purchase agreement between Tonga Power Limited (TPL), the Government of Tonga and Sunergise International. The newly established independent power producer (IPP) will complement the ongoing Outer Island Renewable Energy Project (OIREP) and the recently approved Tonga Renewable Energy Project (TREP) to accelerate moving the country towards the Tonga Energy Road Map (TERM) goal of 50% renewable energy production by 2020. Strategically this proposal is in line with the goal of achieving sustainable and affordable electricity whilst maintaining financial profitability.

TPL as the only electricity utility in Tonga is assisted by this initiative to utilize third parties for electricity generation. It is essential in this context that the lowest cost of funding such developments be achieved whilst maximizing benefits to TPL and its customers, and not compromise on quality, standards and delivery of renewable energy in replacing fossil fuel (diesel). This not only contributes to the achievement of TERM goals, but in addition supports the strategic direction of lowering electricity tariffs for the people of Tonga.

These initial consultations were held on Tongatapu in March-April 2019 in the villages of Fahefa, Kolovai and Fualu/Si'atoutai, the proposed 3 sites for the new IPP solar farms. The objective was to confirm community and stakeholder support and receive any concerns and recommendations for the project. In summary, affected land owners and respective communities, welcomed the proposal acknowledging that in increasing renewable energy inputs into the grid, there is potential for a reduction in the existing tariff. This would possibly reduce the costs of living and provide major economic and social opportunities to help alleviate national poverty. This was the main concern raised throughout all consultations, which is to ensure that future tariffs were made more affordable as a result of this investment in renewable energy sources. No other significant concerns were raised.

Further consultations will be held prior to project implementation but in total, 87 people, 35 women (30%), were consulted this time around in all project sites.

CONSULTATION AGENDA

The consultation team was led by TPL's strategic planning division with the aid of the energy division from MEIDECC and the ADB country office. The task was to touch base with relevant communities and the agenda for consultations comprised the following:

(i) TPL and MEIDECC to present the national strategy for renewable energy,

(ii) TPL to introduce the proposed scope of project works, institutional setup as well as expected roles and responsibilities of TPL/MEIDECC/ the Private Sector and Community,

(iii) Ensure discussion on potential concerns and document recommendations,

(iv) Ensure discussion on procedures for grievance redress, and

(v) Inform affected land owners about the policies and procedures regarding entitlements for the land to be leased by the project, if applicable.

Western District Town Officer's consultation minutes (22/03/2019)

The meeting was officially opened with a prayer by the Western Tongatapu District officer.

MEIDECC OIC then gave welcoming remarks noting the purpose of the meeting, to present the proposal and potential scope of works, confirm community support for the project and provide an opportunity for critical stakeholder feedback.

TPL CEO in support, went into further detail on the scope of works ranging from necessary land acquisition, construction of the solar farms, the modality of an IPP, to the technical aspects of renewable energy contribution to the existing grid. He re-emphasized the critical need for meaningful consultation with relevant communities.

The TPL team then gave a power point presentation with visuals on the proposed project, illustrating what was envisaged to be built and implications for relevant communities.

The floor was then open for discussion, questions and clarifications.

A village town officer thanked the team for presenting the proposal which he feels all the communities will be in clear agreement with. The economic opportunities that would be enabled by the investment he is assured will be welcomed by his village. The query he had for the team was how will this investment contribute to lowering the electricity tariff.

The ADB country office representative in response noted that it was a critical question that needed to be continually raised with Government as it centered around the issue of affordability. There needed to be significant effort and analysis once this initiative was implemented and operational, to ensure that the tariff declines and not continue to increase.

The TPL CEO added further that since July 2017, a bar had been set on the tariff with the goal to not exceed this limit. He affirmed that the project can only contribute to further reduce tariff.

Another village town officer queried on whether there were specific benefits to their communities from the proposed project, such as a lower tariff in comparison to the rest of the nation. In addition, he asked if it was the intention to roll these consultations out to the three individual communities.

The TPL representative responded that any benefits from the project to tariffs will have to be nationwide as electricity produced will feed into the whole of Tongatapu's grid. He also noted that it was critical for these consultations to be rolled out to their respective communities and requested that the times and venues be arranged with the TPL team to carry these out.

The Western Tongatapu district officer noted that it was very important to roll out consultations to the individual communities, as it will give ownership of the project to the communities themselves.

The TPL CEO in response confirmed that his team will be contact over the next week or so to arrange an appropriate consultation schedule depending on availability of the respective communities. He also emphasized the need to for a gender balance in meetings and the addition of youth and other vulnerable groups. Furthermore, the language will be less technical when it goes out to the community to ensure that the message is well received.

The MEIDECC OIC and TPL CEO thanked the district and town officers for their attendance and active participation and the District officer reciprocated on behalf of the town officers before closing the meeting with a prayer.

Fahefa community consultation minutes (28/03/2019)

The meeting was officially opened with a prayer by the village church minister.

The TPL team gave welcoming remarks noting the purpose of the meeting which was to present the proposal and potential scope of works, confirm community support for the project and provide an opportunity for critical community feedback.

The TPL team then gave the power point presentation with visuals on the proposed project, illustrating what is envisaged to be built and implications for the village community. The presentation covered in detail the scope of works ranging from necessary land acquisition, construction of the Fahefa solar farm to the technical aspects of renewable energy contribution to the existing grid.

The floor was then open for discussion, questions and clarifications.

The village town officer thanked the team for presenting the proposal which he and his community are fully supportive off and queried when the project was scheduled to start.

TPL indicated that the scheduled timeline was sometime in June 2019.

The discussion then focused on any potential health risks and hazards to the community from construction and operations of the solar farm, given their close proximity. One member of the community was especially concerned about radiation and another community member wanted to know if it had any impacts on increased tropical cyclones.

TPL in response noted that renewable energy from solar had no known radiation impacts on human life. The only danger would be from getting electrocuted like any other source of power generation but assured the community that the site would be well fenced off from the community and any batteries would be containerized. As a natural source of energy there would also be no contribution to the frequency of tropical cyclones.

On the issue of land acquisition, TPL noted that of the 3 sites, the Fahefa site was the only one pending confirmation as the exact location of the site had not been fully confirmed yet as they were still in discussions with the landowner.

A member of the community then posed a question on the potential to reduce tariffs if the project went ahead as planned.

TPL in response noted that this was a nationwide issue that would be determined eventually in the long term. TPL was assured though that the tariff is expected to decrease.

The ADB country office then wrapped up proceedings as there were no further queries and thanked the community for their attendance and active participation. The town officer reciprocated on behalf of the community before the village church minister closed the meeting with a prayer.

Kolovai community consultation minutes (11/04/2019)

The meeting was officially opened with a prayer by the village town officer.

The TPL team gave welcoming remarks noting the purpose of the meeting which was to present the proposal and potential scope of works, confirm support for the project and provide an opportunity for critical community feedback.

The TPL team then gave the power point presentation with visuals on the proposed project, illustrating what is envisaged to be built and implications for the village community. The presentation covered in detail the scope of works ranging from necessary land acquisition, construction of the Kolovai solar farm to the technical aspects of renewable energy contribution to the existing grid.

The floor was then open for discussion, questions and clarifications.

A community member thanked the presenters for the presentation then posed the question of whether the Kolovai community would have any special benefits from the project.

In response the TPL representative responded that any benefits from the project such as a decrease in tariffs will have to be nationwide as electricity produced will feed into the whole of Tongatapu's grid. Overall the benefits are for the nation as a whole both environmentally with a reduction in our carbon foot print through the use of natural energy sources as well as economically with a contribution to lessening the cost of living.

This led onto a discussion on how the electricity tariff would decrease as a result of the project with TPL explaining the dynamics of a national tariff review and adjustment.

Similar concerns were raised on the risks to the environment and human life from the operation of a solar farm, and TPL again reassured the community that they had nothing to fear.

A final question was posed on the timeline for project implementation and TPL explained that the project was expected to begin in June 2019 with the power purchase agreement recently signed in late March.

As there no further queries, the TPL representative thanked the town officer and his people for their attendance and active participation and the town officer reciprocated before closing the meeting with a prayer.

Fualu/Si'atoutai community consultation minutes (01/05/2019)

The meeting was officially opened with a prayer by the Deputy Principal of Si'atoutai College.

The TPL team gave welcoming remarks noting the purpose of the meeting which was to present the proposal and potential scope of works, confirm community support for the project and provide an opportunity for critical community feedback.

The TPL team then gave the power point presentation with visuals on the proposed project, illustrating what is envisaged to be built and implications for the village community. The presentation covered in detail the scope of works ranging from necessary land acquisition, construction of the Fualu/Si'atoutai solar farm to the technical aspects of renewable energy contribution to the existing grid.

The floor was then open for discussion, questions and clarifications.

A community member immediately queried the team on the potential risks and dangers to the community due to construction and operations of the proposed solar farm. Discussion centered around any harmful effects and whether there were any nuclear substances in the solar panels that can affect the immediate community.

In response, the TPL team assured the community that renewable energy from the natural sun had no known harmful impacts on human life and the environment. The only danger would be from getting electrocuted like any other source of power generation but assured the community that the site would be well fenced off from the community and any batteries would be containerized.

The emphasis of the project in this context is for the sustainable future of the country, through enabling TPL to generate, distribute and control electricity that would reduce the country's significant current reliance on fossil fuel, moving towards a more greener energy future.

The other major concern from the community that was raised was whether this investment would bring about a drastic reduction in tariff.

In response, the TPL representative noted that this was one of the major benefits foreseen for the project. A decrease in tariffs will be made possible by additional electricity produced from these solar farms as they would be cheaper to run and operate then the current diesel generators. It was however a long-term process and would not happen overnight.

The TPL representative thanked the Deputy Principal of the college and the community for their attendance and active participation and the Deputy Principal reciprocated on behalf of the school and community before closing the meeting with a prayer.

Consultation Pictures


sunergise
TONGA POWER LIMITED

Attendance List

LIST OF PARTICIPANTS
Of the
Tonga Power Limited Renewable Energy Projects Consultation
22nd March 2019; 2pm– 4pm
MEIDECC, Conference Room

Total number of participants: 16

No	Name of Participant	Organization/Tittle	Contact	Signature
1	Salesi Manu	Ofisi Sabclo	7723880	[signature]
2	Sione Manumanu	D/O Hihifo	7717702	[signature]
3	Paulo H. Muller	T/O	8737587	[signature]
4	Luisi Fifita	Ofisi Kolo Kolovai	8479716	[signature]
5	Nikolasi Fonua	TPL / Strategic Development Mg	7863208	[signature]
6	Viliami Manuatu	Ofisi kolo Kolovai	75-12313	[signature]
7	Tatafu Moeaki	ADB	7815722	[signature]
8	Kaione Jamil	ADB	7784547	[signature]
9	Salesi Manu	T/O Fahefa	7723880	
10	Vaka Ngauamo	T/O Haiutu		
11	Tamela Faletau	ADB	+63 999999 1633	[signature]
12	Sosefo Tofu	MEIDECC	+676 8416052	[signature]
13	Ofa Sefana	Energy	+676 8853150	[signature]
14	Valeria Fifita	TPL	676 7780546	[signature]
15	Kakau Foliaki	Energy		[signature]
16	Andrew Kautoke	TPL	+676 7737669	[signature]

1

LISI 'O E KAU MAI KI HE FAKATAHA

Felafoaki moe Kainga Fahefa/Ha'utu/Kala'au
3 - 5 'Epeleli 2019; 7:30pm

Tokolahi 'oe kau Fakataha: 31

No	Hingoa	Kolo	Fika Telefoni	Fakamo'oni
1	'Akesa Nuku	Ha'utu	41284	[signature]
2	Seluvaia Nuku	~	7798831	[signature]
3	Kaione Loumoli	ADB	7784542	[signature]
4	[illegible]	Fahefa.	41411	[signature]
5	'Asa Kivalu	FAHEFA	7772618	[signature]
6	Sione Taufa Lomu	FAHEFA	7746467	[signature]
7	Kava Ropeti [illegible]	Fahefa	7746610	[signature]
8.	[illegible]	Ha'utu	41663	[signature]
9	Teisia T. Taumoa	Ha'utu	7711710	[signature]
10	[illegible]	Fahefa	62515	[signature]
11	Loloke. Fonua.	Fahefa.	7725337.	[signature]
12	'Ofusitino Taufa	Fahefa.	8728680	[signature]
13	Viliami Puafisi	Ha'utu	7765443	[signature]
14	Sosefina M Moala	Fahefa	7746768	[signature]
15	[illegible]	Fahefa	7723820	[signature]
16	[illegible] Tonga	Fahefa	7708521	[signature]
17	[illegible]	Fahefa	41297	[signature]
18	Pauline Tonga	Fahefa	7787779	[signature]
19	Nanise Malolo	Fahefa	7702860	[signature]

20	Siu Afu	Faheifa	770558	Afu
21	Losa Poea Talia	Faheifa	7723187	Talia
22	FELEMI LATU	FAHEFA	8872084	
23	Elaiaki-Moa	Faheifa	7772359	
24	Mele Taukeiaho	Faheifa	41153	
25	Utolata Fainga'a	Faheifa	7755452	Fainga'a
26	Amelia Manu	Faheifa	8641391	Manu
27	EMMA VEIMO	FAHEFA	7776752	Veimo
28	Tonase Maka	Faheifa	8405053	Maka
29	MA Nonga	Faheifa	7752106	Nonga
30	L. MAKOKO	Faheifa	8405053	
31	Vaka Ngauamo	Houma	7719739	

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LISI 'O E KAU MAI KI HE FAKATAHA

Felafoaki moe Kainga Kolovai
11 'Epeleli 2019; 7:00pm

Tokolahi 'oe kau Fakataha: 12

No	Hingoa	Kolo	Fika Telefoni	Fakamo'oni
1)	Teni Tofaiela	Kolovai	8409760	[illegible]
2)	Tevita To'a	//	7756420	[illegible]
3)	FELETI SOFELE	//	7731909	[illegible]
4)	Leepina Fifita	//	41064	[illegible]
5)	FEKETI KATOA	//	8722266	[illegible]
6)	Siosaia Fotu.	✓	7704339.	[illegible]
7)	Sione Foliaki	✓	7735948	[illegible]
8)	Langi Vailami	✓	7748412	[illegible]
9)	SIONE F. MOALA	✓	7777-118	[illegible]
10)	Semisi 'Afai	✓	771-5227	[illegible]

1

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No	Hingoa	Kolo	Fika Telefoni	Fakamo'oni
11)	Lisi Fifita	Kolovai	8493716	
12)	KAHO SINA	11	8835527	

2

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LISI 'O E KAU MAI KI HE FAKATAHA

Felafoaki moe Komiuniti Siatoutai

1 Me 2019; 11:00am

Tokolahi 'oe kau Fakataha: 28

No	Hingoa	Kolo	Fika Telefoni	Fakamo'oni
1	Laumeile 'Uhila	Simana	7721244	[signature]
2	Filesa. Mixo Fonua	Simana	—	[signature]
3	Mele. Uai Hangaleta	Simana	7748384.	[signature]
4	Rose. Peaomoeata [illegible]	Simana	—	[signature]
5	Meleana. Tenifa Vaki	Simana	7711502	[signature]
6	Malina. Lotaleleí Manu	Simana	7716621	[signature]
7	Uhila. Halatanu.	Simana	—	U. Halatanu.
8	Salafina. [illegible] Finau	Simana	8702926	[signature]

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No	Hingoa	Kolo	Fika Telefoni	Fakamo'oni
9	Tofe [illegible] Nai	Simana		[signature]
10	Shalom Veamatahau	Siaátoutai (Simana)	77-72356	[signature]
11	Meleane Fatai	Siaátoutai (Simana)	77-30888	[signature]
12	Sitaleki Fangalahi	Siaatoutai	7761157	[signature]
13	Siolaini Fetulimoeatao	Siaatoutai	7709171	[signature]
14	Kinuseli Taloa	Siaatoutai	7716127	[signature]
15	Amanaki Fotofili	Siaatoutai	7763821	[signature]
16	Uesili Tokomaata	Siaatoutai	7751930	[signature]
17	Amini Taufoou	Fila	8704328	[signature]
18	Siosaia Lkamanu.	Siatoutai (Simana)	7709688	[signature]
19	Fakahēone Sili	Siaátoutai (Filatelefia)	77-65414	[signature]

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No	Hingoa	Kolo	Fika Telefoni	Fakamo'oni
20	Folau Teimoffi	Efeso	8708577	[illegible]
21	Sinisa Pifita	Lotosia	7773453	[illegible]
22	Sione Blake	Taiataila	7701422	T. Tupou.
23	Anthony Halahala	Peakamosi	7738310	[illegible]
24	'ALITI MATANGI FATAI	FILATELIFIA	7512128	FATAI
25	Pene 'ofa	Safisi	7755804	P. 'OFA.
26	Pita Vake	Lotosia	7706508	[illegible]
27	Tamasa [illegible]	[illegible]	878 [illegible]	[illegible]
28	MOSESE HOLI	Kolotapu	—	[illegible]

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Due Diligence Report APPENDIX 3

Project No: 53258-001

June 2019

Tonga: 6 Megawatt Hihifo Solar Power Project

Prepared by Sunergise New Zealand for the Asian Development Bank.

Contents

APPENDICES

CURRENCY EQUIVALENTS

(as of 7 November 2018)

Currency units – Australian dollar/s (A$)/pa'anga (T$)

A$1.00	=	$0.72
$1.00	=	A$1.38
T$1.00	=	$0.44
$1.00	=	T$2.27

NOTES

(i) The fiscal year (FY) of the Government of Tonga ends on 31 December. FY before a calendar year denotes the year in which the fiscal year ends, e.g., FY2011 ends on 31 December 2011.

(ii) In this report, "$" refers to US dollars

ABBREVIATIONS

AP	Affected person(s)
ADB	Asian Development Bank
DP	Displaced Person
GCF	Green Climate Fund
GRM	Grievance Redress Mechanism
Ha	Hectares
HH	Households
MEIDECC	Ministry for Meteorology, Energy Information, Disaster Management, Environment, Climate Change and Communications
MAFFF	Ministry of Agriculture and Food, Forests and Fisheries
MFP	Ministry of Finance and Planning
MLSNR	Ministry of Lands, Survey, Natural Resources
MOI	Ministry of Infrastructure
SPS	Safeguard Policy Statement
TPL	Tonga Power Limited

GLOSSARY OF TERMS

Affected Persons	A term used to describe all people that are affected by the project impacts. In the context of an RP, it refers to those that are economically or physically displaced by the project. It is increasingly being replaced by the term "Displaced Person" following ADB Safeguard Policy 2009 – but is still in common use in the field. The terms of affected persons (APs) and displaced persons (DPs) are used interchangeably in this document
Compensation	Means payment in cash or kind for an asset to be acquired or affected by a project at replacement cost at current market value.
Cut-off-date	Means the date after which people will NOT be considered eligible for compensation i.e. they are not included in the list of APs as defined by the census. Normally, the cut-off date is the date of the detailed measurement survey.
Displaced Persons	Sometimes referred to as Affected Persons (APs). In the context of involuntary resettlement, displaced persons are those who are physically displaced (relocation, loss of residential land, or loss of shelter) and/or economically displaced (loss of land, assets, access to assets, income sources, or means of livelihoods). This is a result of (i) involuntary acquisition of land, or (ii) involuntary restrictions on land use or access to legally designated parks and protected areas.
Economic Displacement	Loss of land, assets, access to assets, income sources, or means of livelihoods as a result of (i) involuntary acquisition of land, or (ii) involuntary restrictions on land use or access to legally designated parks and protected areas.
Encroachers	Mean those people who move into the project area after the cut-off date and are therefore not eligible for compensation or other rehabilitation measures provided by the project.
Entitlement	means the range of measures comprising cash or in-kind compensation, relocation cost, income rehabilitation assistance, transfer assistance, income substitution, and relocation which are due to /business restoration due to DPs, depending on the type and degree nature of their losses, to restore their social and economic base.
Inventory of losses	It means the pre-appraisal inventory of assets as a preliminary record of affected or lost assets. Also referred to as the detailed measurement survey (DMS).
Land acquisition	It means the process whereby a person is compelled by a public agency to alienate all or part of the land s/he owns or possesses, to the ownership and possession of that agency, for public purposes, in return for fair compensation.
Meaningful Consultation	A process that: (i) begins early in the project preparation stage and is carried out on an ongoing basis throughout the project cycle; (ii) provides timely disclosure of relevant and adequate information that is understandable and readily accessible to affected people; (iii) is undertaken in an atmosphere free of intimidation or coercion; (iv) is gender inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups; and (v) enables the incorporation of all relevant views of affected people and other stakeholders into decision making, such as project design, mitigation measures, the sharing of development benefits and opportunities, and implementation issues.
Non-leased (non-titled)	It means those who have no recognizable rights or claims to the land that they are occupying and includes people using private or state land without permission, permit or grant i.e. those people without legal lease to land and/or structures occupied or used by them. ADB's policy explicitly states that such people cannot be denied compensation.
Poor	The poverty line established is T$1638 per capita per year. It is estimated that 27% of Tongan households received incomes below that line, meaning that they experienced periodic difficulties in meeting their daily costs of living for food and other essential expenditures.
Physical Displacement	Relocation, loss of residential land, or loss of shelter as a result of (i) involuntary acquisition of land, or (ii) involuntary restrictions on land use or access to legally designated parks and protected areas.
Replacement cost	Means the method of valuing assets to replace the loss at current market value, or its nearest equivalent, and is the amount of cash or kind needed to replace an asset in its condition, without deduction of transaction costs or for any material salvaged.
Significant impact	It means 200 people or more will experience major impacts, which are defined as; (i) being physically displaced from housing, or (ii) losing ten per cent or more of their productive assets (income generating).
Vulnerable	It means any people who might suffer disproportionately or face the risk of being marginalized from the effects of resettlement and includes; (i) female-headed households with dependents; (ii) disabled household heads; (iii) poor households (within the meaning given previously); (iv) landless; (v) elderly households with no means of support; (vi) households without security of tenure; (vii) ethnic minorities; and (viii) marginal farmers (with landholdings of five acres or less).

I. PROJECT OVERVIEW

A. Background

1. The Kingdom of Tonga (Tonga) is a small island developing state consisting of 177 islands with a total area of 748 km^2. Tonga's population is approximately 103,000, of which almost three-quarters live on the island of Tongatapu. Tonga is remote from markets and most resources. Despite this, approximately 89% of households have access to electricity, increasing to 97% in urban areas.

2. The Pacific Islands are challenged by both the high costs of fossil fuel imports and numerous climate-related disasters (Weir 2018). Tonga's electricity production relied almost exclusively on diesel generation. Until recently, over 95% of electricity in Tonga was generated using imported diesel fuel. An estimated 14 million liters of diesel were consumed to generate electricity in 2012, at a cost equivalent to approximately 10% of total gross domestic product (GDP) and 15% of national imports. In 2017, about 11% of electricity consumption was being met by renewables. This high dependency on imported fuels, not only contributes to high electricity costs, but also climate change.

Tonga Energy Road Map 2010-2020

3. Tonga has a greater potential for renewable energy generation, most notably from solar, wind and biomass. The Government of Tonga (GOT) issued the Renewable Energy Act in 2008 and then formulated the Tonga Energy Road Map 2010 – 2020 (TERM).[1] TERM includes the following targets:

- by 2020, 50% of all electricity to be generated from renewables; and
- by 2030, 70% of all electricity to be generated from renewables.

Pacific Islands Renewable Energy Facility

4. The Board of the Green Climate Fund (GCF) announced its support for the *Pacific Islands Renewable Energy Facility* (the Facility) in December 2016. The Facility will help seven Pacific island countries transition to a renewable energy future. The Facility objective is to transform the electricity production sectors across the Pacific to low carbon, climate resilient pathways, and the Facility outcome will be expanded access to clean, resilient and affordable energy.

Tonga Renewable Energy Project

5. The Tonga Renewable Energy Project (TREP) approved in 2018 stems from the Facility. Expected Project benefits from TREP include delivery of an estimated lifetime reduction of 340,395 tCO_{2e} emissions, and it will contribute significantly to increasing the contribution of renewables to Tonga electricity production from under 10% to 50% by 2020. TREP investments focus on renewable off-grid energy generation and Battery Energy Storage Systems (BESS) in Tongatapu and the outer islands, which are both on-grid and off-grid.

B. Proponent

6. Sunergise New Zealand is the proponent for this Project. Sunergise New Zealand ("Sunergise") is an Independent Power Producer (IPP) that has signed a Power Purchasing Agreement (PPA) with Tonga Power Limited (TPL). TPL is a government-owned, public enterprise under the oversight of the Ministry of Public Enterprises and the Cabinet. TPL has the concession for, and operates, four independent grids for on-grid electricity services on the

[1] GOT. June 2010. Tonga Energy Road Map 2010 – 2020: A 10-year road map to reduce Tonga's vulnerability to oil price shocks and achieve an increase in quality access to modern energy services in an environmentally sustainable manner.

main islands of Tongatapu (Tongatapu and Eua) and Vava'u and Ha'apai island groups, where it generates, distributes, and retails electricity, and provides operation and maintenance (O&M) services. TPL will assist with community consultation and grievance redress as per Tongan protocols and requirements. Sunergise is a member of the Sustainable Energy Industry Association of the Pacific Islands (SEIAPI) and Pacific Power Association.

C. Project Description

6. Sunergise New Zealand is proposing three 2MW solar plants[2] on the island of Tongatapu to contribute to the GOT meeting its renewable energy target by 2020 (Figure 1). An additional 6 MW of solar power generation capacity in Tongatapu will result in an estimated saving of 47.5 million liters of diesel fuel and a reduction in CO_2 emissions of 134,425 ton over the Project's twenty-five-year lifespan.

7. The Project includes associated facilities, as follows:

- Power line upgrades to connect the solar plants to the existing electricity grid in Tongatapu. This requires TPL to upgrade the existing 11kV electricity lines at Fualu and extend the electricity lines by 1.2km to the site at Ha'utu. The 11kV electricity lines are situated within the road reserve with a clearance of 5.5m; and

- Fulau road upgrade – TPL will fund an upgrade to one existing rural road to enable the electricity line upgrades and materials to be delivered to site during the pre-construction and construction phase. The road is 1,075m in length from Hihifo Road and has a road reserve of up to 5m[3] (1.33 acres in total area). No land acquisition is required as the road reserve already exists.

8. The solar plant sites were selected based on land availability and approval by Cabinet, and technical requirements for the power generation infrastructure to maximize the energy generation potential. Approximately 24 acres of rural land over three parcels (8 acres each) will be leased for thirty years (as per Tongan legislation) to enable the development of the solar plants. The electricity lines will be located in existing road reserve and will not require any additional land.

D. Compliance Audit

9. This Due Diligence/Social Compliance Report (DDR) is for the proposed investment to be funded under the PPA. The project is categorized as C under ADB's Safeguard Policy Statement (SPS) both for involuntary resettlement (IR) and indigenous peoples (IPs). The proposed project has no IR and IP impacts and no further action is required. The due diligence review presented here supports this categorization.

10. The methodology for this DDR included consultation with national and local stakeholders, site visits, and review of cadastral maps, lease documents, and project design documents. This DDR will be disclosed to the general public through distribution of the written report, posting documents on the government web site, and electronic access to the report on the ADB project web site.

11. No specific monitoring and reporting will be required for land acquisition and resettlement issues. Relevant information related to safeguards, if any, will be reported in the project's

[2] Solar plants are located in Liukava and Ha'utu in the Kolovai district and Fualu in the Nukunuku district.

[3] Confirmed by Head of Land Survey Department, Ministry of Land and Natural Resources (MLNR), 10 May 2019.

progress report. Any unanticipated issues will be dealt with in accordance with ADB's Safeguard Policy Statement (2009) and the guidelines set out in this DDR.

Figure 1. Project locations

II. LEGAL FRAMEWORK

A. Land Tenure System in Tonga

12. In principle, all land in the Kingdom belongs to the Crown. Crown land is divided or categorised as (i) Government estates, (ii) the King's land (Royal/King's estates), (iii) ancestral estates of Nobles and selected Chiefs (Noble and Chief estates). Estate-holders are His Majesty the King for Royal Estates and King's Estates, Nobles and selected chiefs for Noble Estates, and the Minister of Land for Government Estates.

13. Under the Constitution of Tonga (1875), all Tongan males (from age 16yrs) are entitled to an area of 3.3387 hectares of tax allotment ('api tukuhau) for agriculture and 0.0759 hectares of town allotments ('api kolo) for residential. The *Land Act 1927* requires estate-holders to subdivide land among all Tongan males. Tongan subjects must apply to the Minister of Lands requesting a land parcel and require ministerial approval.

14. For a Royal or Nobel estate, they must have the Ministers approval and the estate-holders consent. Granted land allotments are only legally secure if they have been registered with the Ministry of Lands. Figure 2 below outlines the land registration process.

15. All 'api-holders (landholders) can reside on their town allotments ('api kolo) and cultivate their tax allotment ('api tukuhau) or lease their parcel of land in perpetuity but land cannot be sold. When the registered owner of an allotment dies, the allotment is inherited by the eldest son or another male heir. Women can only lease land or hold land in trust for their male heirs.

16. Land allotments are either registered as an inheritance (for tax and/or town allotments) or registered as a property through a leasing arrangement. Leasholds can be brought or sold. Leaseholds can also be inherited by next rightful owner (next of kin) if the leaseholder passed away. Both leases and allotments may be used to secure bank loans.

i. Granting Land Allotments

17. An Estateholder may grant any portion of estate land to a Tongan subject an allotment to own his inheritance (registered land allotment); or for a person or entity to lease (leasehold).

18. A landholder would be a registered landholder who may grant any portion of the allotment to a person or entity by way of lease. There is a limit of 20 years with a 10-year renewal for tax allotments and 30 years for town allotments.

19. An Estateholder (King or Noble) can grant any portion of a noble's estate to a person or entity by way of lease. The leasing period may be up to 99 years.

ii. Leases

20. Non-Tongans can only obtain land under leasehold tenure, subject to the approval of Cabinet. Table 1 outlines the requirements for leases on different land types.

Figure 2 Land Registration Process

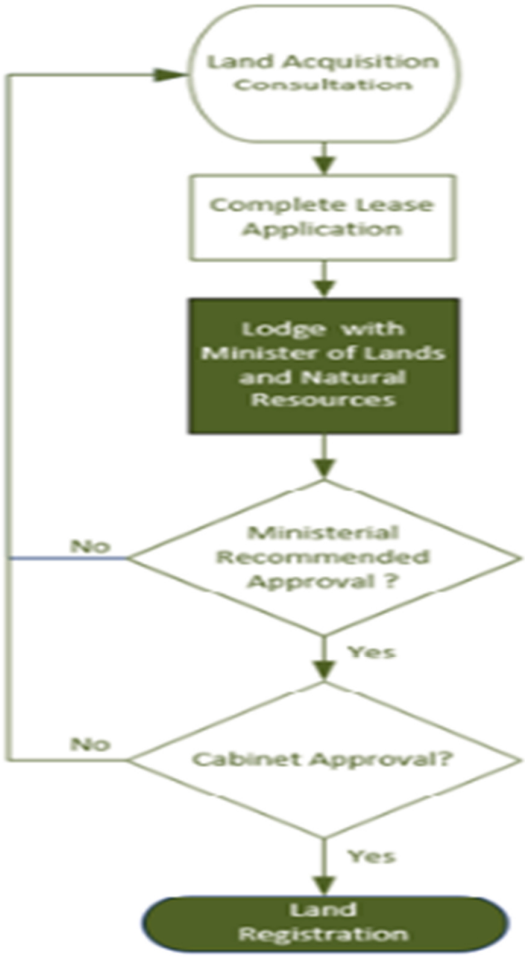


Table 1 Types of land leases

Term	Meaning
Crown land	The Minister, with consent of Cabinet, may grant a lease of crown land to a person or entity for a period of up to 99 years or a renewal of lease provided the period does not exceed 99 years from the original lease.
Noble's estates	A Noble may grant leases provided does not exceed 5% of his total area of that estate (with the exception of religious bodies, charities and Tonga Power Ltd).
Tax and town allotments	The landholder of the allotment may grant a lease of his registered allotment or part of it, with consent of Cabinet.
Leaseholders	The Lessee may grant a sublease of his or her leased property, either in whole or part of it, for sublease. Otherwise, he/she may elect to sell the lease outright for the purpose of a development.

B. Relevant Provisions for Involuntary Resettlement in Tonga

21. There are no laws or legislations in Tonga that specifically address matters related to involuntary resettlement. Rather, land acquisition is governed by the following laws:

(i) Constitution of Tonga as revised 1988 and 1990

(ii) Government Act 1988
(iii) The Land Act 1988 revised edition (amended in 1991 & 1997)

22. Specifically, the lease process and procedures stated in this project are based under Land Lease Act 1988 revised edition. Detailed procedures are based on the Ministry of Land's internal policies and procedures that were formulated to ensure that all land transactions are in line with the governing Act.

23. Collectively, these regulations provide a fundamental basis for acquiring land for this Project and for compensating landowners and users according to the registered use of the land. The Land (Amendment) Act (No.2) 1991 provides for the compulsory grant of easements to the Crown. The easement option is open for TPL and MEIDECC's purposes. However, TPL and MEIDECC have indicated they intend to lease all required lands.

24. A third-party verification is not a requirement by the MLSNR. MLSNR process lease applications when prescribed forms are completed, signed and delivered to the Ministry. Once the landholder signs the form, the assumption is that he understood the lease terms prior to signing. Under the ADB SPS 2009, a third-party verification will be required under the project.

25. In summary, the King or the Minister of Lands can compel any holder of land to grant an easement to the Crown. If land, crops or premises are taken, the Government shall pay fair value, or an amount determined annually by Government. People have the right to relinquish land for public purposes for no compensation voluntarily. A brief descprition of legislation about compensation and the provision of land is provided in the later section of this report.

C. ADB's Policy on Involuntary Resettlement

26. The ADB policy on involuntary resettlement is detailed as "Safeguard 2" in the ADB Safeguard Policy Statement (SPS) 2009. It emphasizes ADB's efforts to assist developing member countries in pursuing sustainable and inclusive economic growth. ADB in this context is committed to ensuring the social and environmental sustainability of the projects it supports.

27. In this context, the goal of the safeguards is to promote the sustainability of project outcomes by protecting people from projects' potential adverse impacts. The objectives of ADB's social safeguards are to:

(i) avoid adverse impacts of projects on people, where possible;
(ii) minimize, mitigate, and compensate for adverse project impacts on affected people when avoidance is not possible; and
(iii) help borrowers/clients to strengthen their safeguard systems and develop the capacity to manage social risks.

D. Comparison of Tonga system and ADB requirements

28. The main variation between Tonga laws/regulation and ADB Safeguards policy are outlined in Table 2 below. Any key differences have been resolved of ADB policy, particularly in areas where practices are less subject to independent oversight.

29. Comparison of the Tonga laws with the ADB requirements on involuntary resettlement under the Safeguard Policy Statement indicates that key elements of the ADB Policy are present in Tonga laws -particularly those related to valuation of immovable property. The ADB's principle of avoidance or minimization of resettlement is also reflected in Tongan Legislation.

30. The key policy difference is about providing compensation to affected person (APs) without lease/title to land and structures and provision of proactive livelihood restoration and improvement activities for APs. The APs under this Project are landowners of affected

allotments; however, this is not expected to be an issue as they are supportive of leasing their lands to the project.

Table 2. Gap Analysis between ADB SPS and Tonga Laws on Land Acquisition and Resettlement

ADB SPS Requirements on Involuntary Resettlement	Tonga Laws on Land Acquisition / Resettlement	Equivalence or Gaps between ADB SPS and Tonga Laws	Gap filling measures
Avoid involuntary resettlement wherever possible. Minimize involuntary resettlement by exploring project and design alternatives.	Not specified in Tongan law.	Gap.	ADB Policy applies
Enhance, or at least restore, the livelihoods of all displaced persons in real terms relative to pre-project levels. Improve the standards of living of the displaced poor and other vulnerable groups.	Tongan law does not provide for compensation to improve livelihoods or housing, or specify the type or timing of compensation payable for assets.	Gap.	ADB Policy applies
Screen the project early on to identify past, present, and future involuntary resettlement impacts and risks. Determine the scope of resettlement planning through a survey and/or census of displaced persons, including a gender analysis, specifically related to resettlement impacts and risks.	Not specified in Tongan law.	Gap.	ADB Policy applies
Carry out meaningful consultations with APs, host communities, and concerned NGOs. Inform all displaced persons of their entitlements and resettlement options. Ensure their participation in planning, implementation, and monitoring and evaluation of resettlement programs. Pay particular attention to the needs of vulnerable groups, especially those below the poverty line, the landless, the elderly, women and children, and Indigenous Peoples, and those without legal title to land, and ensure their participation in consultations.	No specific policy in Tongan Law. However, customary practice is to consult with all affected and potentially affected people. APs are informed and consulted on the project, plans, and the actions to be taken particularly in respect to compensation entitlements and options. There are no specific provisions for vulnerable people in Tongan low. However, such practice is embedded in the customs and traditions of Tonga and the land tenure system. No specific policy in Tongan Law distinguishing between rich and poor; all citizens are treated equally.	Tongan practice is in line with ADB policy.	
Establish a grievance redress mechanism to receive and facilitate resolution of the affected persons' concerns. Support the social and cultural institutions of displaced persons and their host population. Where involuntary resettlement impacts and risks are highly complex and sensitive, compensation and resettlement decisions should be preceded by a social preparation phase.	Grievance redress mechanisms are approved by Tonga on a project-by-project basis. Given traditional and customary processes of communication, community structures and leadership, procedures are often well communicated. However, these same societal structures can allow for power differentials to occur.	Tongan practice is in line with ADB policy.	
Improve, or at least restore, the livelihoods of all displaced persons through (i) land-based resettlement strategies when affected livelihoods are land based where possible or cash compensation at replacement value for land when the loss of land does not undermine livelihoods, (ii) prompt replacement of assets with access to assets of equal or higher value, (iii) prompt compensation at full replacement cost for assets that cannot be restored, and (iv) additional revenues and services through benefit sharing schemes where possible.	Land Act, Section 141 provides powers to the Minister of Lands in case of loss of land for compensation in the form of land and/or cash. Land Act, Section 141 (2) provides for the payment of cash compensation for loss of structures. Tongan Land law provides for compensation to legal land users for crop/tree losses at rates determined by the government and established by Ministry of Agriculture. In practice, compensation is generally paid within a timeframe prior to the action of the civil works.	Tongan policy complies with ADB policy.	None required for this project
Provide physically and economically displaced persons with needed assistance, including the following: (i) if there is relocation, secured tenure to relocation land, better housing at resettlement sites with comparable access to employment and production opportunities, integration of resettled persons economically and socially into their host communities, and extension of project benefits to host communities; (ii) transitional support and development assistance, such as land development, credit facilities, training, or	No specific policy in Tongan Law. Tongan customs and traditions provide support for certain groups.	Tongan practice is in line with ADB policy.	None required for this project

ADB SPS Requirements on Involuntary Resettlement	Tonga Laws on Land Acquisition / Resettlement	Equivalence or Gaps between ADB SPS and Tonga Laws	Gap filling measures
employment opportunities; and (iii) civic infrastructure and community services, as required.			
Improve the standards of living of the displaced poor and other vulnerable groups, including women, to at least national minimum standards. In rural areas provide them with legal and affordable access to land and resources, and in urban areas provide them with appropriate income sources and legal and affordable access to adequate housing.	Tongan law does not provide for compensation to improve livelihoods or housing. Tongan customs and traditions provide support for certain groups. There is no law relating to this provision.	Gap.	ADB Policy applies
Develop procedures in a transparent, consistent, and equitable manner if land acquisition is through negotiated settlement to ensure that those people who enter into negotiated settlements will maintain the same or better income and livelihood status.	Not specified in Tongan Law.	Gap.	ADB Policy applies
Ensure that displaced persons without titles to land or any recognizable legal rights to land are eligible for resettlement assistance and compensation for loss of non-land assets	Land users with no legal registration have no rights.	Gap.	ADB Policy applies
Prepare a resettlement plan elaborating on displaced persons' entitlements, the income and livelihood restoration strategy, institutional arrangements, monitoring and reporting framework, budget, and time-bound implementation schedule.	Not specified in Tongan Law.	Gap.	ADB Policy applies
Disclose a draft resettlement plan, including documentation of the consultation process in a timely manner, before project appraisal, in an accessible place and a form and language(s) understandable to affected persons and other stakeholders. Disclose the final resettlement plan and its updates to affected persons and other stakeholders.	Land Act, Section 142 requires the Minister of Lands to notify affected persons of Government's intention to acquire land at least 30 days prior to resumption. In practice, APs are informed and consulted on the project, plans, and the actions to be taken particularly in respect to compensation entitlements and options.	Tongan practice is in line with ADB policy.	
Conceive and execute involuntary resettlement as part of a development project or program. Include the full costs of resettlement in the presentation of project's costs and benefits. For a project with significant involuntary resettlement impacts, consider implementing the involuntary resettlement component of the project as a stand-alone operation.	Note specified in Tongan Law.	Gap.	ADB Policy applies
Pay compensation and provide other resettlement entitlements before physical or economic displacement. Implement the resettlement plan under close supervision throughout project implementation.	No specific policy in Tongan Law. In practice, each involuntary resettlement is assessed according to the development project. Compensation is generally paid within a timeframe prior to the action of the civil works.	Tongan practice is in line with ADB policy.	
Monitor and assess resettlement outcomes, their impacts on the standards of living of displaced persons, and whether the objectives of the resettlement plan have been achieved by taking into account the baseline conditions and the results of resettlement monitoring. Disclose monitoring reports.	Not specified in Tongan Law.	Gap.	ADB Policy applies

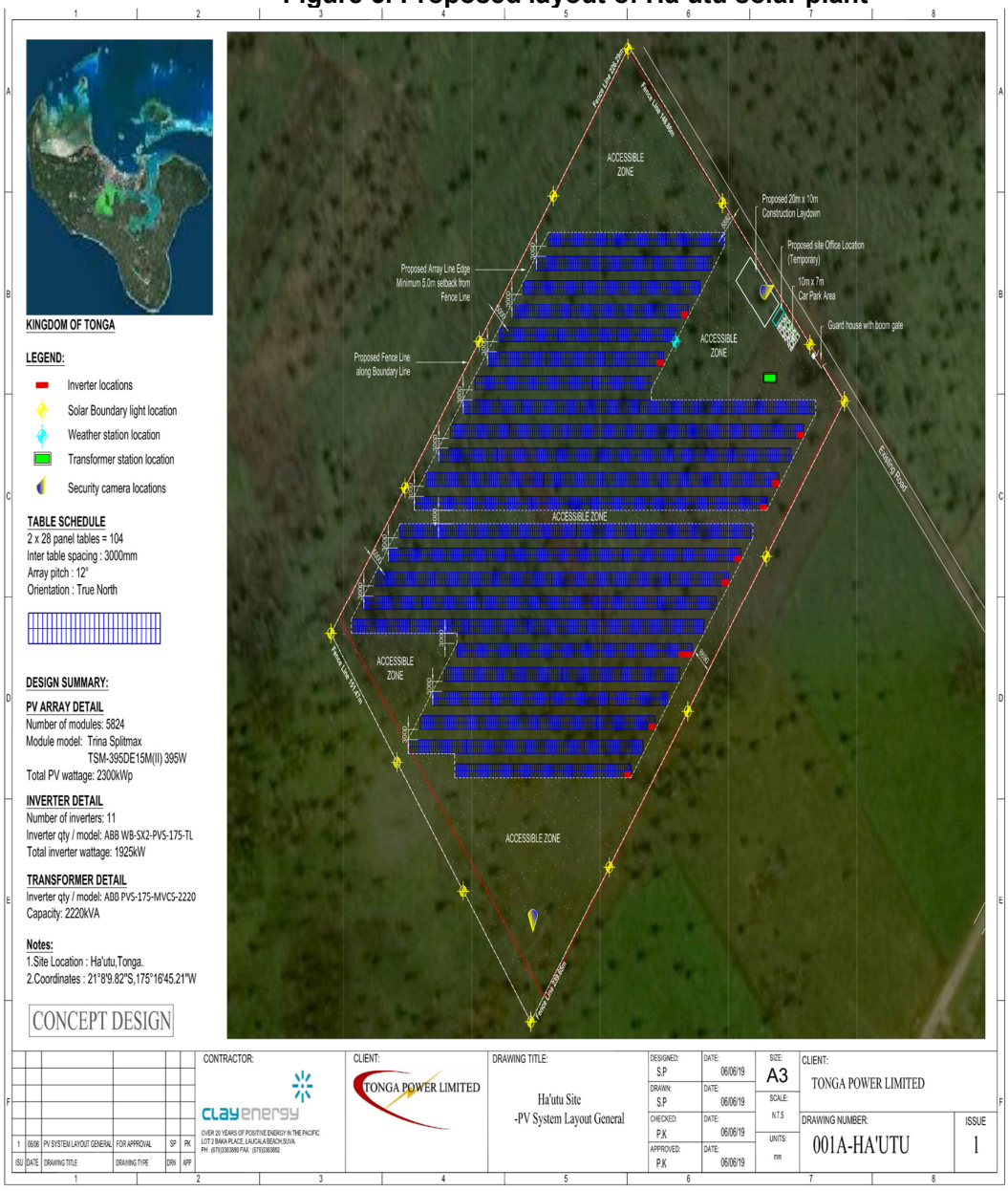
III. LAND REQUIREMENTS AND PROJECT IMPACTS

A. Land Requirement for the Project

31. **Solar Plants**. Establishment of 3 solar plants will require 24 acres of land, as illustrated in Table 3 and illustrated in Figures 3, 4 and 5. The land lease records are in appendix A.

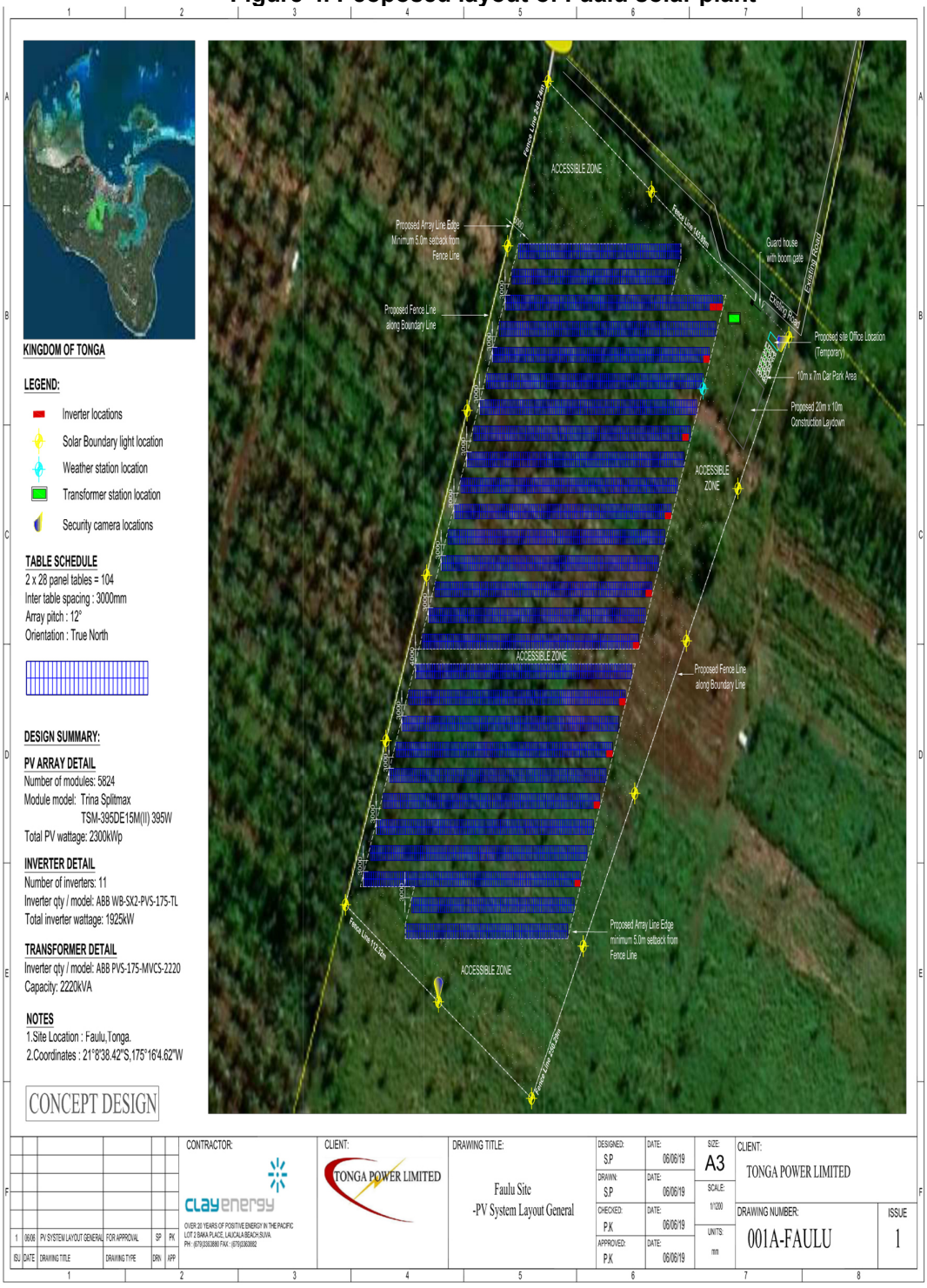
1. **Ha'utu.** The land parcel is underutilized agricultural land with mature mango trees, coconut trees and a variety of introduced low trees and grasses. The site is sometimes used for grazing.

Figure 3. Proposed layout of Ha'utu solar plant



2. **Fualu.** The Fualu site is idle agricultural land with senile coconut trees. There are also panicum grassland, mango trees, papaya trees, and introduced grasses and weeds present.

Figure 4. Peoposed layout of Fualu solar plant



3. **Liukava**. The Liukava site is also idle land with half of the allotment a coconut-grassland, and the other half, an overgrowth of secondary vegetation on the west and north-western parts.

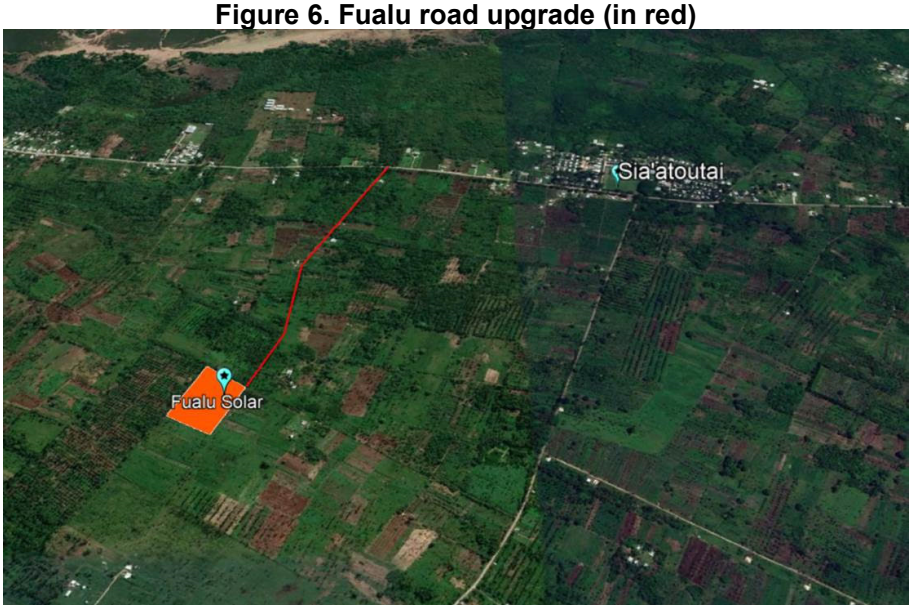
Figure 5. Proposed layout of Liukava solar plant

32. **Associated Facilities**. Upgrading of access road and transmission line extension is not expected to cause any involuntary resettlement impact. In case of any unanticipated impact which are known to be minimal and temporary such as temporary access during road upgrading

and damage or removal of productive trees or crops. This Due Diligence Report provides guidance on how these temporary impacts will be managed.

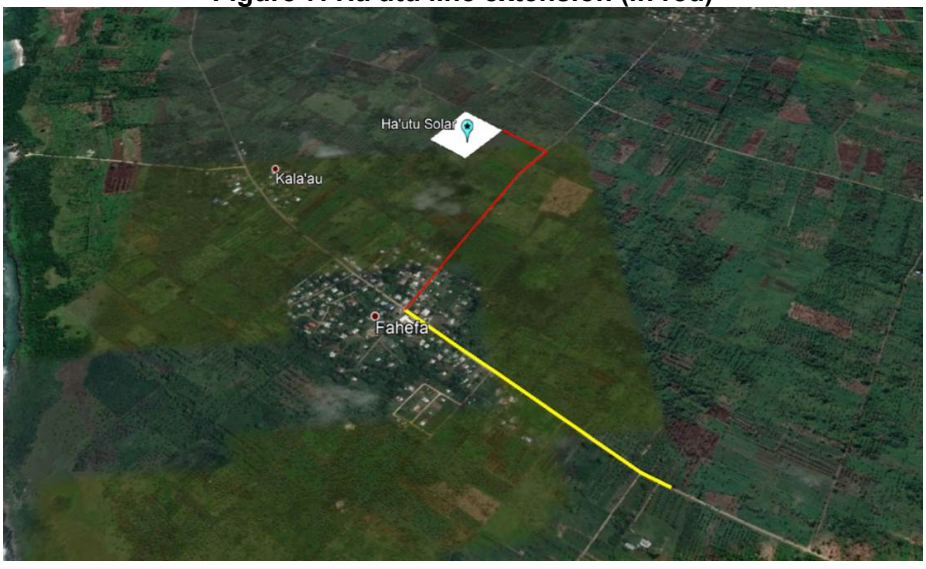
1. Fualu access road. The solar plant site at Fualu does not currently allow for adequate access to site. TPL will fund an upgrade to one existing rural road to enable the electricity line upgrades and materials to be delivered to site during the pre-construction and construction phase. The road is 1,075m in length from Hihifo Road and has a road reserve of up to 5m (1.33 acres in total area). No land acquisition is required as the road reserve already exists and TPL will work with residents living along the road well in advance of construction to reinstate the road reserve with minimal disruption.

Figure 6. Fualu road upgrade (in red)



2. Ha'utu transmission line extension. A 1.2km extension from the existing electricity line to the Ha'utu 2MW Solar Plant is required. The 11kV electricity lines are situated within the road reserve with a clearance of 5.5m and will not require additional land.

Figure 7. Ha'utu line extension (in red)



Overall, 24 acres of land is required by the project for the three sites on Tongatapu. Landowners for the 3 sites comprise of 2 nobles; Honourable Lavaka and Honourable 'Ata who administer his Majesty's estate at Fualu and Liukava and one private landowner for Ha'utu. The table below summarizes these land requirements.

Table 3: Summary of Land Requirements

Location	Project Description	Land Requirements	Current land use	Landowner lease agreement
1. Ha'utu Solar Plant	2MW Solar farm	8 acres	Idle agricultural land (livestock, coconuts)	Private landowner XXX
2. Fualu Solar Plant	2MW Solar farm	8 acres	Idle agricultural land (livestock, coconuts)	Hon. Lavaka
3. Liukava Solar Plant	2MW Solar farm	8 acres	Idle agricultural land (coconuts)	Hon. 'Ata
4. Fualu access road upgrade	Road rehabilitation	None	Rural road	Road reserve
6. Ha'utu electricity line	Electricity line extension to grid.	None	Rural road reserve	Road reserve
TOTAL		24 acres		3 landowners

Ha = hectare, m = meter, MW = megawatt, MWh = megawatt-hour, PV = photovoltaic.

B. Project Impacts

33. 6MW Solar Plants. These sites are leased by TPL with Cabinet's approval. A sublease between TPL and Sunergise for 25 years will be in place prior to construction.

34. Fualu access road - There is a rural road reserve of 5m in width as government land for the existing road. No land acquisition will be required. This subproject will only re-establish the road reserve. However if there are unanticipated impacts such as temporary access or the cutting of productive trees, the government compensation scheme applies.

35. Ha'utu electricity line - Within the existing road reserve (government land), 11m high poles will be located at 50 metre intervals to support the electricity line extension of 1.2 km.

36. Physical or Economic Displacement (any loss of trees, structures crops or income) - No households or persons will be physically and economically displaced by the Project. However, should there be any unanticipated impacts, the project will adhere to Government regulations and ADB guidelines on compensation. The project is also expected not to result in any other losses to structures, residences, or community assets (land or non-land) as well as trees or crops. In instances where this happens, in the cases of crops and trees, the project will utilize the schedule of payments under the Ministry of Agriculture; in the cases of structures or residences, this will be determined jointly by both the proponent, TPL and the affected land owner based on replacement cost of the said structure, residence or community assets. This will, however, be confirmed during the detailed design.

37. The Ministry of Agriculture and Food, Forests & Fisheries (MAFFF) uses a standard compensation table determined by Government. This uses average yields and pre-determined prices. ADB guidelines indicate that prices should be determined in the market and assume that the farmer sells at the peak price.

38. Compensation for the land will be offered either as a lump sum, annual payment or any variation depending on the preference of the landowners and agreement during negotiation. The leases will be undertaken between registered allotment owners and TPL as negotiated and approved by Cabinet.

Table 4: Entitlements Matrix

Table 6: Entitlement Matrix			
Type of Loss	**Specification**	**Affected People**	**Compensation Entitlements**
Permanent loss of rural or townland	All land losses independent of impact severity	Landowners	• Long term sub-lease based on the market value of the affected land. Or, once-off compensation equivalent to the 20-year lease, depending on the landowner's preference. • Provision of all legal and other expenses associated with the lease. • Compensation will be paid for unaffected portions of plots if they become unviable or have their usage rights altered after impact occurs. • Payment for the affected assets/improvements on the land to be leased.
Economic and physical displacement	All land and non-land losses	Any persons	• ADB SPS 2009 will be enforced in that assistance will be provided to vulnerable APs/DPs, if any identified, to ensure that living standards the same as, or wherever possible better than, pre-project levels. .
Permanent loss of rural or town land	All land losses independent of impact severity	Landowners	• Once off compensation payment equivalent to the 20-year lease payment to registered landowner
Crops	Crops affected	Land Users	• Cash compensation equivalent to the gross income from the crop calculated at the maximum annual market value of the total annual produce from affected land or the formal government rate – whichever is greater
Trees	Trees affected	Land Users	• Fruit Trees - The full cost of seedling, the cost of preparation of a garden and lost profit at annual income (using maximum annual market values) multiplied by the number of years of fruiting remaining or the regular government rate – whichever is greater. • Timber Trees - The full cost of seedling, the cost of preparation of a garden and maximum market value of maximum timber production per tree (at full maturity) or the regular government rate – whichever is greater.

VI. INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION

A. Project Stakeholders

39. There are three categories of stakeholders under this project: (i) government, (ii) landowners, allotment holders and nearby residents, and (iii) the public including power users and businesses.

40. The government stakeholders include: (i) national government, (ii) Ministry of Finance and National Planning (MFNP) (iii) Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications (MEIDECC) (iv) Ministry of Ministry of Land, Survey and Natural Resources (MLSNR) (v) Ministry of Internal Affairs (MIA) (vi) Ministry of Commerce, Tourism and Labour (MCTL) (vii) Ministry of Infrastructure (MOI), and (viii) Tonga Power Ltd (TPL). Under the local government, stakeholders include the District and and Town Officers as well as the immedieate communities within the main vicinity of the 3 sites.

41. Affected landowners include His Majesty and the two Nobles of the realm Hon. Lavaka and Hon. ‘Ata as well as the one private landowner (Mr XXX) owning the Ha’utu allotment.

B. Summary of Consultation

42. Consultation was undertaken in three stages: (i) during the feasibility study for TREP, (ii) during the environmental assessment process for TREP, and (iii) during the feasibility and environmental assessment process for this Project. Consultation during feasibility included consultation with government agencies regarding options to achieve GOT renewable energy targets by 2020. Consultation during EIA process for TREP were undertaken in April 2017 and August 2018 for the BESS installation.

43. Consultation specific to this Project was undertaken between March and May 2019 (Appendix C) and involved TPL and MEIDECC staff, local community leaders (Town Officers), community members from the three project areas. These initial consultations were held on Tongatapu in March-May 2019 in the villages of Fahefa, Kolovai and Fualu/Si’atoutai, the proposed 3 sites for the new IPP solar farms. The objective was to confirm community and stakeholder support and receive any concerns and recommendations for the project. In summary, affected landowners and respective communities, welcomed the proposal acknowledging that in increasing renewable energy inputs into the grid, there is potential for a reduction in the existing tariff. This would possibly reduce the costs of living and provide major economic and social opportunities to help alleviate national poverty. This was the main concern raised throughout all consultations, which is to ensure that future tariffs were made more affordable as a result of this investment in renewable energy sources. No other significant concerns were raised. Further consultations will be held prior to project implementation but in total, 87 people, 35 women (30%), were consulted this time around in all project sites.

44. Highlights of Consultations are as follows:

Concerns	Response
Western District Town Officer’s Consultation, 22 March 2019	
• The query he had for the team was how will this investment contribute to lowering the electricity tariff.	• ADB Country Office noted that this is critical question of affordability needed to be continually raised with Government. There is also a need for significant effort and analysis once this initiative has been implemented and operational to ensure that the tariff declines and not continue to increase.

	• The TPL CEO affirmed that the project can only contribute to further reduce tariff.
• specific benefits from the proposed project specific benefits to their communities from the proposed project, low tariff in comparison to the rest of the nation • roll out of consultations to the three individual communities	• TPL responded that any benefits from the project to tariffs will have to be nationwide as electricity produced will feed into the whole of Tongatapu's grid. • TPL added that conduct of consultation is critical and will be rolled out to the respective communities
Fahefa community consultation, 28 March 2019	
• any potential health risks and hazards to the community from construction and operation of the solar farm given their close proximity (radiation, query if it had any impacts on increased tropical cyclones)	• TPL responded that renewable energy from solar had no known radiation impacts on human life. The only danger would be from getting electrocuted like any other source of power generation but assured the community that the site would be well fenced off from the community and any batteries would be containerized. As a natural source of energy there would also be no contribution to the frequency of tropical cyclones.
• status of land acquisition	• TPL informed the participants that out of the 3 sites, the Fahefa site was the only one with pending confirmation as the exact location of the site has not been fully confirmed and TPL is still in discussion with the landowner.
• tariff reduction	• TPL responded that this is a nationwide issue that would be determined eventually. TPL added though that the tariff is expected to decrease.
Kolovai community consultation minutes, 11 April 2019	
• benefits from the project	• TPL responded that benefits from the project include decrease in tariffs, overall the benefits are on the environment with a reduction in carbon footprint and economical with reduced cost of living. • This led to discussion on how the electricity tariff would decrease as a result of the project with TPL explaining the dynamics of a national tariff review and adjustment.
Fualu/Si'atoutai community consultation minutes, 01 May 2019	
• Potential risks and dangers to the community due to construction and operation of the proposed solar farm	the TPL team assured the community that renewable energy from the natural sun had no known harmful impacts on human life and the environment. The only danger would be from getting electrocuted like any other source of power generation but assured the community that the site would be well fenced off from the community and any batteries would be containerized.

• Will this investment bring about a drastic reduction in tariff	• The TPL representative responded that this is one of the major benefits foreseen for the project. A decrease in tariff will be made possible by additional electricity produced from these solar farms as they would be cheaper to run and operate than the current diesel generators. This is, however, a long-term process and would not happen overnight.

C. Disclosure

45. This DDR and all due diligence documents are subject to disclosure, and therefore will be made available to the public. Adhering to the ADB Access to Information Policy 2018, this DDR will be disclosed on ADB's website. TPL will also disclose this report and project information locally and provide a one-page summary in theTongan language.

VII. GRIEVANCE REDRESS MECHANISM

A. Grievance Procedures

46. People may perceive or experience negative impacts of the Project and have a right to have their complaint heard and acted on in a timely manner. It is an ADB requirement to establish a grievance redress mechanism (GRM) for the life of the Project.

47. TPL have an existing complaints procedure given their standing as a key utility company for the majority of the population. The GRM is for those who have concerns about project-specific issues. It is (i) easily accessible and free from repercussions for those making a complaint and (ii) sensitive to culture and gender and reflects local traditions for conflict resolution. The process will not incur costs or retributions and will not impede access to Tonga's judicial or administrative remedies.

48. **Access to GRM**. Concerned persons can either raise their grievance to Sunergise in person to the Site Manager, CLO or EHS Officer on-site, as well as to TPL via (i) email to powerbillstbu@tongapower.to or feedback@tongapower.to; (ii) phone call to the fault line (phone 944 at any time day or night), or (iii) in person at the TPL office where they can lodge a verbal complaint or written complaint into the feedback box. TPL customer service personnel direct the issue to the correct division in TPL, where divisional managers are responsible for resolving the issue and providing feedback to the complainant within the regulated timeframe. Each complaint is recorded in TPL's Complaints Register which is monitored by the Risk and Compliance Division on a monthly basis. The Risk and Compliance Manager reports progress and performance on complaints and queries to the Board and Ministry each month.

49. For site-related concerns, the CLO will maintain a grievance log and discuss grievances appropriate for TPL's resolve with them. TPL and Sunergise will report grievances at the time they arise, and through the fortnightly reporting process.

50. **Grievance procedures**. Project stakeholders have been informed that they can ask any questions or discuss grievances with Project staff, TPL representatives or district/town officers by phone or in person. A complaints register will be maintained by TPL on behalf of all parties. Response times are five working days for customer queries/complaints and two days for electrical faults or outage. This process is governed by TPL and the Electricity Commission.

51. If the complaints are not responded to in the timeframe above, the Risk and Compliance Manager will respond or delegate staff for a response.

52. Table 7 outlines the GRM process and escalation if a satisfactory solution cannot be found.

Table 7: Grievance Resolution Process

GRM	Steps	Timeframe
Site managers or District Officer / Town Officer	Complaints made to DO, TO or site manager. Questions and/or complaints recorded in site register. Parties seek mutually satisfactory solution. If no solution is possible or response is unsatisfactory, complaint raised to next level.	ASAP 5 days
TPL	TPL proposes solution to complainant and meeting with relevant parties takes place to resolve the issue.	5 days
TPL	If the issue cannot be resolved within the timeframe it is raised to the TPL's Risk and Compliance Manager for resolution.	5 days
Minister - MEIDECC	If the issue is still not resolved it is escalated to the Minister for a decision.	1 month

Court	If the decision is still unacceptable to the complainant, they may take it before the Court (Land Court or other relevant court). The complainant has the right to take the issue to court if they are not satisfied with the outcome or solution. Court makes a final decision that is binding on all parties.	Court procedural timeframes

VIII. INSTITUTIONAL ARRANGEMENTS

A. Project Management.

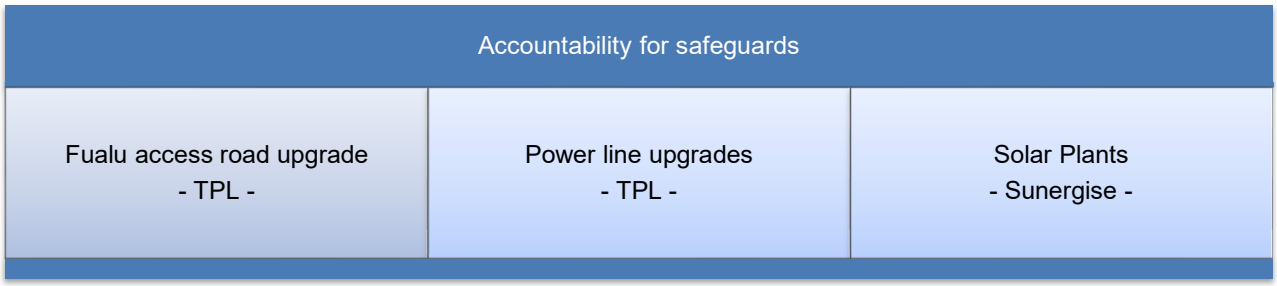
53. The figure below illustrates the proponent's involvement in, and responsible for, safeguards in relation to the Project and its associated facilities. Sunergise New Zealand will be responsible for the project management of the three solar plants. This involves detailed design, ordering and importation of equipment, procurement of local civil works contractors (vetted by TPL), contract management, supervision of civil works and commissioning of solar plants. Sunergise will engage an Environmental, Health and Safety Officer (EHS) and Community Liaison Officer (CLO) during pre-construction, construction and early operations phases.

56. TPL will be responsible for the project management of Fualu access road upgrade and the power line upgrades in readiness for the commissioning of the three 2MW solar plants. This involves detailed design, land surveying of road reserve and confirmation of land boundaries, supervision of linesmen and civil works contractors, community consultation and liaison with relevant government agencies for permits and sign-off/completion.

57. MEIDECC DOE have mandate to ensure the ESMP and conditions of environmental permit(s) are complied with.

58. Ministry of Infrastructure (MOI) have a mandate to ensure quality Building Codes and Standards and engineering standards and approval, as well as enforcement of planning policy and regulation such as compliance with building and road permits.

Safeguard responsibilities



59. Sunergise, and any contractors involved in implementing the Project, have responsibility for meeting the costs associated with implementing and adhering to ESMP prepared for the proposed project[4], any relevant environmental and social mitigation measures, occupational health and safety (OHS) requirements, compliance with applicable national labor laws and GOT's COEPs for renewable energy projects in Tonga. Compliance with safeguards, applicable national laws and permit conditions are the responsibility of the parties outlined in the above figure.

[4] Please refer to Project IEE

IX. MONITORING AND REPORTING

60. **Monitoring**. Sunergise will have Site Managers stationed at each solar plant site as a key focal point during pre-construction, construction and operational phases to monitor issues on a daily basis. Sunergise, will engage a Community Liaison Officer (CLO) and will work together with the EHS Manager to monitor and resolve issues related to the project across all sites on a daily basis.

61. **Reporting**. The Site Manager will report to Sunergise management on a weekly basis. Sunergise will report to TPL on a fortnightly basis (as per the PPA) and to ADB on a bi-annual basis during construction then on annual basis during operations. Reports will contain a summary of compliance checks, health and safety issues, complaints or safeguard issues and corrective action. TPL will report if there are any unanticipated social impacts and provide status of its compliance with applicable Government regulations and ADB guidelines on compensation.

APPENDIX A - LEASE RECORD AND CABINET APPROVAL

Fualu (Pea)

2. Cabinet Decision No. 536 (1st May 2019) approved as follows –

Lessee	Tonga Power Ltd
Lessor	Lavaka
Area	8A 1R 00P
Purpose	Solar Farm
Rental	$1,000 per annum
Term	50 years
Effective	Date of Registration

Kolovai

3. Cabinet Decision No. 537 (1st May 2019) approved as follows –

Lessee	Tonga Power Ltd
Lessor	Ata
Area	8A 0R 00P
Purpose	Solar Project
Rental	$1,000 per annum
Term	30 years
Effective	Date of Registration

MINISTRY OF LANDS AND NATURAL RESOURCES
Government of the Kingdom of Tonga

Rosamond C. Bing
Chief Executive Officer

Tel: (676) 23 611 / 23 210
Email: ceo.mlnr@gmail.com

P. O. Box 5
Vuna Road, Nuku'alofa
Kingdom of Tonga

RINGO FA'OLIU
Chief Executive Officer
Ministry of Infrastructure
Nuku'alofa

18 June 2019

Dear Ringo,

PERMIT APPLICATION : TONGA POWER LTD
Lease Applications at Fualu/Pea (Tongatapu) and Kolovai (Tongatapu)

1. I write to advise and confirm on the status of the above sites, which Tonga Power Ltd (TPL) has secured for the construction of solar facilities.

Fualu (Pea)

2. Cabinet Decision No. 536 (1st May 2019) approved as follows –

Lessee	Tonga Power Ltd
Lessor	Lavaka
Area	8A 1R 00P
Purpose	Solar Farm
Rental	$1,000 per annum
Term	50 years
Effective	Date of Registration

Kolovai

3. Cabinet Decision No. 537 (1st May 2019) approved as follows –

Lessee	Tonga Power Ltd
Lessor	Ata
Area	8A 0R 00P
Purpose	Solar Project
Rental	$1,000 per annum
Term	30 years
Effective	Date of Registration

4. The Ministry of Lands is now expediting the conducting of the surveying and draughting the Deeds of Lease, which we are scheduled to be completed and registration effected by the end of this month. The approved land boundaries have already been provided by TPL to your office as part of its permit application.

5. Given the scheduled timeline for these projects, I would appreciate your accepting our foregoing advice as confirmation of TPL's legal interest in the said lands and the intention of the Lord Minister of Lands to register TPL as the Lessees, in due course. I trust you will process TPL's application accordingly.

6. Please do not hesitate to contact me for any clarification.

Yours sincerely,

FETU'U VEA
Acting Chief Executive Officer

Ministry of Lands and Natural Resources * Government of Tonga *

RE : ALEAPAU KI HE 'API TUKUHAU Í HA'UTU, TONGATAPU

KO E ALEAPAU NI 'oku fakahoko 'i he 'aho 2 'o e mahina ko 'Aokosi 'o e ta'u 2019 'i Nuku'alofa.

'I HE VAHA'A

'o Salesi Kafalava 'o Masilamea, Tongatapu
(ko e Ma'u 'Api 'o e 'api tukuhau : Tohi Fakamo'oni Ma'u 'Api 23/44)

PEA MO

Mosese 'Uhila 'o Tofoa, Tongatapu
(ko e Lesii 'o e Lisi Fika 9394 'a ia ko e lisi 'eka 'e 4 'o e 'apitukuhau 'a Salesi Kafalava)

'OKU 'OSI FEMAHINO'AKI 'A E ONGO TAFA'AKI 'I HE 'AHO NI 'O PEHEE:

1. Ke tamate'i 'a e Lisi Fika 9394 koe'uhi ke 'ataa 'a e kelekele kia Salesi Kafalava ke alea lisi fo'ou mo e Tonga Power Ltd;

2. Ke fakahoko ki he 'Eiki Minisita Fonua 'i he faingamalie vavetaha 'a e aleapau ni; pea

3. Ke fakafoki 'e Mosese 'Uhila 'a e tatau mo'oni 'o e Lisi Fika 9394 ki he 'Eiki Minisita Fonua.

'I HONO FAKAMO'ONI 'O E ALEAPAU NI, 'OKU FAKA'ILONGA'I AI 'OKU TALI LELEI 'E HE ONGO FA'AHI 'AE FAKAIKIIKI 'O E ALEAPAU NI.

Fakamo'oni 'ihe 'aho 2 'o 'Aokosi 2019.

Salesi Kafalava
Ma'u 'Api

Mosese 'Uhila
Lesii

Fakamo'oni
Hingoa :

F. 2.8.2019
Hrs. 1125 Am

Fakamo'oni
Hingoa :

Foomu L9

Tu'asila TPL
Ph. MATATOA
Date 2 . 8 . 2019

Ki he 'Eiki Minista Fonua
The Hon. Minister of Lands.
Nuku'alofa

Tangata'eiki,
Sirs,
'Oku ou faka'apa'apa mo fai 'eku no fonua ke lisi 'a e konga 'i MASILAMEA pea koe fakamatala
I have the honour to make application for the lease of certain property at more particularly

kiai 'oku ha 'i lalo ni. Ko e taumu'a 'a ia 'oku faka'amu ke ngaue'aki kiai 'a e konga 'api kuo lau kiai ko e SOLAR FARM
describe below. The purpose for which i wish to use the said property is

Vahe Fonua 'o *District of*	Tofi'a 'o *Estate*	'Apikolo pe 'api tukuhau 'aho ne lesisita ai 'apikolo *Tax 'api date of registration*	Ko hono kotoa 'o hono lahi 'o e kelekele 'oku ma'u *Area of holding*
TONGATAPU	GOVERNMENT	3-3-1927	8A 1R 0.5P
Hono fakaofiofi 'o e konga 'oku no *Approximated area require*	**Lahi 'o e ta'u ke fai kiai** *Terms of years*	**Lisi 'i he Ta'u** *Rent per annum*	**Pa'anga totongi fua** *Amount survey fee*
8A 1R 0.5P	20	$1500.00	$80.50

Fakamo'oni 'a 'ana 'oku no fonua [signature]
Signature of applicant
For TONGA POWER LIMITED

TONGA POWER LIMITED

'Oku ou fakaha heni 'oku ou loto ke lisi 'a e kelekele 'oku fakamatala kiai 'i 'olunga peau fakapapau foki 'oku
I hereby agree to the lease of the property as describe above and declare that there is no impediment
'ikai ha me'a ke ta'ofi ai 'a e no fonua ni
to prejudice this lease

Fakamo'oni 'a'ana 'oku 'o'ona 'a e kelekele Salesi Kafalava
SALESI KAFALAVA
Signature of Grantor

Fakamo'oni [signature]
Witness signature
TU'I'ILEI'ILA KAFALAVA

Fakamatala 'a e Minisita Fonua pe ko hono fakafofonga 'Api Lesisita – 3.3.1927
Re: Land Lease agreement between SALESI KAFALAVA as Lessor and Tonga Power Ltd as Lessee.
Hingoa – Ha'afia Fonga
Lahi – 8A 1R 0.5P
Tu'unga – Block 80/86 Lot 75
Mort. – Nil D/G. 23/144
[signature] E. 2.8.2019
Hrs. 1055 Am.

TOFI'A

Lahi 'o e kakai Tukuhau *Total number of tax payers*	Lahi 'o e kelekele lisi ki he muli *Area leased Foreigners*	Lahi kelekele lisi ki he Tonga *Area leased Tongans*	Lahi 'o e Tofi'a *Total area of Tofi'a*	Lahi 'o e 'api fakatofi'a *Total area of Noble's Reserve*

Fika 'o e tohi tali totongi fua........................
Survey fee Official Receipt No.

'Aho........................
Date

....
Minisita Fonua pe ko hono fakafofonga
Minister for Lands or Deputy

APPENDIX B – CONSULTATION RECORDS

SUMMARY OF PERSONS CONSULTED IN TONGATAPU

STAKEHOLDER CONSULTATIONS

Fahefa, Kolovai & Fualu-Si'atoutai, March-April 2019

BRIEF

This is a record of the initial stakeholder consultations conducted for the proposed 6MW solar farms to be built on Tongatapu under a power purchase agreement between Tonga Power Limited (TPL), the Government of Tonga and Sunergise International. The newly established independent power producer (IPP) will complement the ongoing Outer Island Renewable Energy Project (OIREP) and the recently approved Tonga Renewable Energy Project (TREP) to accelerate moving the country towards the Tonga Energy Road Map (TERM) goal of 50% renewable energy production by 2020. Strategically this proposal is in line with the goal of achieving sustainable and affordable electricity whilst maintaining financial profitability.

TPL as the only electricity utility in Tonga is assisted by this initiative to utilize third parties for electricity generation. It is essential in this context that the lowest cost of funding such developments be achieved whilst maximizing benefits to TPL and its customers, and not compromise on quality, standards and delivery of renewable energy in replacing fossil fuel (diesel). This not only contributes to the achievement of TERM goals, but in addition supports the strategic direction of lowering electricity tariffs for the people of Tonga.

These initial consultations were held on Tongatapu in March-April 2019 in the villages of Fahefa, Kolovai and Fualu/Si'atoutai, the proposed 3 sites for the new IPP solar farms. The objective was to confirm community and stakeholder support and receive any concerns and recommendations for the project. In summary, affected land owners and respective communities, welcomed the proposal acknowledging that in increasing renewable energy inputs into the grid, there is potential for a reduction in the existing tariff. This would possibly reduce the costs of living and provide major economic and social opportunities to help alleviate national poverty. This was the main concern raised throughout all consultations, which is to ensure that future tariffs were made more affordable as a result of this investment in renewable energy sources. No other significant concerns were raised.

Further consultations will be held prior to project implementation but in total, 87 people, 35 women (30%), were consulted this time around in all project sites.

CONSULTATION AGENDA

The consultation team was led by TPL's strategic planning division with the aid of the energy division from MEIDECC and the ADB country office. The task was to touch base with relevant communities and the agenda for consultations comprised the following:

(i) TPL and MEIDECC to present the national strategy for renewable energy,

(ii) TPL to introduce the proposed scope of project works, institutional setup as well as expected roles and responsibilities of TPL/MEIDECC/ the Private Sector and Community,

(iii) Ensure discussion on potential concerns and document recommendations,

(iv) Ensure discussion on procedures for grievance redress, and

(v) Inform affected land owners about the policies and procedures regarding entitlements for the land to be leased by the project, if applicable.

Western District Town Officer's consultation minutes (22/03/2019)

The meeting was officially opened with a prayer by the Western Tongatapu District officer.

MEIDECC OIC then gave welcoming remarks noting the purpose of the meeting, to present the proposal and potential scope of works, confirm community support for the project and provide an opportunity for critical stakeholder feedback.

TPL CEO in support, went into further detail on the scope of works ranging from necessary land acquisition, construction of the solar farms, the modality of an IPP, to the technical aspects of renewable energy contribution to the existing grid. He re-emphasized the critical need for meaningful consultation with relevant communities.

The TPL team then gave a power point presentation with visuals on the proposed project, illustrating what was envisaged to be built and implications for relevant communities.

The floor was then open for discussion, questions and clarifications.

A village town officer thanked the team for presenting the proposal which he feels all the communities will be in clear agreement with. The economic opportunities that would be enabled by the investment he is assured will be welcomed by his village. The query he had for the team was how will this investment contribute to lowering the electricity tariff.

The ADB country office representative in response noted that it was a critical question that needed to be continually raised with Government as it centered around the issue of affordability. There needed to be significant effort and analysis once this initiative was implemented and operational, to ensure that the tariff declines and not continue to increase.

The TPL CEO added further that since July 2017, a bar had been set on the tariff with the goal to not exceed this limit. He affirmed that the project can only contribute to further reduce tariff.

Another village town officer queried on whether there were specific benefits to their communities from the proposed project, such as a lower tariff in comparison to the rest of the nation. In addition, he asked if it was the intention to roll these consultations out to the three individual communities.

The TPL representative responded that any benefits from the project to tariffs will have to be nationwide as electricity produced will feed into the whole of Tongatapu's grid. He also noted that it was critical for these consultations to be rolled out to their respective communities and requested that the times and venues be arranged with the TPL team to carry these out.

The Western Tongatapu district officer noted that it was very important to roll out consultations to the individual communities, as it will give ownership of the project to the communities themselves.

The TPL CEO in response confirmed that his team will be contact over the next week or so to arrange an appropriate consultation schedule depending on availability of the respective communities. He also emphasized the need to for a gender balance in meetings and the addition of youth and other vulnerable groups. Furthermore, the language will be less technical when it goes out to the community to ensure that the message is well received.

The MEIDECC OIC and TPL CEO thanked the district and town officers for their attendance and active participation and the District officer reciprocated on behalf of the town officers before closing the meeting with a prayer.

Fahefa community consultation minutes (28/03/2019)

The meeting was officially opened with a prayer by the village church minister.

The TPL team gave welcoming remarks noting the purpose of the meeting which was to present the proposal and potential scope of works, confirm community support for the project and provide an opportunity for critical community feedback.

The TPL team then gave the power point presentation with visuals on the proposed project, illustrating what is envisaged to be built and implications for the village community. The presentation covered in detail the scope of works ranging from necessary land acquisition, construction of the Fahefa solar farm to the technical aspects of renewable energy contribution to the existing grid.

The floor was then open for discussion, questions and clarifications.

The village town officer thanked the team for presenting the proposal which he and his community are fully supportive off and queried when the project was scheduled to start.

TPL indicated that the scheduled timeline was sometime in June 2019.

The discussion then focused on any potential health risks and hazards to the community from construction and operations of the solar farm, given their close proximity. One member of the community was especially concerned about radiation and another community member wanted to know if it had any impacts on increased tropical cyclones.

TPL in response noted that renewable energy from solar had no known radiation impacts on human life. The only danger would be from getting electrocuted like any other source of power generation but assured the community that the site would be well fenced off from the community and any batteries would be containerized. As a natural source of energy there would also be no contribution to the frequency of tropical cyclones.

On the issue of land acquisition, TPL noted that of the 3 sites, the Fahefa site was the only one pending confirmation as the exact location of the site had not been fully confirmed yet as they were still in discussions with the landowner.

A member of the community then posed a question on the potential to reduce tariffs if the project went ahead as planned.

TPL in response noted that this was a nationwide issue that would be determined eventually in the long term. TPL was assured though that the tariff is expected to decrease.

The ADB country office then wrapped up proceedings as there were no further queries and thanked the community for their attendance and active participation. The town officer reciprocated on behalf of the community before the village church minister closed the meeting with a prayer.

Kolovai community consultation minutes (11/04/2019)

The meeting was officially opened with a prayer by the village town officer.

The TPL team gave welcoming remarks noting the purpose of the meeting which was to present the proposal and potential scope of works, confirm support for the project and provide an opportunity for critical community feedback.

The TPL team then gave the power point presentation with visuals on the proposed project, illustrating what is envisaged to be built and implications for the village community. The presentation covered in detail the scope of works ranging from necessary land acquisition, construction of the Kolovai solar farm to the technical aspects of renewable energy contribution to the existing grid.

The floor was then open for discussion, questions and clarifications.

A community member thanked the presenters for the presentation then posed the question of whether the Kolovai community would have any special benefits from the project.

In response the TPL representative responded that any benefits from the project such as a decrease in tariffs will have to be nationwide as electricity produced will feed into the whole of Tongatapu's grid. Overall the benefits are for the nation as a whole both environmentally with a reduction in our carbon foot print through the use of natural energy sources as well as economically with a contribution to lessening the cost of living.

This led onto a discussion on how the electricity tariff would decrease as a result of the project with TPL explaining the dynamics of a national tariff review and adjustment.

Similar concerns were raised on the risks to the environment and human life from the operation of a solar farm, and TPL again reassured the community that they had nothing to fear.

A final question was posed on the timeline for project implementation and TPL explained that the project was expected to begin in June 2019 with the power purchase agreement recently signed in late March.

As there no further queries, the TPL representative thanked the town officer and his people for their attendance and active participation and the town officer reciprocated before closing the meeting with a prayer.

Fualu/Si'atoutai community consultation minutes (01/05/2019)

The meeting was officially opened with a prayer by the Deputy Principal of Si'atoutai College.

The TPL team gave welcoming remarks noting the purpose of the meeting which was to present the proposal and potential scope of works, confirm community support for the project and provide an opportunity for critical community feedback.

The TPL team then gave the power point presentation with visuals on the proposed project, illustrating what is envisaged to be built and implications for the village community. The presentation covered in detail the scope of works ranging from necessary land acquisition, construction of the Fualu/Si'atoutai solar farm to the technical aspects of renewable energy contribution to the existing grid.

The floor was then open for discussion, questions and clarifications.

A community member immediately queried the team on the potential risks and dangers to the community due to construction and operations of the proposed solar farm. Discussion centered around any harmful effects and whether there were any nuclear substances in the solar panels that can affect the immediate community.

In response, the TPL team assured the community that renewable energy from the natural sun had no known harmful impacts on human life and the environment. The only danger would be from getting electrocuted like any other source of power generation but assured the community that the site would be well fenced off from the community and any batteries would be containerized.

The emphasis of the project in this context is for the sustainable future of the country, through enabling TPL to generate, distribute and control electricity that would reduce the country's significant current reliance on fossil fuel, moving towards a more greener energy future.

The other major concern from the community that was raised was whether this investment would bring about a drastic reduction in tariff.

In response, the TPL representative noted that this was one of the major benefits foreseen for the project. A decrease in tariffs will be made possible by additional electricity produced from these solar farms as they would be cheaper to run and operate then the current diesel generators. It was however a long-term process and would not happen overnight.

The TPL representative thanked the Deputy Principal of the college and the community for their attendance and active participation and the Deputy Principal reciprocated on behalf of the school and community before closing the meeting with a prayer.

Consultation Pictures

Attendance List

LIST OF PARTICIPANTS
Of the
Tonga Power Limited Renewable Energy Projects Consultation
22nd March 2019; 2pm– 4pm
MEIDECC, Conference Room

Total number of participants: ~~[illegible]~~ 16

No	Name of Participant	Organization/Tittle	Contact	Signature
1	Salesi Manu	Ofisakolo	7723880	[signature]
2	Sione Mangumanga	D/O Hihifo	7717702	[signature]
3	Paulo H. Muller	T/O	8737587	[signature]
4	Luisi Fifita	Ofisakolo Kolovai	8479716	[signature]
5	Nikolasi Fonua	TPL / Strategic Development Mng	7863208	[signature]
6	Viliami Manuatu	Ofisakolo Kolonga	75-12313	[signature]
7	Tatafu Moeaki	ADB	7815722	[signature]
8	Kaione Jarl	ADB	7784547	[signature]
9	Salesi Manu	T/O Fahefa	7723880	
10	Vaka Ngauamo	~~[illegible]~~ T/O Haiutu		
11	Tanela Faletau	ADB	+63 999999 1633	[signature]
12	Soceta Tofu	~~[illegible]~~ MEIDECC	+676 8416052	[signature]
13	Ofa Sefana	Energy	+676 8853150	[signature]
14	Valeria Fifita	TPL	676 7784546	[signature]
15	Kakau Foliaki	Energy		[signature]
16	Andrew Kautoke	TPL	+676 7737869	[signature]

LISI ‘O E KAU MAI KI HE FAKATAHA

Felafoaki moe Kainga Fahefa/Ha’utu/Kala’au

3 - 5 ‘Epeleli 2019; 7:30pm

Tokolahi ‘oe kau Fakataha: 31

No	Hingoa	Kolo	Fika Telefoni	Fakamo’oni
1	Akesa Nuku	Hau'atu	41284	[signature]
2	Seluvaea Nuku	~	779883	SNuku
3	Kaione Loumoli	ADB	7784542	[signature]
4	Sinoke [illegible]	FAHEFA.	41411	[signature]
5	Asa Kinaeu	FAHEFA	7772618	[signature]
6	Sione Taufa Lomu	FAHEFA	7746467	SLomu
7	Kava Sepeti Ofa	fahefa	7746610	[signature]
8	[illegible] Pelu	Hau'atu	41663	[signature]
9	Teisia T. Taunua	Hau'atu	771710	[signature]
10	[illegible] Paea	Fahefa	62515	[signature]
11	Loloke Tonua	Fahefa.	7725337	[signature]
12	Okusitino Taufa	Fahefa.	8728680	[signature]
13	VILIAMI PUAFISI	Hau'atu	7765443	[signature]
14	Sosefina M Moala	Fahefa	7746768	Moala
15	[illegible]	Fehefa	7723820	[signature]
16	Tonita Tonga	Fahefa	7708521	Tonga
17	[illegible] Mangisi	Fahefa	41297	[signature]
18	Pauline Tonga	Fahefa	7787779	PTonga
19	Nanise Maldo	Fahefa	7702860	Maldo

20	Siu Afu	Fāhefa	7701558	[signature]
21	Losa Poea Talia	Fāhefa	7723187	[signature]
22	FELETI LATU	FAHEFA	8872084	[signature]
23	'Elalaki Moa	Fahefa	7772359	[signature]
24	Mele Taukeiaho	Fahefa	441153	[signature]
25	'Otolata Faingaa	Fahefa	7755452	[signature]
26	'Amelia Manu	Fahefa	8641391	[signature]
27	EMMA VEAMA	FAHEFA	776752	[signature]
28	Tonkase Halolo	Fāhefa	8405033	[signature]
29	MA Mosese	Fahefa	7752106	[signature]
30	L. MALOLO	Fahefa	8405053.	[signature]
31	Vaka Ngauamo	Hauta	7719739	[signature]

TONGA POWER LIMITED

LISI 'O E KAU MAI KI HE FAKATAHA

Felafoaki moe Kainga Kolovai
11 'Epeleli 2019; 7:00pm

Tokolahi 'oe kau Fakataha: 12

No	Hingoa	Kolo	Fika Telefoni	Fakamo'oni
1)	Feni Fotaeki	Kolovai	8409760	
2)	Tevita Toa	"	7756420	
3)	Feleti Sofele	"	7731909	
4)	Lepiona Fifita	"	41064	Fifita
5)	Feleti Katoa	"	8722266	
6)	Siosaia Fotu	✓	7704339	
7)	Sione Foliaki	✓	7735948	
8)	Lusi Vailanu	✓	7748412	
9)	Sione F. Moala	✓	7777-118	
10)	Semisi 'Afaki	✓	771-5227	

1

TONGA POWER LIMITED

No	Hingoa	Kolo	Fika Telefoni	Fakamo'oni
11)	Lusi Fifita	Kolovai	8493716	
12)	KAHO SINA	"	8835527	

2

TONGA POWER LIMITED

LISI 'O E KAU MAI KI HE FAKATAHA

Felafoaki moe Komiuniti Siatoutai

1 Me 2019; 11:00am

Tokolahi 'oe kau Fakataha: 28

No	Hingoa	Kolo	Fika Telefoni	Fakamo'oni
1	Laumaile 'Uhila	Simana	7721244	[signature]
2	Filesa. Mike Pongi	Simana	—	[signature]
3	Mele. Uai Havealeta	Simana	7748384.	[signature]
4	Rose. Peaomoeata ~~[illegible]~~	Simana	—	[signature]
5	Meleana. Tenifa Vaki	Simana	7711502	[signature]
6	Malina. Lotuleleí Manu	Simana	7716621	[signature]
7	Uhila. Halatanu.	Simana	—	U. Halatanu.
8	Salafina. ~~[illegible]~~ Finau	Simana	8702926	[signature]

1

TONGA POWER LIMITED

No	Hingoa	Kolo	Fika Telefoni	Fakamo'oni
9	Tofe [illegible] Nai	Simana		[signature]
10	Shalom Veamatahau	Siatoutai (Simana)	77-72356	[signature]
11	Meleane Fatai	Siatoutai (Simana)	77-30888	Fatai.
12	Sitaleki Fangalahi	Siatoutai	776115	[signature]
13	Seilani Fetuliaatea	Siatoutai	7709171	[signature]
14	Kamueli Talu	Siatoutai	7716111	[signature]
15	Anaseki [illegible]	Siatoutai	7763821	[signature]
16	Uesili Tokomaata	Siatoutai	7751930	[signature]
17	Anini Taufoou	Fila	8704328	[signature]
18	Sisaina Ikamanu.	Siatoutai (Simana)	7709688	[signature]
19	Fakahelone Sili	Siatoutai (Filatelefia)	77-65414	[signature]

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TONGA POWER LIMITED

No	Hingoa	Kolo	Fika Telefoni	Fakamo'oni
20	Folau Teimoffi	Efeso	8708577	[signature]
21	Sinisa Pikite	Leotisia	7773453	[signature]
22	Siona Blabo	Taiatafa	7701422	[signature]
23	Anthony Hufanga	Peakamosi	7738310	[signature]
24	'Aliki Matangi Fatai	Filatelifia	7512128	[signature]
25	Pene 'ofa	Safisi	7755804	P. 'OFA
26	Pita Vake	Leolisia	7706508	[signature]
27	[illegible]	[illegible]	878 [illegible]	[signature]
28	Mosese Holi	Kolotapu	—	[signature]

3