Papua New Guinea National Energy Access Transformation Project

(P173194)

ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK

February 2024

Papua New Guinea Power Limited

National Energy Authority

ACRONYMS AND ABBREVIATIONS

AIFFP	Australian Infrastructure Financing Facility for the Pacific
BESS	Battery Energy Storage System
BOO	Build Own and Operate
BOOT	Build-Own-Operate-Transfer
C-ESMP	Contractor Environment and Social Management Plan
CEPA	Conservation and Environment Protection Authority
DAL	Department of Agriculture and Livestock
DLIR	Department of Labour and Industrial Relations
DLPP	Department of Lands and Physical Planning
E&S	Environmental and Social
EMS	Environmental Management System
EPM	Employer's Project Manager
ESCP	Environmental and Social Commitment Plan
ESCoP	Environmental and Social Code of Practice
ESF	Environmental and Social Framework
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
ESS	Environmental and Social Standard
EUPRIP	Energy Utility Performance and Reliability Improvement Project
GBV	Gender-based Violence
GoPNG	Government of Papua New Guinea
GRM	Grievance Redress Mechanism
HPP	Hydro Power Plant
HV	High Voltage
IFC	International Finance Corporation
ILG	Incorporated Land Group
ILO	International Labour Organization
IPPF	Indigenous Peoples Policy Framework
IVA	Independent Verification Agency
JHA	Job Hazard Analysis
KCHL	Kumul Consolidated Holdings Limited
LARF	Land Access and Resettlement Framework
LLG	Local Level Government
LMP	Labour Management Procedure
LV	Low Voltage

MSK	Minimum Supply Kit
MV	Medium Voltage
MW	Megawatt
NEA	National Energy Authority
NEAT	National Energy Access Transformation Project (“the Project”)
NEC	National Executive Council
NEROP	National Electrification Roll-out Plan
NGO	Non-Government Organisation
OE	Owner’s Engineer
OHS	Occupational Health and Safety
PIM	Project Implementation Manual
PIU	Project Implementation Unit
PNG	Papua New Guinea
PPL	PNG Power Limited
PPP	Public–Private Partnership
PT	Project Team
RBF	results-based financing
SEA	Sexual Exploitation and Abuse
SEP	Stakeholder Engagement Plan
SH	Sexual Harassment
SHS	Solar Home System
SOE	State-Owned Entity
SOP	Standard Operating Procedure
TA	Technical Assistance
ToR	Terms of Reference
URP	Urgent Rehabilitation Plan
VAC	Violence Against Children
WB	World Bank

EXECUTIVE SUMMARY

Background

The Government of Papua New Guinea (GoPNG) has requested support from the World Bank for the Papua New Guinea National Energy Access Transformation Project (NEAT or the 'Project'). The Project will be implemented by the National Energy Authority (NEA) and PNG Power Limited (PPL). The Project Development Objective (PDO) is: *to increase access to renewable energy and enhance the reliability of electric supply.*

This Environmental and Social Framework (ESMF) will serve as the Project's umbrella for the environmental and social management document. The purpose of this ESMF is to guide NEA and PPL on the environmental and social screening of the Project activities and subsequent environmental and social assessment and management of these activities during project preparation, design and implementation - in a manner that meets the requirements of the World Bank Group and relevant PNG regulations, and aligns with the existing PPL environmental management system (EMS). This ESMF includes information on:

- Project activities
- Applicable PNG regulations and World Bank standards/guidelines
- Environmental and social context
- Environment and social risks, potential impacts and mitigation
- Screening processes for the various subprojects
- Incident management
- Implementation responsibilities, resources and capacity building
- Detailed protocols, procedures and templates to support the implementation of the ESMF (provided as appendices).

The ESMF is one of several instruments developed to manage the E&S aspects of the Project and is supported by:

- Environmental and Social Commitment Plan (ESCP).
- Stakeholder Engagement Plan (SEP).
- Land Access and Resettlement Framework (LARF).
- Labour Management Procedure (LMP) – refer ESMF Annex.
- Indigenous Peoples' Policy Framework (IPPF) – refer ESMF Annex.

Project Description

The Project consists of four components:

- Component 1: Rehabilitation, resiliency enhancement of PPL infrastructure, and on-grid electrification. Comprising three subcomponents:
    - 1.1: Grid rehabilitation, modernization and resilience improvement - Substations, and grid digitalization upgrades within the boundaries of existing power generation and transmission infrastructure.
    - 1.2: Grid densification and expansion for new household connection - LV/MV extensions up to approximately 5 km for densification works; and potently longer MV extensions for the grid expansion works; subsidy scheme for household connections covering all areas with grid access.
    - 1.3: Public-Private Partnerships (PPP) in existing mini-grids for clean energy and modernization - Capital grant to facilitate private investment in mini-grids and buy-down tariff. This will transform a status quo ante of 100 percent diesel mini-grid to a hybrid mini-grid by installing solar Photo Voltaic (PV) plus Battery Energy Storage System (BESS) as a clean energy source.

- Component 2: Renewable energy micro-grids and rural energy market development. Comprising two subcomponents:
    - 2.1: Micro-grid systems - Establishment of micro-grids in peri-urban/rural/remote areas where grid electricity cannot reach in next 10 to 15 years. The micro-grids to utilise renewable energy including solar and/or hydropower combined with or without battery storage, and have a maximum capacity of less than 1 MW.
    - 2.2: Solar home systems and products - Support growth off-grid solar markets through to support companies expand their offer of quality products and services, prioritizing underserved and rural populations. This will be done through catalytic and results-based framework grants.
- Component 3: Energy sector institutional development support. Comprising two subcomponents:
    - 3.1: NEA institutional development – Fund key studies for project implementation and sector policy development by NEA, including on preparation of pre-feasibility studies, preliminary design and bidding documents for Component 2, off-grid products technical standards, and cost-of-service.
    - 3.2: PPL institutional development - Provide small[1] hydropower and other variable RE pre-feasibility studies and support management and technical capacity development of PPL, including on pre-feasibility study stage environmental and social assessment.
- Component 4: Project management. Comprising two subcomponents:
    - 4.1: NEA project implementation support.
    - 4.2: PPL project implementation support.

The Project will be implemented across the country. Component 1 will be carried out in and around the existing main distribution network (i.e., Port Moresby Grid and Ramu Grid) and at select existing mini-grids (either Alotau, Kavieng, Kimbe, Lorengau and/or Wewak); Subcomponent 2.1 will be undertaken at some of the pre-identified micro-grid sites (contained in the NEROP report and to be selected during implementation) and potentially other locations; Subcomponent 2.2 will be undertaken primarily in rural areas incentivizing private sector to push their supply chains deeper towards underserved populations for off grid solar products; and Component 3 will investigate potential HHPs that would connect to (and therefore be in the vicinity of) the existing Port Moresby, Ramu and Gazelle grids and/or isolated mini-grids of PPL.

The primary beneficiaries of the Project are households, micro and small and medium enterprises, and communities in PNG who either did not have access to modern energy services or only had unreliable ones. The Project will also benefit NEA and PPL by supporting strengthened institutional capabilities to better plan, coordinate, regulate, and implement electrification projects and activities.

Key Risks and Potential Impacts

The Project's support for the expansion of electricity services is expected to have long-term positive impacts for target communities in the areas of health, education, safety and economic development, as well as the reduction of greenhouse gas emissions resulting from the electricity generation from renewable sources.

Despite this, there are potential environmental and social risks associated with the project. The key risks, potential impacts and mitigations identified are:

- Typical risks and impacts associated with construction activities (e.g., soil erosion, increased dust and noise, sedimentation, pollution from inappropriate hazardous materials

[1] Expected capacity of less than 10 MW.

management, community and occupational health and safety risks, theft and vandalism of newly procured equipment, materials and tools on site in preparation for construction) to be managed through preparation and implementation of Contactor Environmental and Social Management Plans.

- Generation of hazardous waste and non-hazardous waste through the renovation/replacement of infrastructure at substations and mini-grids to be managed through and preparation of detailed waste management plans to manage all expected waste types, including asbestos, contaminated land and waste oil (including potential PCB-contaminated oil).
- Generation of hazardous waste and non-hazardous waste through operations and decommissioning of mini-grids, micro-grids and solar home systems (e.g., solar panels and batteries), which will be managed in collaboration with suppliers, including the collection, storage, and disposal. To further support the suppliers on the feasibility to collect the waste batteries and solar panels, options for setting up a mechanism to collect used batteries and solar panels and centrally arrange for adequate disposal will be explored by NEA.
- Potential impacts from micro-grids with hydropower (e.g., sedimentation, disturbance to aquatic habitat, impact to downstream water resources) to be assessed and managed through project screening and preparation of site-specific mitigation measures.
- Typical operational impacts associated with operation of mini-grids (with solar PV, BESS and diesel generator), such as management of hazardous substances, emissions to air and noise, and fire safety risk. These will be assessed in the ESIA to be prepared for each mini-grid, and an Operations ESMP that will be prepared.
- Land and livelihood impacts (including social issues relating to crop compensation) associated with the establishment of sites/easements for mini-grid and micro-grid electricity generation; battery storage; and distribution infrastructure to be managed through application of the Land Access and Resettlement Framework.
- Transfer of existing land and social issues relating to land acquisition, past compensation agreements and cleared state-lease titles to be managed by undertaking land due diligence assessments as part of site selection for the mini-grid solar PV and BESS sites.
- Inequitable access to expanded electricity services within communities particularly for vulnerable social groups to be managed through implementation of Component 1.2 (grid access subsidies) for residences within the grid area and connection of all residences (where feasible) for residencies within the micro-grid areas for Subcomponent 2.1. Subcomponent 2.2 will also provide other means of electricity access (standalone home solar) and provide a variety of products at different price ranges.
- Social tensions and conflict resulting from real or perceived inequities concerning selection of target sites/communities will be mitigated through clear communication to communities of the wider electrification plan for PNG and explanation of all the ways to access electricity (e.g., grid, micro-grid, stand-alone home solar).
- Safety risks associated with the supply and use of electricity in communities with limited awareness of electrical safety to be mitigated through roll out of a community electrical safety awareness program.
- General labour and working condition risks for project workers to be mitigated through implementation of a Labour Management Procedure.
- Labour and working condition risks associated with solar PV panel supply chain and polysilicon suppliers, to be mitigated through procurement provisions including obtaining declarations and qualification requirements regarding forced labour from suppliers of solar panels and solar components.
- Labour risks associated with workforce restructuring at existing mini-grids, with a detailed roadmap for management of this issue to be developed by a specialist labour consultant early in project implementation (prior to going to market).

- Potential downstream, (i.e., future) E&S risks and impacts associated with TA activities to be managed by including ESSs requirements in the Terms of Reference (TOR) for TA activities.

Implementation

Implementation of the ESMF and other E&S risk management tools is the responsibility of the implementing entities. The implementing entities will each form a Project Implementation Unit (PIU) to oversee implementation of their components, comprising of a program/project manager, technical officers, procurement officers, financial management and E&S specialists.

Other parties involved in implementing the ESMF include consultants, construction contractors (who will be engaged to construct power lines, renovate power infrastructure, install micro-grid solar infrastructure), concessionaires (who would develop and operate the mini-grids under subcomponent 1.3, micro-grid developers (who will plan, oversee construction and then operate the micro-grids under subcomponent 2.1) and the WB (who will provide support to the implementing entities). The project will also finance a Grant Administrator (Component 4) and an Independent Verification Agency (subcomponent 1.2 and subcomponent 2.1). E&S resources will be included in the TORs for each of these contracts.

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1. INTRODUCTION

The Government of Papua New Guinea (GoPNG) has requested support from the World Bank (WB) for the Papua New Guinea (PNG) National Energy Access Transformation Project (NEAT or the 'Project'). The Project will be implemented by the National Energy Authority (NEA) and PNG Power Limited (PPL). The objective of the Project is to increase access to renewable energy and enhance the reliability of electric supply through supporting the implementation of several priority investments identified in the National Electrification Roll-out Plan (NEROP) implementation strategy and investment plan. The NEROP was developed to support the National Energy Policy for 2017-2027 which outlines an ambitious target of 70% electrification by 2030.

This Environmental and Social Framework (ESMF) will serve as the Project's umbrella environmental and social management document. The purpose of this ESMF is to guide NEA and PPL on the environmental and social screening of the Project activities and subsequent environmental and social assessment and management of these activities including cascading responsibilities to grant beneficiaries and contractors, during project preparation, design and implementation in a manner that meets the requirements of the WB and relevant PNG regulations.

This ESMF includes information on:

- Project activities
- Applicable PNG regulations and WB Group standards/guidelines
- Environment and social risks, potential impacts and mitigation
- Screening processes for the various subprojects
- Incident management
- Implementation responsibilities, resources and capacity building
- Detailed protocols, procedures and templates to support the implementation of the ESMF (provided as annexes).

The ESMF is one of several instruments developed to manage the E&S aspects of the Project and is supported by:

- Environmental and Social Commitment Plan (ESCP)
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- Labour Management Procedure (LMP) – refer ESMF Annex
- Indigenous Peoples' Policy Framework (IPPF) – refer ESMF Annex.

This ESMF and associated E&S instruments were discussed with stakeholders as part of consultation undertaken in February, March and May 2023 and the draft and final E&S instruments will be disclosed on the websites of NEA, PPL and the WB.

2. PROJECT DESCRIPTION

2.1 Context

PNG is a lower-middle-income country with a per capita GDP in 2021 of US$2,673 and ranks among the world's most culturally diverse and resource-rich nations. Its vast and varied geography includes mountains, tropical forests, grasslands, rivers, deltas, islands, and atolls. It has a wide variety of natural resources including petroleum and mineral deposits as well as renewable resources including fisheries, forests, and agricultural products. Further information about the country context is provided in Annex 1.

Access to on-grid electricity in PNG is low despite the significant potential to produce energy though hydropower, natural gas, solar, wind, and geothermal resources. The country has one of the lowest per capita consumptions of electricity in the world, and it is estimated that only about 14 percent of the population has access to grid electricity. These consumers are concentrated around the main urban centres and access in rural areas (where most of the population lives) remains limited. Even where grid electricity is available, power supply is unreliable, and customers frequently experience blackouts.

Issues around electricity supply can be summarized as follows:

- **The high cost of electricity constraining people's affordability of electricity services.** This is due to reliance of expensive thermal generation using imported oil products, relatively small size of the market, logistical challenges, and inadequate enforcement of sector investment plans.
- **Low reliability of electricity supply.** This is attributable to inadequate maintenance and/or refurbishment of electricity transmission and distribution assets that need to be urgently rehabilitated, and to low collection of electricity bills that impact PPL's cashflow and compel the company to reduce fuel purchases, limit power generation, and thereby shed load on a rotational basis.
- **Inadequacies in planning, coordinating, financing, and implementing investment projects.** Weak enforcement of sector planning and governance arrangements compound the general—and invariably costly—challenges of doing business in PNG. PPL entered into power purchase agreements (PPAs) with several independent power producers to supply the PPL grids. Investment decisions in the past were ad-hoc rather than based on long-term, least-cost planning, and such investment projects were often selected from unsolicited proposals, which could cause higher cost of service.

Access to sound electricity services enables delivery of social services, such as health, education, and clean drinking water, helps improve gender disparity. Electrification strategies in the East Asia and Pacific countries have facilitated electrifying schools, health centres, drinking water schemes in all villages covered under electrification. Modern energy services have helped lifting the quality of life in rural areas and have been of special help. The electrified health centres could be used as facility for storage of vaccinations, besides reducing child and maternal mortality, more students could be exposed to pedagogy using computers and internet facilities for remote education. Similar achievements are reported across the countries that have successfully implemented their national electrification programs. When women gain access to modern energy services, their health improves, children are able to study, and opportunities to earn income are enhanced, which are often used in ways that benefit their families, communities, and economies. Broader opportunities also exist in terms of employment, skills development and entrepreneurship for women in energy sector projects and programs.

In addition to the direct social benefits, access to reliable electricity can remove the constraints to output of firms, thereby spurring economic growth. Firms in PNG are constrained by unreliable

electricity supply and frequent outages. Improving the reliability of power supply is required to reduce the use of expensive backup diesel generators and allow them to better plan investments and activities.

PNG Development Strategic Plan 2010-30 sets the goal of providing electricity to 70 percent of the population by 2030. PNG's Vision 2050 envisages achieving carbon neutrality in power generation by 2050. Under the Energy Sector Development Project (ESDP) that was implemented between 2013 and 2019, the WB supported the GoPNG to prepare the NEROP, based on an underlying analysis report[2], that reviewed the electrification coverage, and evaluated the potential to expand PPL service in urban- and peri-urban areas, and to provide services to rural and remote communities with off-grid technologies. The National Executive Council (NEC) of GoPNG approved NEROP in May 2022.

The GoPNG developed a detailed NEROP implementation strategy and investment plan. The plan includes a project-by-project roll-out strategy covering the entire country based on a geo-spatial and least-cost planning tool. NEROP investments are prioritized in the plan to balance early wins and institutional development needs. The following considerations were factored in for sequencing the on-grid (densification and expansion), mini-grid, micro-grid, and off-grid market development investments:

- focus on lower-cost electrification opportunities to achieve early growth in access;
- provide better service where feasible;
- pace the implementation to allow time for institutional development and private sector participation, where relevant;
- undertake supplementary least-cost investments in generation and transmission; and
- build on development partners' existing and proposed programs to the extent feasible.

Following on from this, the GoPNG has requested the WB to finance the proposed NEAT to directly support the implementation of a part of NEROP through investment and institutional development.

2.2 Project Overview

The objective of the Project is to increase access to energy and enhance the resilience of the energy sector. This is planned to be achieved through the implementation of several priority investments identified in the NEROP implementation strategy and investment plan. The proposed Project is expected to commence in mid/late 2024 and run for seven years.

The Project will be jointly implemented by NEA, the economic and technical regulator of the energy industry, and PPL, the power utility company responsible for generation, transmission, distribution and retailing of electricity.

The Project consists of four components:

- Component 1 (to be implemented by PPL): Rehabilitation, resiliency enhancement of PPL infrastructure, and on-grid electrification, comprising three subcomponents:
    - 1.1: Grid rehabilitation, resilience improvement, and modernization.
    - 1.2: Grid densification and expansion for new household connections.
    - 1.3: Public-Private Partnerships (PPP) in mini-grids for clean energy and modernization.
- Component 2 (to be implemented by NEA): Renewable energy micro-grids and rural energy market development, comprising two subcomponents:
    - 2.1: Micro-grid systems

[2] The Earth Institute/Economic Consulting Associates, 2017.

    - 2.2: Solar home systems and products
- Component 3 (to be implemented by NEA and PPL): Energy sector institutional development, comprising two subcomponents:
    - 3.1: NEA institutional development.
    - 3.2: PPL institutional development.
- Component 4 (to be implemented by NEA and PPL): Project management, comprising two subcomponents:
    - 4.1: NEA project implementation support.
    - 4.2: PPL project implementation support.

2.3 Project Components

The Project's four components are described in the following sections.

2.3.1 Component 1: Rehabilitation, resiliency enhancement of PPL infrastructure, and on-grid electrification

This component aims to support PPL to restore and improve the reliability and resilience of power supply in the existing grid, expand and densify its medium voltage (MV)[3] and low voltage (LV)[4] distribution networks, support households with connection financing, and installation of solar PVs and batteries, and refurbishment/replacement of existing infrastructure at an existing mini-grid. High voltage (HV)[5] transmission lines are not proposed as part of the Project.

Works associated with this component will be carried out in the selected assets in the existing Port Moresby Grid and Ramu Grid, and at one or more existing mini-grids (Alotau, Kavieng, Kimbe, Lorengau and/or Wewak) (

Figure 1). The grids that make up the overall grid in PNG are the Port Moresby Grid (centred around Port Moresby), the Ramu Grid (through the Markham Valley from Lae to the Highlands and Madang) and the Gazelle Grid (which connects the area around Kokopo and Rabaul in the northeast of New Britain Province). There are also 17 PPL-operated mini-grids across PNG.

The three subcomponents under Component 1 are described in the following sections.

Subcomponent 1.1: Grid rehabilitation, resilience improvement, and modernization

The aim of this subcomponent is to restore the reliability of supply through the continuing the implementation of the Urgent Rehabilitation Plan (URP)[6] which includes transmission and substations rehabilitation and upgrades. Works under this subcomponent will include:

Control rooms.

Renovation of an existing National Control Room in Port Moresby. These works will include:

- Removal and disposal of items to be replaced

[3] MV is used to represent the distribution line voltage (11 and 22 kV)

[4] LV is used to represent 240 V (single-phase) and 415 V (three-phase) and LV line uses the small insulated lines that connect to houses

[5] HV is used to represent the transmission line voltage (66 and 132 kV)

[6] This plan is currently supported under the WB-funded Energy Utility Performance and Reliability Improvement Project (EUPRIP, P167820).

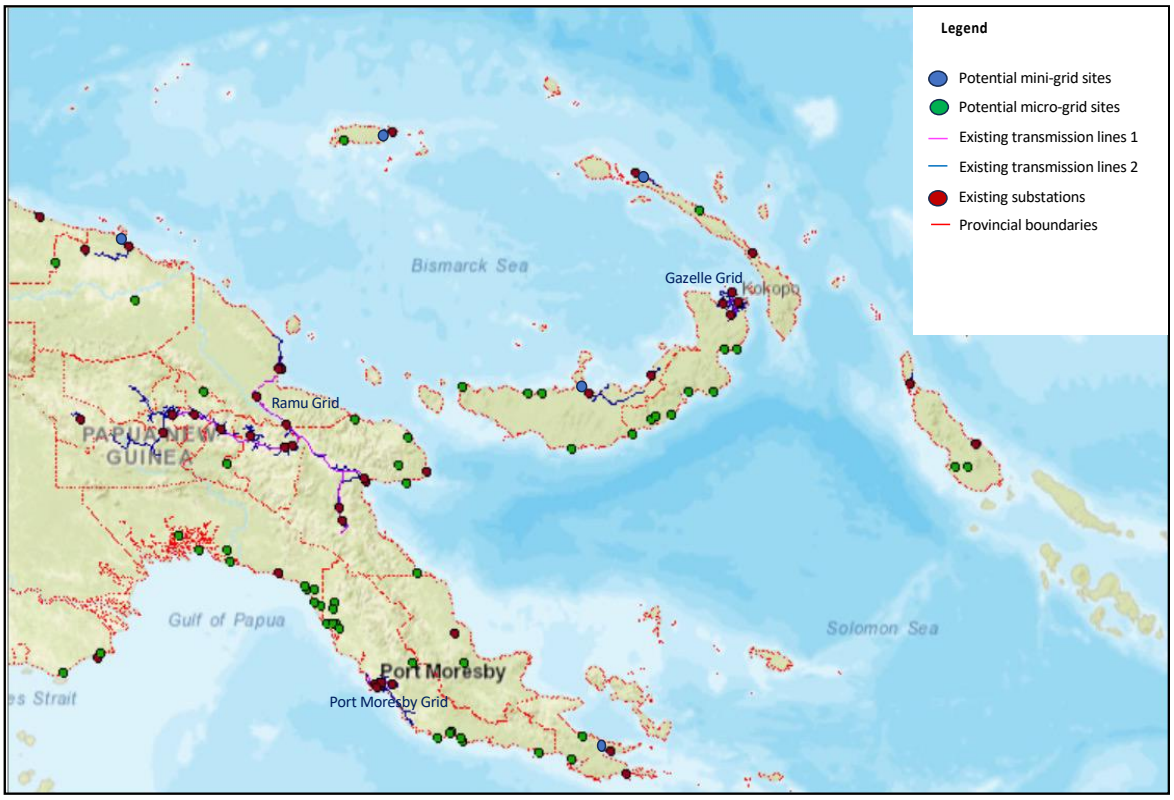


Figure 1: Existing grid and energy infrastructure, and some potential micro-grid sites

- Upgrade of ICT systems
- Server room
- Communications equipment

Construction of a new control room in Lae (within an existing PPL facility). These works will include:

- Construction of the control room building
- Fit of the building
- Installation of IT and communications equipment

Example photos of control rooms are provided as Figure 2 and Figure 3.

Figure 2: Substation control room in need of renovation

Figure 3: Example of a newly constructed control building in a substation

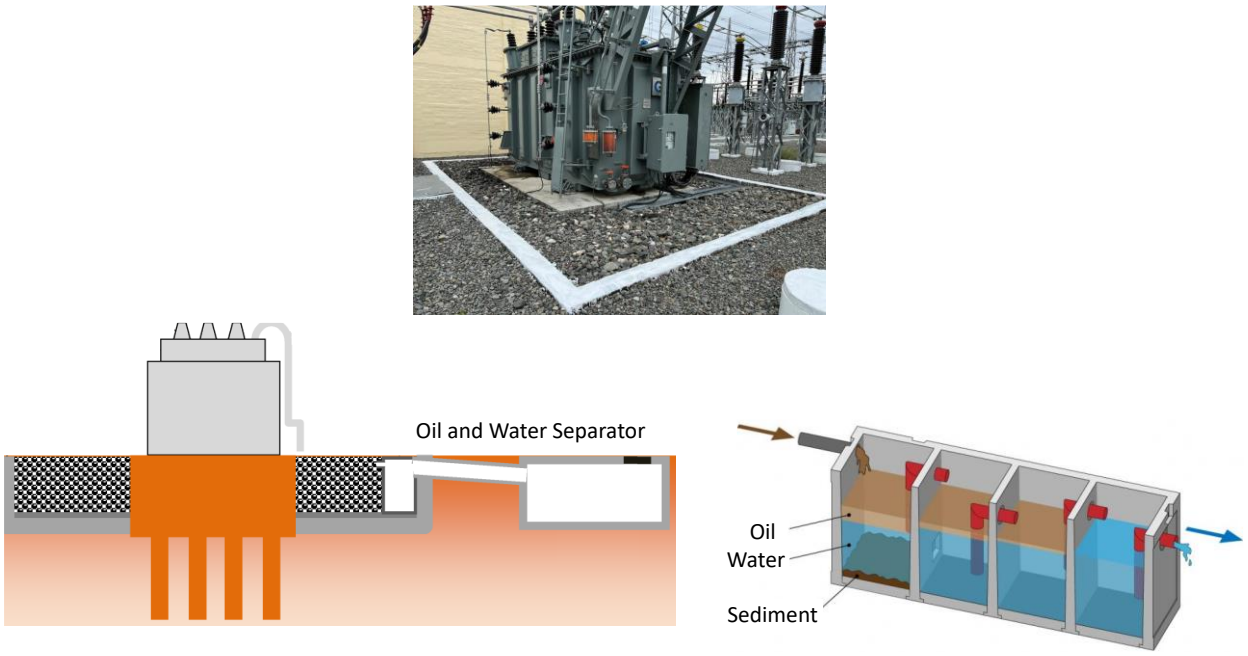


Figure 4: Example transformer foundation design

Upgrade of substations and other infrastructure. Details of the candidate infrastructure for upgrade is provided in and the final selection of infrastructure for upgrade will occur during project implementation. The upgrade works will be conducted within existing sub-station footprints and include partial renovation (removal, disposal and replacement of some components) and full-scale rehabilitation (removal, disposal and replacement of all components). These works will likely generate a significant volume of waste including, waste oil from the transformers, copper, ceramics, concrete, wire, aluminium, and contaminated soil (from clean-up of existing leaks). The new infrastructure will include foundation design to prevent future leaks (Figure 4). The purchase of one or more new mobile substations (for disaster response and resilience improvement in case of severe failure) may also be included in the works. The mobile substations would be stored at existing sites. Example photos of the types of sites to be upgraded are provided in Figure 5, Figure 6 and Figure 7.

Table 1: Candidate infrastructure for upgrade under Subcomponent 1.1

Infrastructure	Scale of works	Province
Milford Substation	Partial renovation	Morobe
Taraka Substation	Partial renovation	Morobe
Boroko Substation	Full scale rehabilitation	National Capital District
Waigani Substation	Full scale rehabilitation	National Capital District
Konedobu Substation	Full scale rehabilitation	National Capital District
Ramu Power Plant Station	Full scale rehabilitation	Eastern Highlands
Moitaka Substation	Partial renovation	National Capital District
Rouna 4 Power plant Substation	Partial renovation	Central
Kanudi Substation	Full scale rehabilitation	National Capital District
Bomana Substation	Partial renovation	National Capital District
Kudjip Substation	Partial renovation	Jiwaka

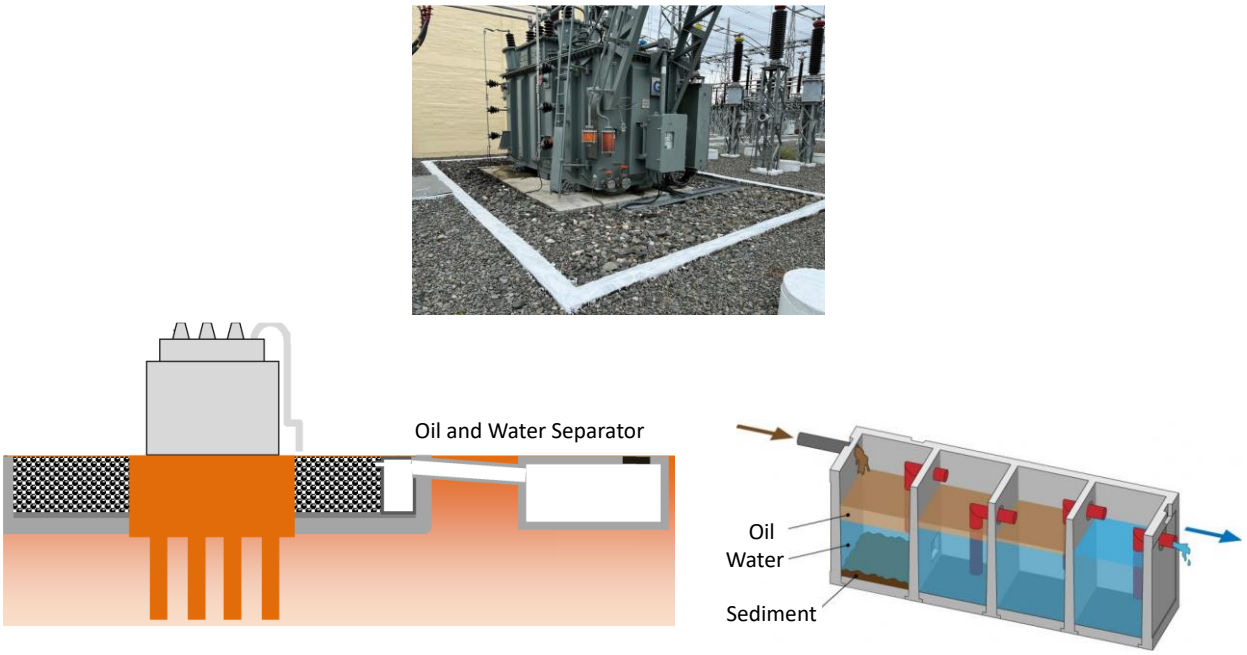


Figure 4: Example transformer foundation design

Figure 5: Konedobu Substation

Figure 6: Milford Substation

Figure 7: Boroko Substation

Subcomponent 1.2: Grid densification and expansion for new household connections.

This subcomponent aims to densify the existing distribution grid and expand the grid to serve unelectrified residential clusters. Works under this subcomponent will include:

Densification of the existing distribution grid. The densification works are to connect customers whose residences lie within the reach of existing distribution transformers and MV/LV networks. This work would include LV line extensions and LV service drop as a last mile to a household. This work involves installing one or a few small poles for LV line and service drop mostly along existing road corridors and running the line between poles.

Expansion of the distribution grid. The grid expansion is to serve unelectrified housing clusters. Many expansion projects will require new MV short line, roughly up to 5 km, single or multiple distribution transformer placements, and extensions of LV line and service drop to a household. In sparsely populated areas, the grid design will aim to introduce low-cost technical design. This work would include installing MV and LV poles mostly along existing road corridors, placing transformers on some MV poles, and running the line between poles.

Household connections. A key constraint for accelerating energy access is the initial connection processes and fees that households need to pay to be connected to the nearby distribution network via service drop cables and the installation of a meter and a meter box. PPL's standard Minimum Supply Kit (MSK) box is shown in Figure 8 (which includes LED lights either side of the meter) and Figure 9. This subcomponent aims to mitigate the affordability of connection by providing a subsidy scheme for connection fees and/or supporting PPL as a Project cost. Depending on the affordability constraints, a subsidy scheme will provide a results-based subsidy for low-income households to be implemented and administered by PPL. This work would include connection works such as connecting the premise to the network using a LV line and installing a meter inside a meter box or a MSK box. Wiring within the premise is not included in the scope.

Figure 8: Minimum Supply Kit box including a prepaid meter and accessories

Figure 9: Minimum Supply Kit box inside view

Subcomponent 1.3: Mini-grids

This subcomponent includes the provision of capital subsidy to a private project company through PPL. It will operate on a Build-Own-Operate-Transfer (BOOT) concession basis for one or more PPL mini-grids. The International Finance Corporation (IFC) is also supporting this subcomponent by undertaking feasibility and other studies to assist with project planning and structuring of the transaction. The capital subsidy will cover a portion of the capital expenditure needed to upgrade eroding PPL's mini-grid assets, which currently operate with peak loads ranging from 10 KW to 26 MW. This will include new solar PV with a Battery Energy Storage System (BESS), refurbishment/replacement of existing infrastructure, a powerhouse, medium voltage distribution lines, low voltage lines to customers, and pre-paid meters for existing and new households. Additional capital works not funded by the capital subsidy may also be undertaken, such as refurbishment/replacement of transformers and diesel generators. The capital costs not covered by the subsidy will be borne by the concessionaire. The concessionaire will operate the asset and supply electricity based on the required service level, such as power quality, reliability, and availability. At the end of the concession period (in the order of 15 to 20 years), the project/asset will be handed back to PPL. The provision of capital subsidy aims to improve affordability by lowering the project tariff and make the project more attractive for private companies.

2.3.2 Component 2: Renewable energy micro-grids and rural energy market development

This component aims to expand energy access in remote communities that are not served by PPL. The two subcomponents under Component 2 are described in the following sections.

Subcomponent 2.1: Micro-grid systems

This subcomponent aims to support the NEA to establish solar and hydro micro-grids with or without battery storage. The micro-grids will target isolated population centres that lack grid access and have some degree of demand and higher potential of utilizing energy for income generating activities and for social development (education, health, etc.). This component will be implemented through provision of a grant through the NEA to private developers (also referred to as service providers) to subsidize the capital cost of setting up the micro-grids. The detailed design will be documented in the Project Implementation Manual (PIM), which will include E&S considerations and will be cleared by the WB prior to implementation.

Subcomponent 2.1 will be implemented in phases. Phase 1 is a pilot phase to test the market and enhance the capacity of the NEA NEAT PIU. Subsequent phase(s) will roll out to full scale and to further strengthen the capacity of NEA to implement additional micro-grid development projects in future projects. NEA will pre-select about five promising sites for micro-grid development in Phase 1. After launching the Phase 1 bids, the Employer's Project Manager (EPM) will initiate the selection of additional sites with high potential for the Phase 2 bids. For this purpose, the EPM will develop criteria to prepare a long list of about 15 additional sites, collect the required data and information and prepare the long list.

The NEROP includes a 'mini-grids map book' which identities 57 potential sites for solar micro-grids (see Figure 1) and provides initial estimates for each micro-grid on the number of consumers, direct current (DC) solar array size required, LV line length, MV line length, and cost per customer. A summary of this information is provided in Annex 3 and shows that most solar micro-grids will require around 500 to 1,000 m^2 of land and service a few hundred households. Some larger solar micro-grids may have a capacity of up to 1 MW. Additional sites may also be investigated for micro-grid potential, including potential for micro or pico-hydropower, although the construction of hydropower micro-grids will not be funded by the Project.

The NEA will use selection criteria to select the most attractive potential micro-grids locations. The final selection criteria will be documented in the PIM and will consider aspects such as:

- average cost per connection
- accessibility to the site
- security (absence of conflict)
- availability of land / formation of an Incorporated Land Group (for customary land)
- biodiversity (not within a protected area)
- less vulnerable to climate change impact
- community interest and organization
- anchor load and demand characteristics
- characteristics of locally available renewable energy sources
- no prospect for PPL grid integration for 10 to 15 years.

Separate to the section criteria, the micro-grids sites will go through a screening and assessment process that will inform site selection and consider the potential environmental and social impacts associated with each micro-grid and how these will be managed. The process also includes eligibility criteria such as availability of land and no disturbance to protected areas.

The micro-grids will also include street lighting, a meter and main switch installation, as well as standard internal wiring, plug-in socket, and basic LED bulbs to newly electrified customers. Additional lighting, sockets and/or electrical appliances may also be offered to customers for an additional cost. The micro-grids and customer connections will meet technical and safety standards consistent with those operated under PPL grid to facilitate future potential connection to the main grid.

The legal framework under which the micro-grids will be selected, constructed, and operated is the PNG Off-Grid Regulation for Small Power System, which applies to micro-grids with a capacity of less than 1 MW. The regulation is yet to be finalised, however, the draft version[7] sets out a framework for the micro-grids to be established (i.e., constructed and operated) by a developer/service provider[8] in a formal agreement (tri-party agreement) with the community[9] and the NEA on a 'Willing Buyer / Willing Seller' basis.

The cost model for the micro-grids is yet to be finalised, however, the capital cost will likely be funded through investment grant through NEA to the developer. The developer will install, operate, and maintain the microgrids, with the developer recouping their investment through agreed usage charges (electricity tariff) paid by the customers during their term of contract (which will likely be less than ten years). The tariff will also need to cover the operation and maintenance costs associated with running the micro-grid. At the end of concession period, the community may take over ownership of the assets and a new operation and maintenance agreement with the same or a different developer may be negotiated, or the community may opt to self-operate the micro-grid.

A solar micro-grid typically consists of several solar panels, cable, power station (charge controller, battery, inverter), alternating current (AC) lines (3 phase, 4 wire, or 3 phase, 3 wire) to users (e.g., homes, street lights, businesses, schools, healthcare facilities, etc). An example solar micro-grid set-up is provided as

Figure 10. The solar panels will also need to be installed in areas and at angles to get the maximum absorption of sunlight. In some instances, tree branches or other obstacles that might prohibit the sunlight to enter the solar panel may be removed.

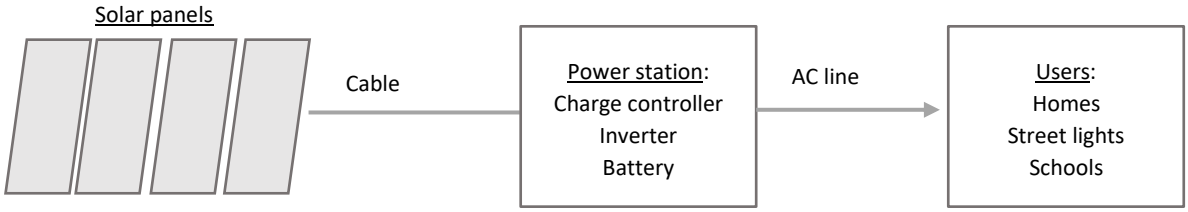


Figure 10: Example a typical solar micro-grid

[7] Version 7, April 2022

[8] Any entity legally established under PNG law which has applied to the Regulator for a Registration or a License to operate a Service Area or which is preparing a Tripartite Contract for an Interconnected Service Area.

[9] A group of people within the same geographic location organised under a local leadership structure or a legally recognised corporate entity and in both cases capable of entering into contracts and being capable of suing and being sued.

A consideration with solar micro-grids is the disposal of batteries and solar panels at the end of their usable life. Batteries are expected to be functional for around 8 to 10 years. Solar panels are expected to be functional for around 20 to 30 years. The management of waste will be the responsibility of the developer, including the collection, storage, and disposal, in alignment with Annex 2 of the PNG Off-Grid Regulation for Small Power System. To further support the developers on the feasibility to collect the waste batteries and solar panels, options for setting up a mechanism to collect used batteries and solar panels and centrally arrange for adequate disposal will be explored by NEA as part of the wider Project. This will also consider the management of waste beyond the developer's involvement in the Project (i.e., if the micro-grid is handed over to the community to self-operate).

Subcomponent 2.2: Solar Home Systems and products

This subcomponent includes the establishment of a solar grant fund implemented through a grant administer to be contracted by NEA. The solar fund will provide investment grants in the form of catalytic fund and/or results-based financing (RBF) to the private sector which will provide competitively awarded incentives to accelerate off-grid solar expansion in PNG. The fund will have a particular focus on currently underserved and rural populations; and require the provision of eligible products such as Verasol[10] quality-verified for solar.

The subcomponent aims to support off-grid solar companies, cooperatives, or NGOs, including suppliers, distributors, and/or retailers to extend their current supply chains deeper towards underserved and rural populations to provide off-grid solar products.

PNG's current off-grid solar market focuses mostly on peri-urban and more densely populated areas and is dominated by low-quality products that are priced lower than quality products. To make quality products more affordable and reduce high up-front costs, consumer financing in the Pay-as-You-Go (PAYGo) business model or in cooperation with micro-finance institutions may be offered. This allows consumers to make regular repayments towards full product ownership, usually using mobile money.

The fund will be implemented through a competitively selected fund/grant administrator to be sub-contracted by NEA and will use two key mechanisms, catalytic grants and RBF grants. The catalytic grant mechanism will offer start-up and/or development grants incentives to partially offset the initial costs associated with the establishment or expansion of operations to make eligible solar solutions available to underserved and rural households. The RBF grant mechanism make payments linked to predefined results and tiered subsidies specific to each eligible solar product offered. Together, these mechanisms will offer competitively awarded incentives that partially offset the initial costs and risks associated with off-grid solar companies expanding their operations and/or setting up their sales and service infrastructure in new regions, thereby incentivizing the private sector to serve more rural and underserved areas. The fund mechanisms will be codified in a PIM, providing its governance, rules, processes and relative conditions of eligibility and amounts proposed. The grant contracts will specify instalment payments based on the achievement of pre-agreed milestones and satisfactory after-sales service support.

The project will also provide supporting TA to companies and public and private stakeholders that will include, but not be limited to, communication and awareness-raising activities, capacity building and organizational, technical, and business assistance activities. It will also provide support technical standards development and adoption and enforcement to protect consumers from low quality products, raise awareness of available quality solar products.

[10] https://verasol.org/

A typical SHS consists of a solar panel (0.02 to 0.3 kW in the case of Verasol certified products) on a pole or on a house roof, battery, controller, inverter, and indoor wiring of bulb, lamps, wires and switches (Figure 11). Smaller systems, usually called pico-solar, can have all parts integrated in one product. The use of lithium-ion batteries is preferred over lead-acid batteries as they are less toxic. As discussed for the solar micro-grids, a strategy for the management of waste will need to be established in collaboration with suppliers, including the collection, storage, and disposal. To further support the suppliers on the feasibility to collect the used products, options for setting up a mechanism to collect used batteries and solar panels and centrally arrange for adequate disposal will be explored by NEA as part of the wider Project. Examples of Verasol quality-verified solar products are provided in Figure 12.

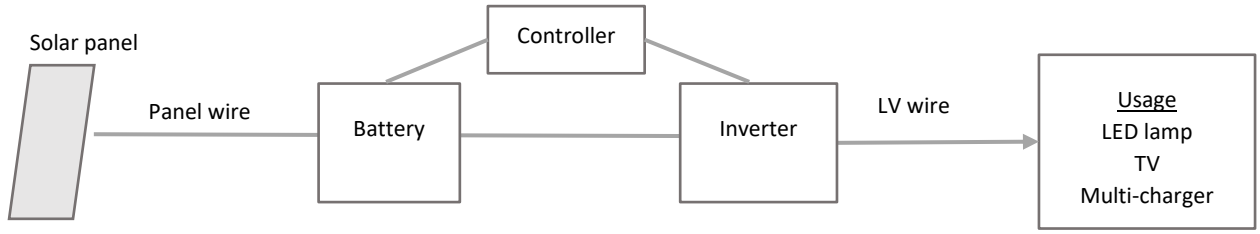
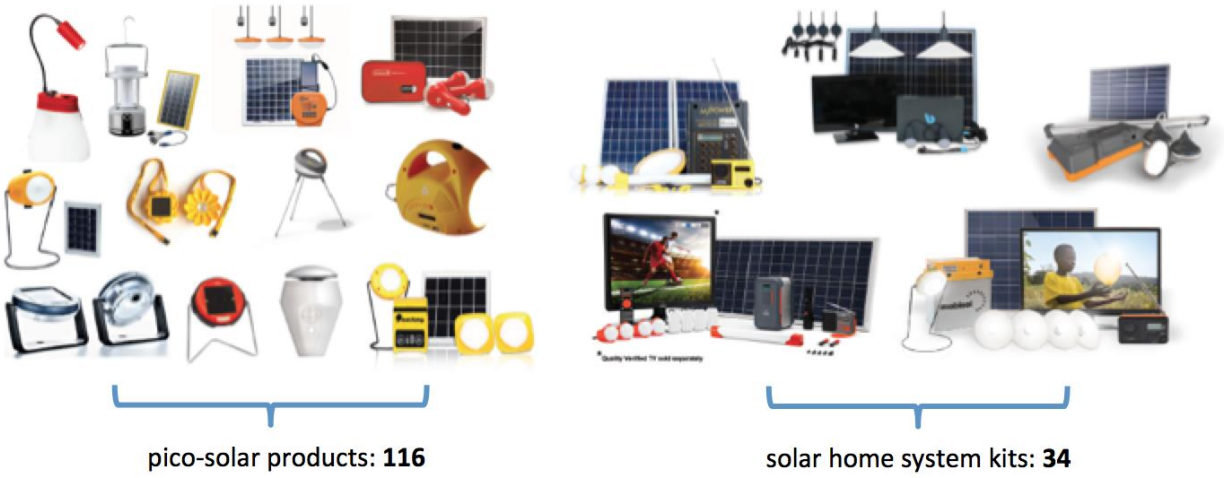


Figure 11: Typical solar home system



Source: Lighting Global website

Figure 12: Examples of Verasol quality-verified solar products

2.3.3 Component 3: Energy sector institutional development support

This component aims to strengthen PPL and NEA the capabilities to plan, survey, design, coordinate, and implement NEROP to achieve the GoPNG national energy access targets and to support the two entities conduct strategic studies for the energy sector.

Subcomponent 3.1 NEA institutional development

This subcomponent will fund key studies for project implementation and sector development, and policy development to be conducted by NEA. This subcomponent will prioritise activities that will focus on building NEA's capacity and may include:

- preparation of pre-feasibility studies, preliminary design and bidding documents for Component 2

- market study and preliminary design work for clean cookstoves development
- off grid solar products technical standards enforcement and consumer protection, awareness raising
- business development support to participating companies through the NEA
- household surveys
- updating the NEROP, and mid-term review of the NEROP implementation arrangements
- cost-of-service and tariff rate design study
- renewable energy potential assessment and promotion policy
- women's employment promotion program
- training.

Sub-Component 3.2 PPL institutional development

This subcomponent will provide small hydropower and other variable renewable energy pre-feasibility studies, and selected institutional strengthening initiatives to support management and technical capacity development of PPL. It will support:

- pre-feasibility studies for E&S impact assessment and high-level engineering design to develop small hydro power plants and solar PV plants in places where they are potentially available to reduce the reliance on the diesel generation and CO_2 emissions
- least cost power development plan
- variable renewable energy integration
- provincial and local government engagement program
- new customer awareness program
- women's employment promotion program.

2.3.4 Component 4: Project management

This component aims to support management of the project by NEA and PPL. The two subcomponents under Component 4 are described in the following sections.

Subcomponent 4.1: NEA project management

This sub-component will support project implementation and coordination. The proposed project will help establish a Project Team (PT) within the NEA that will be fully equipped with qualified staff to manage the NEROP investment program. As part of project design, it will also finance Owner's Engineer (OE), Grant Administrator, and an Independent Verification Agency (IVA), and related capacity building and incremental operating expenses.

Subcomponent 4.2: PPL project management

This sub-component will help PPL establish an Employer's Project Manager (EPM) under PPL's project director. EPM's key personal will include specialists from various disciples. At the early project implementation stage, the project may finance individual consultants (technical, environmental, and social/gender) to help PPL recruit an EPM. As part of project design, it will also finance an IVA to verify new connections under subcomponent 1.2, as well as related capacity building and incremental operating expenses.

3. LEGAL AND OTHER REQUIREMENTS

3.1 Papua New Guinea Institutional Framework

This section presents information on the GoPNG agencies and departments that will most likely play a role in implementation of the project, including NEA and PPL.

3.1.1 National Energy Authority

NEA was established by the *National Energy Authority Act 2000* and the *Electricity Industry (Amendment) Act 2000* enacted in April 2021. The NEA is the economic and technical regulator of the energy industry in PNG and is based on the former Energy Wing of the Department of Petroleum and Energy.

3.1.2 PNG Power Limited

PPL is a fully integrated power company responsible for generation, transmission, distribution and retailing of electricity throughout Papua New Guinea and servicing individual electricity consumers.

PPL (Company No 1-44680) was incorporated as a State-Owned Entity (SOE) under Section 3 (1) of the Electricity Commission (Privatisation) Act 2002, and operates in accordance with the Companies Act 1997.Kumul Consolidated Holdings Limited (KCHL) holds the shares for incorporated state entities as the trustee of the General Business trust. KCHL acts as the sole shareholder on behalf of the Government of PNG. The Minister for Public Enterprise and State Investments appoints a Board that reports to KCHL.

PPL have recently updated their Environmental and Social Management System in collaboration with support from the Australian Infrastructure Financing Facility for the Pacific (AIFFP) and are in the process of rolling out the new system.

3.1.3 Conservation and Environment Protection Authority

The Conservation and Environment Protection Authority (CEPA) was established in 2014. CEPA takes over from the former Department of Environment and Conservation that was established in 1985, and continues DEC's former mandate by being vested with the powers to protect the environmental values of air, water, soil and biodiversity and the sustainable use of natural resources as mandated by the Fourth Goal of the National Constitution: "*Papua New Guinea's natural resources and environment to be conserved and used for the collective benefit of all and are replenished for the benefit of future generations*".

CEPA is the key agency responsible for assessing, monitoring and mitigating the environmental and social impacts of developments in PNG and will play an oversight role to ensure that NEA and PPL implement the Project according to the directions set by the government, and the environmental acts and regulations.

CEPA regulate the environmental permitting process and will evaluate and issue the development consent for subprojects that require an environment permit.

A major constraint faced by CEPA is the limited number of environment officers available to manage issues relating to ESIA for Level 3 activities. This is often addressed through a "user pay" system whereby the project proponent pays for the ESIA to be peer-reviewed by external consultants.

3.1.4 Department of Labour and Industrial Relations

The Department of Labour and Industrial Relations (DLIR) is tasked with the responsibility of promoting labour employment opportunities at a national level, to furnish employees with information on their rights through the Office of Labour Administration. It is entrusted with the responsibility of administering labour employment and industrial relations services of the country as

outlined in various pieces of legislation and international conventions (e.g., International Labour Organisation [ILO]). Through the *Industrial Safety, Health and Welfare Act 1961*, DLIR is also responsible for providing occupational health and safety protection of workers.

DLIR is also responsible for ensuring that employers have no difficulty in recruiting qualified, skilled and experienced non-citizen workers where these skills cannot be found locally. Overall, DLIR has an obligation to ensure that the work permit system looks after the interests of Papua New Guineans.

3.1.5 Department of Lands and Physical Planning

The complex task of administering land lies with (DLPP). DLPP is responsible for promoting the best use of land in PNG in the interest of all citizens, the Department of Lands and Physical Planning individually and collectively by ensuring that an orderly process exists for sustainable economic and social developments and that land rights are guaranteed. Within DLPP there are eleven divisions that are responsible for various planning and land management issues. Those of greatest relevance to the Project include:

- **Physical Planning Division -** responsible for the spatial expression of the desired form of social and economic development. The purpose of physical planning is to establish and maintain a framework of physical planning nationwide, which aligns the ongoing conversion of land uses and spatial development with long term government objectives for sustainable economic and social development.
- **Customary Land Acquisition Division** – the Division is responsible for administering the process by which the State acquires land from its owners, following one of two possible modes of acquisition provided for under the *Land Act 1996* by which the Minister may acquire land on behalf of the State – Acquisition by Agreement and Compulsory Acquisition. Acquisition by Agreement can apply to Customary Land and Alienated Land for public purposes, reservation, wildlife and conservation, church and non-government organisations activities, economic and resource development, and business and private purposes.
- **Incorporated Land Groups (ILG) Division** – the Division is under the Customary Land Services within the DLPP. The core function of the Division is to register customary landowning units, giving them legal recognition under the *Land Groups Incorporation Act*, which empowers customary groups for greater participation in the national economy.
- **Land Administration (Alienated Land) Division** – efficient management of the State Land Leases with probity and ensures that State Land is required for approval purposes. It also ensures effective and efficient management of the Division's corporate goals ensure identified and made available to stakeholders through lease arrangements as and when State Land to ensure compliance as required under all land related legislation. The Division also facilitates the process of equitable allocation of land by the Land Board and ensures that State Land is made available when required for approved purposes by controlling squatting and unauthorised settlements. It also administers State Leases and ensures that lease covenants and conditions are observed.
- **Office of Registrar of Titles** – the Office's major function is to administer and provide reliable and accurate land information in PNG. It is also tasked with effectively and efficiently supporting services to provide an orderly process for land transactions. Further, the Office ensures that land rights are guaranteed, and titles registered and issued are indefeasible. The Office of the Registrar of Titles was established under the *Land Registration Act* 1981, (Chapter 191).
- **Office of the Surveyor General** – the OSG is one of the core divisions of the Department of Lands and Physical Planning that looks after all land survey matters in PNG. The OSG also oversees the functioning of the Surveyors Board, which deals with the registration of all the surveyors practicing land surveying in PNG and regulates all laws affecting the surveyors and the survey profession.

- **Office of the Valuer General** – the Office forms a division within the Department of Lands and Physical Planning. The functions of the office are defined in part, by the *Valuation Act* (and associated regulations), which establishes the Valuer General as a statutory position, with responsibility for administering Valuer registrations, the Valuer Registration Board, regulations for practice and maintenance of standards of valuing and valuation of properties for local government rating purposes. Overall, the Office of the Valuer General is to provide an effective and impartial valuation service and to conduct quality rating and taxing valuations for the DLPP and specific stakeholders throughout the assessment of current unimproved values and ensure there is consistency and integrity across all valuation in the Declared Valuation Areas.

3.1.6 Department of Treasury

The role of the Department of Treasury is to undertake research and provide advice to GoPNG on economic issues; provide advice on financial issues that arise from the National Budget; prepare and monitor the National Budget; and provide policy advice on the finance and resource management of national government departments, provincial and local level government and state-owned enterprises. The Department of Treasury will be active in structuring and sourcing the financing for the Project.

3.1.7 Department of National Planning and Monitoring

The Department of National Planning and Monitoring plays a critical role in guiding PNG's development trajectory and ensuring that its economic and social development is sustainable and inclusive. The department is responsible for:

- Developing and coordinating policies, plans, and programs for sustainable economic and social development.
- Coordinating development assistance from international donors, including managing and disbursing aid funds.
- Conducting research and analysis to inform policy and decision-making.
- Monitoring and evaluating development programs and projects to ensure they are meeting their intended goals and objectives.
- Providing technical assistance and capacity building to government agencies and other stakeholders involved in development planning and implementation.
- Ensuring that development efforts are aligned with PNG's long-term development vision and goals, as outlined in the Vision 2050 strategic plan.

3.1.8 Provincial Governments

The Organic Law on Provincial Governments and Local-level Governments provides certain powers with respect to local government in accordance with section 187B of the Constitution. The Organic Law defines the system, structure and composition of government, requirements for compliance with the PNG constitution, the roles, responsibilities and administrative functions of elected and appointed officials, law making powers, taxation policies, and monitoring and auditing functions for provincial and local-level governments.

3.1.9 Local-Level Governments

There are over 300 local-level governments (LLGs) in PNG, made up of over 6,000 wards. Wards participate in LLG planning, which in turn contributes to provincial planning, which contributes to national planning. Each LLG is headed by a directly elected LLG President, along with Councillors and an employed LLG Manager. Most LLGs are currently under-resourced and/or have limited management and administrative capacity and struggle to perform basic administrative functions. LLGs

tend to rely on the provincial government administration to carry out administrative and service delivery responsibilities.

3.1.10 Other Government Agencies

Ministry of Tourism, Arts and Culture

The primary role of the Ministry of Tourism, Arts and Culture (MTAC) is to develop, protect and promote PNG's culture, art and heritage. Cultural heritage is the responsibility of the National Museum and Art Gallery of PNG. The Office of Tourism, Arts and Culture (OTAC) has been established as a policy secretariat under policy formulation and coordination of the line agencies PNG Tourism Promotion Authority (PNG TPA), National Cultural Commission (NCC), and the National Museum and Art Gallery (NMAG). These functions are in line with the strategic directions as set out in the Vision 2050, DSP 2010 - 2030 and the MTDP 200-2015 where 'Papua New Guinea will grow the manufacturing, services, agriculture, forestry, fisheries and tourism sectors from 2010 to 2050. If cultural artefacts are encountered as chance finds during project implementation, the National Museum will be contacted.

The Department of Agriculture and Livestock

The Department of Agriculture and Livestock (DAL) is the lead Government of PNG agency responsible for the management of the agriculture sector in PNG. Its mandate is to provide policy advice and technical and administrative support for optimal performance of the sector. DAL aims to promote improvement and expansion of food crops and livestock programs and projects in a bid to assist the people of PNG in meeting their local requirements in nutrition and household food security. DAL also strives to promote innovative strategies aimed at increasing food production for both local and global markets.

While DAL is not likely to have any direct inputs to the Project, development activities to compensate for impacts on livelihoods could be agriculturally based and, therefore, their inputs in any such initiatives will be important.

Forestry Authority

The PNG Forestry Authority was established in 1993 under the *Forestry Act* 1991 replacing the former Department of Forest, and unifying all Provincial Forest Divisions and the Forest Industries Council. The FA has 19 provincial offices, which include five regional offices. It's mission statement indicates that it is to: "*promote the management and wise utilization of the forest resources of Papua New Guinea as a renewable asset for the well-being of present and future generations*".

Public Solicitors Office

The Public Solicitor and his Office were established as a branch of the then Law Department on 14 April 1958. At Independence, on the advice of the Constitutional Planning Committee, the Office of the Public Solicitor was established as an independent constitutional office.

The Public Solicitor and his Office have the mandate to provide legal assistance so that everybody in PNG has access to the Law Court. Presumably, this includes legal assistance and representation with free legal advice sessions and formal representation to landowners across the country.

3.2 Key Papua New Guinea laws, regulation and policy

This section presents information on the key laws, regulation and policies that relevant to the Project. Other potentially relevant laws, policy and regulations are provided in Annex 4. Laws, policy and regulation are also provided in the LMP (Annex 5) (relating to employment and workplace safety) and LARF (relating to land).

3.2.1 Constitution of PNG

The PNG constitution includes national goals and directives that outline the aspirations and principles for the development of the nation. The fourth of these national goal and directive principles states:

We declare our Fourth Goal to be for Papua New Guinea's natural resources and environment to be conserved and used for the collective benefit of us all, and be replenished for the benefit of future generations.

The constitution is supported by a legislative and policy framework that ensures that proposed developments assess, reduce and manage any residual social and environmental impacts such that they are as low as practicable. The Constitution provides additional safeguards for the compulsory acquisition of customary land (s.53 – Protection from unjust deprivation of property [5.e]; s.54 – Special provision in relation to certain lands [b]).

3.2.2 PNG National Energy Policy (2018 – 2028)

The Policy, approved by the National Executive Council, outlines the National Government's policies for the planning and management of the energy sector over the next 10 years.

The Policy promotes the establishment and maintenance of the safe and efficient system of electricity generation, transmission, distribution and supply, and will also enforce proper standards of safety reliability and quality in the electricity supply industry.

3.2.3 National Authority Act 2020 and *Electricity Industry (Amendment) Act 2020*

These acts establish the NEA as the body responsible for the regulation of energy supply in PNG. The acts cover:

- Approve licensing and economic regulatory functions.
- Authority to take over operations of power producers where there is a breach of license conditions.
- Change levies and fees on licenses granted under the NEA Act.
- National content provisions for all new projects licensed under the NEA Act for the generation, transmission, distribution or retailing of electricity[11].

3.2.4 PNG Off-Grid Regulation for Small Power Systems (Draft)

The NEA are in the process of finalising the PNG Off-Grid Regulation for Small Power Systems, which applies to small power systems with a combined generation capacity up to 1 MW and will be used to regulate the micro-grids proposed under Component 2. The draft regulation (version 7) includes the licensing requirements, process for the service provider and community to agree on contractual terms, technical standards, commercial arrangements, etc.

3.2.5 *Environment Act 2000* and supporting regulations

The *Environment Act 2000* and its Environment Regulations encompass a number of processes, and procedures and, with the *Conservation and Environmental Protection Authority Act 2014*, established an institution (Conservation and Environmental Protection Authority [CEPA]), to regulate them. The following key issues are addressed by the legislation:

- Provides protection of the environment in accordance with the Fourth National Goal and Directive Principle (National Resources and Environment) of the Constitution.

[11] An exception for national content provisions will be sought for the mini-grid subprojects.

- Identifies Matters of National Importance, including:
    - Preservation of PNG traditional social structures
    - Maintenance of clean water and subsistence food sources; for those who depend upon them to maintain traditional lifestyles
    - Protection of areas of significant biological diversity and the habitats of rare, unique or endangered species; recognition of the role of land-owners in decision-making about the development of the resources on their land
    - Responsible and sustainable development.
- Regulates environmental impacts of development activities to promote sustainable development of the environment and the economic, social and physical well-being of people.
- Provides for the protection of the environment from environmental harm, by defining prescribed activities for which an Environmental Impact Statement must be prepared, and sets out the procedures for undertaking and approving Environmental and Social Impact Assessments.
- Develops requirements for robust stakeholder engagement processes through public consultation as part of assessment and in the decision-making process.
- Requires the formulation of appropriate environmental and social safeguards as part of the environment and social impact assessment process.
- Requires environmental monitoring of the development (section 31)

The Act links to the *National Park Act 1984*.

The *Environment Act 2000* and the Environment (Prescribed Activities) Regulation of 2002 require development consent for prescribed activities (Level 2 and Level 3) to be obtained from CEPA[12]. A development consent application must include an environmental assessment that complies with the Environment Act and Environment (Prescribed Activities) Regulation requirements. An overview of the environment regulatory process is provided as

Figure 13. Level 1 activities, defined as “any other activity” that is not a Level 2 or Level 3 activity, are activities with very low risk of causing environmental harm and do not require an environment permit, although still require a Notification of Intent and supporting documentation (e.g., ESMP or similar).

The prescribed activities that may be relevant to the project are:

- Operation of hydroelectric plants with a capacity of more than 2 Megawatts (MW) (Subcategory 10.1) - Level 2B
- Construction of electricity transmission lines or pipelines greater than 10 km in length (Subcategory 12.6) - Level 2B
- Damming or diversion of rivers or streams (Subcategory 13.1) - Level 2B
- Activities involving investment of a capital cost of more than K50 million, except where such investment is made in pursuing an activity otherwise dealt with in this Regulation in which case that category of activity will apply to the investment (Subcategory 14.1) – Level 3
- Construction of major hydropower schemes or water supply reservoirs inundating an area greater than 5 km^2 (Subcategory 19.1) - Level 3

[12] The act and regulation refer to the Department of Environment and Conservation (DEC), however, this entity has been replaced by CEPA

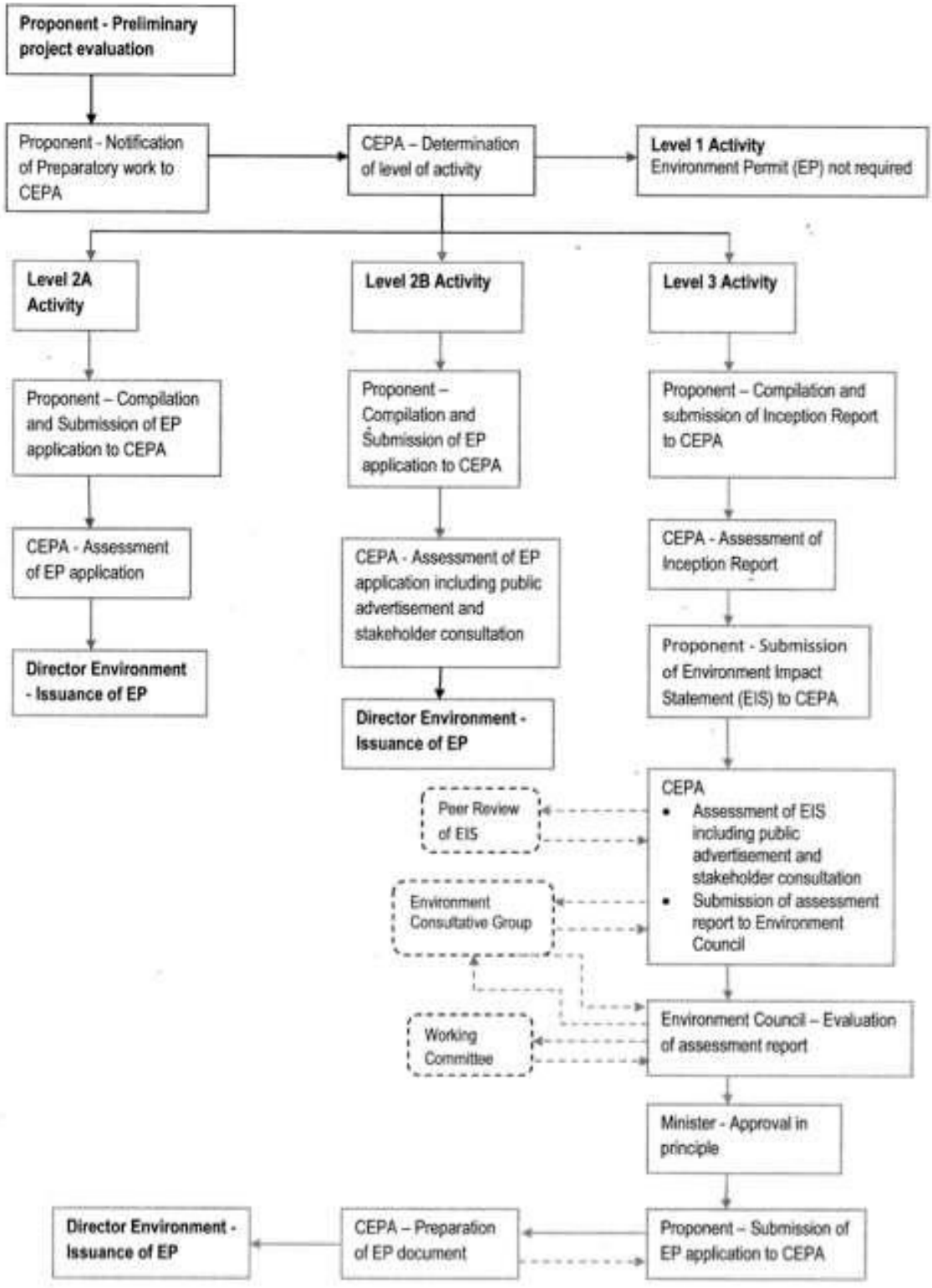


Figure 13: Environment regulatory process overview

The requirement for environment permits will be determined during project implementation. The information currently available for the subprojects indicates that activities under Subcomponent 1.2 are unlikely to constitute a prescribed activity as transmission lines are not planned to be constructed under the grid expansion works. Although not specified in the regulation, transmission lines are generally considered to be HV, whereas the Project is planning to install only LV and MV lines. Solar power generation is not currently listed as a prescribed activity; however, it is understood that CEPA consider stand-alone solar or mini-grids with a capacity of 5 MW or more to be a Level 2B activity and such activities are subject to the EIA process. Clarification will be sought from CEPA during project implementation around applicability to the mini-grid subproject. Upgrade works to the existing power generation infrastructure may also trigger the requirement for (or amendment of) an environment permit.

The scale of the hydropower projects to be investigated under Subcomponent 3.2 as a TA activity are yet to be confirmed, however, are indicatively estimated to be a few MW and therefore may meet the definition of a prescribed activity. The scale of river/stream diversions that may be required as part of these hydropower projects may also make them a prescribed activity.

Environment (Water Quality Criteria) Regulation 2002 contains a Schedule 1 that sets water quality criteria for aquatic life protection, in accordance with the *Environment Act 2000*, and sets monetary penalties for exceeding these criteria.

3.2.6 Physical Planning Act 1989

The Act incorporates a comprehensive mechanism for physical planning at national and provincial levels of government and empowers government to plan and regulate physical development. The Act applies to towns, the National Capital District and areas deemed to be physical planning areas of national interest. Further, it establishes the Office of the Chief Physical Planner to administer the Act.

3.2.7 Organic Law on Provincial Governments and Local-Level Governments 1995

The Organic Law empowers each Provincial Government and Local-level Government, public authority or agent to carry out specific duties or functions. Those of interest to the Project include: ensuring the proper use and care of all public properties; accountability in the use of public finances, properties and as public power; recognising human rights as recognised and enforced by PNG law; and striving to achieve the Fourth National Goal (Natural Resources and Environment) of the National Goals and Directive Principles of the Constitution.

Further the Organic Law directs that the wealth generated by lawful exploitation of any natural resources be equitably distributed by the National Government, the Provincial Governments and Local-level Governments for the benefit of resource owners and all levels of governments, and that all levels of government and governmental bodies recognise traditional land rights and other rights and ensure that adequate compensation is made for the loss of such rights.

3.3 International Environmental Agreements

PNG is a signatory to various regional and international agreements that may be relevant to the Project, and these are summarised in Table 2.

Table 2: Regional and International Environmental Agreements

Agreements	Purpose	Relevance
Waigani Convention on Hazardous & Radioactive Wastes 1995	Bans the importation of hazardous and radioactive wastes into Forum Island countries and to control the trans-boundary movement and management of hazardous wastes within the South Pacific region.	Potentially applicable given the need to dispose of hazardous waste that will be generated through Subcomponent 1.1 and potentially also through Components 2 and 3. No radioactive waste is expected.
Basel Convention on the Control of Trans- boundary Movements of Hazardous Wastes and Their Disposal	Reduce the movements of hazardous wastes between nations, and specifically prevent transfer of hazardous wastes from developed to less developed countries.	Potentially applicable to the given the need to dispose of hazardous waste that will be generated through Subcomponent 1.1 and potentially also through Components 2 and 3.
Pacific Regional Solid Waste Management Strategy 2010-2015	PNG was one of several Pacific island countries to adopt the Pacific Regional Solid Waste Management Strategy, initiated by SPREP, and adopted by member countries in 2009.	Potentially applicable given the need to dispose of hazardous waste that will be generated through Subcomponent 1.1 and potentially also through Components 2 and 3.
Stockholm Convention for Persistent Organic Pollutants	The Stockholm Convention on Persistent Organic Pollutants is an international environmental treaty, signed in 2001 and effective from May 2004, that aims to eliminate or restrict the production and use of persistent organic pollutants (POPs). This convention entered into force in PNG in May 2004.	Potentially applicable to the Project given the need to dispose of hazardous waste that will be generated through Subcomponent 1.1.
United Nations Framework Convention on Climate Change (UNFCCC)	Its purpose / aim is to set an overall framework for intergovernmental efforts to tackle the challenges posed by climate change. It is administered by the CEPA.	Potentially applicable as the Project will result in an increased consumption of grid electricity (through increasing grid connections), which is partially generated by existing power stations that use fossil fuels although the additional (non-grid) electricity generation capacity as a result of the project will be from renewable sources (e.g., solar and hydropower). The project will also help reduce the production of GHG emissions through support of technical investigations into potential new small HPPs that would add to the grid-generation capacity.
Paris Agreement (within the UNFCCC)	It deals with GHG emissions mitigation, adaptation and finance, starting in 2020.	Potentially applicable for the same reasons that the UNFCCC is potentially applicable.
UN Convention on Biological Diversity (UNCBD)	Its purpose is to conserve biological diversity through the sustainable use of its components and the fair and equitable sharing of the benefits arising out of utilizing genetic resources.	Potentially applicable if any subprojects affect areas of potentially high biodiversity.
Ramsar Convention on Wetlands of International Importance	Its purpose is to ensure conservation and sustainable use of wetlands, especially as waterfowl habitat.	Potentially applicable if any subprojects are located in or near Ramsar wetlands.
International Plant Protection Convention	Its aim is to prevent and control introduction and spread of pests of plants and plant products.	Potentially applicable if equipment or building materials contaminated with invasive plant materials or insects are brought in from outside and are released into the local ecosystems.

Agreements	Purpose	Relevance
World Cultural and Natural Heritage Convention	Its purpose / aim is the protection and management of cultural and natural heritage. It is administered by the PNG National Museum and Art Gallery under the Ministry of Tourism, Arts and Culture.	Potentially applicable if cultural heritage resources are encountered during construction of any subprojects.
United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP)	Enshrines the rights that "constitute the minimum standards for the survival, dignity and well-being of the indigenous peoples of the world." The UNDRIP protects collective rights that may not be addressed in other human rights charters that emphasize individual rights, and it also safeguards the individual rights of Indigenous people.	Potentially applicable as the majority of project beneficiaries and those that may be negatively impacted by the project are indigenous peoples.

3.4 World Bank

3.4.1 Environmental and Social Framework

The WB ESF sets out the 'World Bank's commitment to sustainable development, through a Bank Policy and a set of Environmental and Social Standards (ESS) that are designed to support Borrowers' projects, with the aim of ending extreme poverty and promoting shared prosperity'. The framework become effective on 1 October 2018 and applies to all Investment Project Financing initiated after this date. The framework consists of three parts:

1. A Vision for Sustainable Development - the Bank's aspirations regarding environmental and social sustainability.
2. The World Bank Environmental and Social Policy for Investment Project Financing - requirements that apply to the Bank.
3. The ESS requirements that apply to the Borrower and projects. The ESS are comprised of ten standards covering various topics:
    - ESS1 Assessment and Management of Environmental and Social Risks and Impacts
    - ESS2 Labor and Working Conditions
    - ESS3 Resource Efficiency and Pollution Prevention and Management
    - ESS4 Community Health and Safety
    - ESS5 Land Acquisition, Restrictions on Land Use and Involuntary Resettlement
    - ESS6 Biodiversity Conservation and Sustainable Management of Living Natural Resources
    - ESS7 Indigenous Peoples
    - ESS8 Cultural Heritage
    - ESS9 Financial Intermediaries
    - ESS10 Stakeholder Engagement and Information Disclosure

3.4.2 Operational Procedure 4.03

The WB Operational Procedure 4.03 'Performance Standards for Private Sector Activities' sets out the requirements for WB funded projects that are designed, owned, constructed and/or operated by a private entity. The WB Group Performance Standards (PS) are adopted for such projects, in lieu of the WB ESS (described in section 3.4.1). The PS are comprised of eight standards covering various topics:

- PS1 Assessment and Management of Environmental and Social Risks and Impacts
- PS2 Labor and Working Conditions
- PS3 Resource Efficiency and Pollution Prevention

- PS4 Community Health, Safety, and Security
- PS5 Land Acquisition and Involuntary Resettlement
- PS6 Biodiversity Conservation and Sustainable Management of Living Natural Resources
- PS7 Indigenous Peoples
- PS8 Cultural Heritage

3.4.3 Environment and Social Risk Classification

As part of the WB's requirements for project financing (as per the Environmental and Social Policy for Investment Project Financing) projects must be assessed and classified according to their level of environment and social risk. The classifications are: High Risk, Substantial Risk, Moderate Risk and Low Risk. This classification considers:

- Type, location, sensitivity, and scale of the project
- The nature and magnitude of the potential environmental and social risks and impacts
- The capacity and commitment of the Borrower to manage the environmental and social risks and impacts.

The risk ratings for the overall NEAT are assessed as Substantial for both environmental and social risks.

3.4.4 Applicable Environmental and Social Standards and Performance Standards

Screening of the ESS and PS that apply to the Project was undertaken by the WB team as part of project planning. The ESS will apply to Subcomponent 1.1, Subcomponent, 1.2, Component 2, Component 3 and Component 4; and the PS will apply to Subcomponent 1.3. The relevant standards are summarised in Table 3.

Table 3: Applicable Environmental and Social Standards and Performance Standards

Environmental and Social Standards	Performance Standards	Summary
ESS1: Assessment and Management of Environmental and Social Risks and Impact	PS1: Assessment and Management of Environmental and Social Risks and Impact	This standard sets out the Borrower's responsibilities[13] for assessing, managing and monitoring environmental and social risks and impacts associated with each stage of a project supported by the WB, in order to achieve environmental and social outcomes consistent with the ESSs / PSs. The requirement for an Environmental and Social Management System is also set out in the PS.
ESS2: Labor and Working Conditions	PS2: Labor and Working Conditions	This standard recognizes the importance of employment creation and income generation in the pursuit of poverty reduction and inclusive economic growth. Borrowers can promote sound worker-management relationships and enhance the development benefits of a project by treating workers in the project fairly and providing safe and healthy working conditions.

[13] Although these are the ultimate responsibility of the Borrower, they are typically delegated to the Implementing Entity (e.g., NEA and PPL in the case of NEAT) who also cascade these, where relevant, to grant beneficiaries, contractors, etc.

ESS3 Resource Efficiency and Pollution Prevention and Management	ESS3 Resource Efficiency and Pollution Prevention	This standard recognizes that economic activity and urbanization often generate pollution to air, water, and land, and consume finite resources that may threaten people, ecosystem services and the environment at the local, regional, and global levels.
ESS4 Community Health and Safety	ESS4 Community Health, Safety and Security	This standard recognizes that project activities, equipment, and infrastructure can increase community exposure to risks and impacts.
ESS5 Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	PS5 Land Acquisition and Involuntary Resettlement	Restrictions on Land Use and Involuntary Resettlement. This standard recognizes that project-related land acquisition and restrictions on land use can have adverse impacts on communities and persons. It may cause physical displacement (relocation, loss of residential land or loss of shelter) economic displacement (loss of land, assets or access to assets, leading to loss of income sources or other means of livelihood) or both.
ESS6 Biodiversity Conservation and Sustainable Management of Living Natural Resources	PS6 Biodiversity Conservation and Sustainable Management of Living Natural Resources	This standard recognizes that protecting and conserving biodiversity and sustainably managing living natural resources are fundamental to sustainable development. Biodiversity is defined as the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species, and of ecosystems.
ESS7 Indigenous Peoples	ESS7 Indigenous Peoples	This standard recognizes that Indigenous Peoples have identities and aspirations that are distinct from mainstream groups in national societies and often are disadvantaged by traditional models of development.
ESS10 Stakeholder Engagement and Information Disclosure:	Stakeholder engagement requirements are included in PS1.	This standard recognizes the importance of open and transparent engagement between the Borrower (and implementing entities) and project stakeholders as an essential element of good international practice. Effective stakeholder engagement can improve the environmental and social sustainability of projects, enhance project acceptance, and make a significant contribution to successful project design and implementation.

Although ESS8/PS8 (Cultural Heritage) were not deemed relevant to the Project due to Project activities being unlikely to affect cultural heritage (i.e., as impacts on tangible cultural heritage will be avoided during project screening), Chance Find Procedures have been included (Annex 6) to address unknown archaeological or historical remains and objects, including graveyards and/or individual graves. In the unlikely event that a cultural heritage site is unavoidable, ESS8/PS8 will apply, and the impact will be assessed as part of the ESIA/ESMP undertaken for the subproject.

3.4.5 Environmental, Health and Safety Guidelines

The Project will utilise the WB Group's Environmental, Health, and Safety (EHS) Guidelines. The EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). It contains the performance levels and measures that are normally acceptable to the WB Group and are generally considered to be achievable in new facilities at reasonable costs by existing technology. The EHS Guidelines are comprised of General Guidelines which are organised by themes (environmental; occupational health and safety; community health

and safety; construction and decommissioning) and industry-specific guidelines that cover over 60 specific industries relating to agribusiness and food production; chemicals; forestry; general manufacturing; infrastructure; mining; oil and gas; and power.

The following EHS Guidelines are relevant to the project:

- General EHS Guidelines: Environmental (including management air quality, water quality, noise, waste and hazardous materials)
- General EHS Guidelines: Occupational Health and Safety
- General EHS Guidelines: Community Health and Safety
- General EHS Guidelines: Construction and Decommissioning
- EHS Guidelines for Electric Power Transmission and Distribution.

3.5 Gap Analysis

A gap analysis between the PNG legal framework and the WB requirements (ESF, ESSs and PSs) with respect to environmental and social assessment is provided in Table 4. A gap analysis identified several differences between frameworks and gap filling measures have been identified where necessary. Where national legal framework differs from the WB requirements, the project is expected to align to whichever is more stringent. A gap analysis for resettlement-related requirements is provided in the LARF.

Table 4: Gap Analysis

Assessment stage	WB ESF, ESSs and PSs	National Legislation	Equivalence and Gap Filling Measures
Screening	The WB will classify all projects into one of four classifications: high risk, substantial risk, moderate risk or low risk. The screening takes into account relevant issues, such as the type, location, sensitivity, and scale of the project; the nature and magnitude of the potential E&S risks and impacts; and the capacity and commitment of the Borrower to manage the E&S risks and impacts in a manner consistent with the ESSs or PSs (as relevant).	Projects are screened and categorised as Level 1, 2A, 2B and 3 depending on the type and scale of the activity. These categories do not necessarily algin with the WB risk categories.	Partially equivalent. Screening for eligibility and potential impacts according to the ESMF, which takes into consideration the WB classification and the PNG legislation. The highest level of assessment will be applied.
E&S instrument and scope	Depending on the project risks and impact, a range of instruments and procedures required to meet the ESS or PS objectives, these include ESIA; ESMF; ESMPs, sectoral & regional ESIA; a hazard or risk assessment; environmental and social audit; cumulative impacts assessment (CIA); and social and conflict analysis. The WB provides general guidance for the implementation of each instrument.	Level 2A, Level 2B and Level 3 projects require a Permit Application, which requires an EMP and/or ESIA. The scope the EMP / ESIA is similar to that required by the WB for environmental aspects. The social aspects are less detailed than that required by the WB.	Partially equivalent. Apply the project's ESMF and prepare instruments to meet national and WB requirements.
Monitoring	Monitoring is required that includes a monitoring framework that allocates location, frequency, costs and responsibilities.	Monitoring is required but there is no specified framework provided.	Partially equivalent. Apply the project's ESMF.
Institutional	Institutional capacity and training	Institutional capacity and	Not equivalent.

Assessment stage	WB ESF, ESSs and PSs	National Legislation	Equivalence and Gap Filling Measures
capacity and training	requirements are assessed.	training requirements are not assessed.	Apply the project's ESMF.
Public consultation, stakeholder engagement, grievance redress mechanism (GRM) and Disclosure	During the ESA process, the Borrower consults project-affected groups and local NGOs about the project's environmental aspects and takes their views into account. In line with ESS10, preparation of a Stakeholder Engagement Plan (SEP), information disclosure, and establishment and operations of a GRM are required to ensure adequate consultation and transparency. ESS2 and PS2 also require the preparation of the labour management procedures (LMP) and an establishment and operation of a GRM for project workers. For meaningful consultations, the Borrower provides relevant project documents promptly before the consultation in a form and language that are understandable and accessible to the group being consulted. Minutes of the public meetings are included in the reports. The WB will disclose documentation relating to the E&S risks and impacts of high risks and substantial risks projects before project appraisal. Once the WB officially receives the report, it will make the EA report in English available to the public through the WB website.	Consultation is only required for Level 2B and Level 3 projects. Disclosure is not required.	Partially equivalent. Apply the project's ESMF, SEP, IPPF, LARF and LMP for the subproject to meet the WB and national requirements.
Supervision	During project implementation, the WB supervises the project's environmental aspects based on the environmental provisions, and the Borrower's reporting arrangement agreed in the loan agreement and described in the other project documentation, to determine whether the Borrower's compliance with the environmental covenant (primarily with ESMP) is satisfactory. If compliance is not satisfactory, the WB will discuss with the Borrower action necessary to comply.	CEPA has the authority to undertake audits. Regular reporting on the implementation of the conditions in the Environment Permit (e.g., for Project classified under PNG legislation as Level 2 or 3) by the proponent to CEPA is required.	Partially equivalent (as PNG requirements only apply to projects with an Environment Permit) Apply the project's ESMF, SEP, IPPF, LARF and LMP for the subproject to meet the WB and national requirements.

4. POTENTIAL E&S BENEFITS, RISKS, POTENTIAL IMPACTS & MITIGATION

This section identifies potential E&S benefits, risks and impacts associated with the Project; outlines the E&S risk management tools that have been or will be developed for the Project; and describes how these tools (along with other mitigations) will be used to manage the E&S risks and impacts and enhance the Project benefits.

4.1 Project Benefits

The Project's support for the expansion of electricity services is expected to have long-term positive impacts for target communities in the areas of health, education, safety and economic development, as well as in the reduction of greenhouse gas (GHG) emissions resulting from the electricity generation from renewable sources displacing some existing diesel generation and future potential diesel generation. The project will aim to identify and optimize these benefits including:

- creation of opportunities to employ local businesses and workers in subproject construction, operations and maintenance activities.
- training and skills development for local workers.
- provision of electricity to social infrastructure within communities such as health clinics and schools as well as streetlights to enhance community safety, particularly for women and children.
- enterprise opportunities through providing reliable electricity access.

The primary project beneficiaries are households, micro- and small and medium enterprises, and communities in PNG who either did not have access to modern energy services or only had unreliable ones. The Project will benefit NEA and PPL by supporting strengthened institutional capabilities to better plan, coordinate, regulate, and implement electrification projects and activities.

4.2 Potential Environmental Risks and Impacts

Key environmental risks and potential impacts associated with the project include:

- typical risks and impacts associated with construction activities such as soil erosion, increased dust and noise, sedimentation, pollution from inappropriate hazardous materials management, unexploded ordinance (UXO) potential, community and occupational health and safety risks, and security risks such as theft and vandalism of materials, equipment and tools.
- generation of hazardous waste (e.g., waste oil, asbestos, PCB oil, contaminated land) through the renovation/replacement of infrastructure at substations and existing mini-grids.
- generation of hazardous waste (e.g., solar panels and batteries) through operations and decommissioning of mini grids, micro grids and solar home systems.
- potential impacts from small hydropower plant operations such as sedimentation, disturbance to aquatic habitat, impact to downstream water resources.
- potential downstream (i.e., future) environmental risks and impacts associated with TA activities.
- risks from the operation of the diesel power generation at the mini-grids (e.g., emissions to air, noise and potential for spills).

4.3 Potential Social Risks and Impacts

Key social risks and potential impacts associated with the Project include:

- land and livelihood impacts associated with the establishment of sites/easements for grid expansion and mini-grid and micro-grid electricity generation, storage and distribution infrastructure, including social issues relating to crop compensation.

- transfer of existing land and social issues relating to land acquisition, past compensation agreements and cleared state-lease titles.
- inequitable expansion of electricity access within communities (i.e., ability to afford access to expanded electricity services and products, and risk of indebtedness) particularly for vulnerable social groups (widows, single mothers, disabled, elderly).
- social tensions, conflict and civil unrest between diverse cultural groups/communities resulting from real or perceived inequities concerning selection of target sites/communities.
- community health and safety risks associated with construction and labour influx (i.e., antisocial behaviour, transmissible disease and sexual exploitation and abuse and sexual harassment [SEA/SH]), as well as safety risks associated with the supply and use of electricity in communities with limited awareness of electrical safety.
- labour and working condition risks, particularly within the solar PV panel supply chain concerning polysilicon suppliers, and restructuring of the existing workforce at the mini-grid sites.
- potential downstream (i.e., future) social risks and impacts associated with TA activities.

4.4 E&S Risk Management Tools

Numerous tools have been prepared during Project planning to manage the E&S risks associated with the Project. Additional instruments will be prepared during Project implementation when further details of the subprojects are available and by the contractors to support their scopes of work. An overview of the tools is provided in Figure 14, followed by a description of each tool.

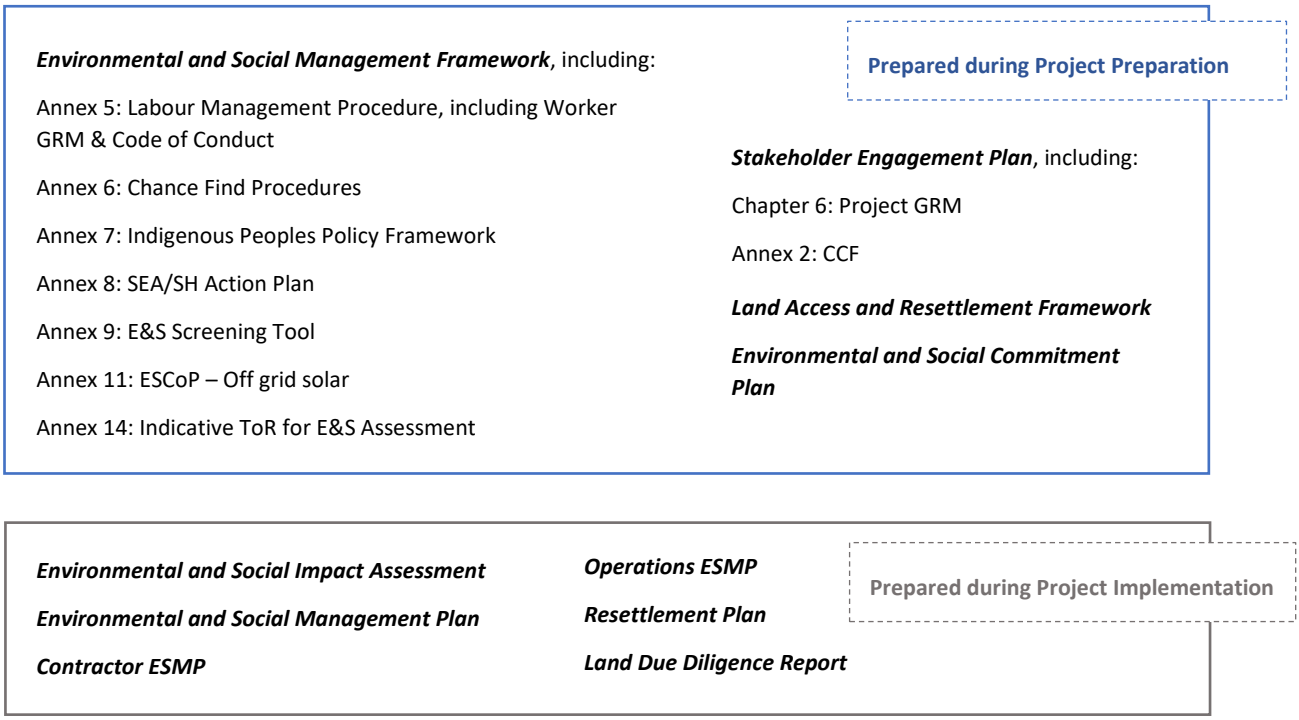


Figure 14: Overview of E&S risk management tools

Environmental and Social Management Framework (ESMF) - the ESMF (i.e., this document) is the Project's umbrella environmental and social management document, and sets out the strategy for screening the Project to ensure that key project-related environmental and social issues are captured. The ESMF includes the following annexes:

- **Environmental and Social Code of Practice (ESCoP) -** the Environmental Code of Practice (ESCoP) describes the types of measures to be taken to prevent or minimise environmental or social harm. The ESCoP provided relates to the off-grid subcomponent (subcomponent 2.2), and will be provided to any supplier selected to participate in the program.
- **SEA/SH Action Plan** – this plan outlines the strategies that Project will adopt to mitigate and respond to risks of SEA / SH related to the Project.
- **E&S Screening Tool** - this tool provides guidance on screening E&S risks and determination of requirements for assessment and preparation of further E&S instruments for activities under subcomponents 1.1, 1.2 and 2.1.
- **Indicative ToR for E&S assessment** – this document a draft ToR for the E&S assessments that will be undertaken for the TA activities that involve investigation into potential HPPs and solar projects. The draft ToR will be used to prepare final ToR for E&S assessments for each of the applicable TA activities when further details of the TA activities is available.
- **Chance Find Procedures** – a procedure to follow in the event a site of cultural value is found during construction works.
- **Labour Management Procedure (LMP)** – this procedure identifies different categories of workers that will be employed during the Project and provides guidelines on how these workers will be managed, according to national laws and WB requirements. The LMP includes:
    - **Worker GRM** – this mechanism sets out the process for Project workers to employment-related concerns and grievances.
    - **Code of Conduct** – this document sets out the obligations on all direct workers and contracted works to address potential issues that may be caused by work's conduct, such as OHS, discrimination, cultural respect, SEA/SH, conflict of interest, etc.
- **Indigenous Peoples Policy Framework (IPPF)** – this framework includes the requirements for subprojects, and other activities where necessary, to identify the ethnic groups that are present in the subproject areas; assess the potential direct and indirect economic, social and cultural impacts on these communities; and outline measures for protecting and enhancing the interests of IPs during project implementation. The framework also outlines a process to obtain free, prior and informed consent in the event that involuntary land acquisition is required.

Land Access and Resettlement Framework (LARF) – this framework establishes the principles, objectives, procedures and rules to manage land acquisition and associated impacts. It includes processes for negotiated settlement, voluntary land donation, and involuntary resettlement.

Stakeholder Engagement Plan (SEP) – this document identifies and analyses key project stakeholders; describes the process and modalities for sharing information on the project activities and seeking and incorporating stakeholder feedback into project design and during implementation; outlines specific strategies for consultation and information dissemination; and outlines approaches for reporting and disclosure of project documents. The SEP includes:

- **Project GRM** – this mechanism sets out the process for stakeholders to raise Project-related concerns and grievances.
- **Community Consultation Framework (CCF)** – this framework sets out the community consultation and engagement to be undertaken during identification, design, construction and operation of the micro-grids under subcomponent 2.1.

Environmental and Social Commitment Plan (ESCP) – This is an important legal document that forms part of the loan package and will be negotiated and agreed during the Project negotiation. It sets out how the borrower (or implementing entity) will comply with the ESSs and PSs, and refers to the various E&S instruments (e.g., ESMF, SEP, LARF, etc). It includes a table with:

- Material measures and actions.

- Timeframes for implementation and/or action.
- Responsible parties.

Environmental and Social Management System - is the integrated environmental, social, health and safety management system to be implemented by the concessionaire operating the mini-grids under subcomponent 1.3 to identify, assess and manage the environmental and social risks and impacts of subcomponent 1.3 of the Project on an ongoing basis in compliance with the applicable environmental and social laws, environmental and social instruments (i.e., ESIA/ESMP and O-ESMP).

Environmental and Social Impact Assessment (ESIA) – this tool will be prepared on an as needs basis to assess the subproject-specific risks and impacts associated with subprojects require an ESIA. The ESIA will also include an ESMP as a separate chapter or attachment. For subcomponents 1.1, 1.2 and 2.1, the need for an ESIA will be determined through completion of the E&S Screening Tool. Subprojects under subcomponent 1.3 require an ESIA.

Environmental and Social Management Plan (ESMP) - an ESMP will be prepared for:

- Subprojects under Component 1 as this is required by CEPA as part of the Notice of Intent process that PPL follows for all its projects that do not require an Environment Permit, and it a requirement for all project that do require an environment permit.
- Subprojects under subcomponent 2.1 (micro-grids) as each project will be unique and the potential impacts assessed at a site level.

The primary objective of the ESMP is to record environmental and social impacts resulting from the subproject activities and ensure implementation of the identified mitigation measures. An ESMP is prepared in order to reduce adverse impacts and enhance positive impacts. It is also intended to address any unexpected or unforeseen environmental and social impacts that may arise during the construction and operations phases of the subprojects. Example table of contents for a ESMP is provided in Annex 12a (for subcomponent 1.1 and 1.2 subprojects) and Annex 12b (for subcomponent 2.1 subprojects).

The ESMP should be carried out as an integrated part of the subproject planning and execution. It must not be seen merely as an activity limited to monitoring and regulating activities against a pre-determined checklist of required actions. Rather it should be used as a dynamic management approach, dealing flexibly with environmental and social impacts, both expected and unexpected, as subproject implementation proceeds. For those subprojects requiring an ESMP, it should be a part of the Contract Document.

Contractor ESMP (C-ESMP) – this document will be prepared by the contractors and reviewed/approved by PPL and/or NEA and/or concessionaire and then by WB prior to commencement of works. The C-ESMP will document how the contractor will implement the requirements in the ESMP in relation to the contractor's scope of work. An example C-EMSP template is provided as Annex 13. This document would also reference the Chance Finds Procedure (if applicable) and contain a section on waste management. The C-ESMP would include a section on OHS that documents how the contractor will comply with the WB EHSGs and PNG regulations with respect to OHS, including:

- Appointing a health and safety officer at site, who will have the authority to issue directives for the purpose of maintaining the health and safety of all personnel and provide OHS-related training.
- A simple action plan to cope with risk and emergency (e.g., fire, earthquake, civil unrest, COVID outbreak).
- Completing different levels of risk assessment, i.e., from whole Job Safety Analysis down to the personal level, to identify any potential hazards, rank the risks, and identify ways to eliminate, control or minimize the hazards.

- Ensuring all personal have the appropriate licences (if required) for their scope of work.
- Providing project workers with accessible means to raise workplace concerns as outlined in the LMP.

Operations ESMP (O-ESMP) – this document will be prepared by the concessionaire operating the mini-grids under subcomponent 1.3 and reviewed/approved by PPL and then by WB prior to commissioning of the solar PV and batteries. The O-ESMP will document how the concessionaire will implement the requirements in the ESMP in relation to operation of the mini-grids.

Land Due Diligence Report and Resettlement Plan – these documents are required if a subproject will result in the need for land access. They will be prepared by NEA and/or PPL (and submitted to the WB for clearance and review) in accordance with the policy, principles and planning and implementation arrangements set out in the LARF.

4.5 Summary of Potential Risks and Mitigations

A summary of the potential social and environmental risks and impacts that may result from proposed Project activities, key mitigations, and E&S risk management tools that have been or will be developed is provided in Table 5.

Table 5: Summary of Potential E&S Risks/Impacts and Risk Management Tools

Subcomponent	Phase	Potential E&S Risks / Impacts	Mitigation Methods	E&S Risk Management Tools
Subcomponent 1.1: Grid rehabilitation, resilience improvement, and modernization Substations, and grid digitalization upgrades within the boundaries of existing power generation and transmission infrastructure.	Construction	Typical construction related risks/impacts, such as dust, noise, accidental spills (including risk of spills associated with the replacement of oil-filled transformers). Typical OHS construction risks and OHS risks related to working at heights, and working with live power lines and magnetic fields, etc. Land and/or water pollution from improper waste disposal, including possible asbestos, possible PCB oil, and contaminated land which may be present at the sites to be upgraded.	High-risk activities to be screened out using the E&S Screening Tool E&S management measures to manage typical construction-related risk/impacts are provided in the E&S Management and Monitoring Table (Annex 10). These are to be included in the ESMP and C-ESMP where applicable to the scope of work. PPL to prepare and implement and EMSP that includes specific procedure/s for the handing, treatment and disposal of asbestos, PCB contaminated material and contaminated soil (as applicable to the scope of work) in line with GIIP and PNG requirements[14]. Procedure to be reviewed and approved by the WB prior to commencement of works. Contractor to develop and implement a C-ESMP in line with requirements in the ESMP that also addresses the OHS risks associated with their scope and waste management measures (including recycling of waste oil where practicable).	E&S Screening Tool E&S Management and Monitoring Table ESIA/ESMP and C-ESMP Asbestos management procedure Contaminated soil management procedure PCB management procedure

[14] Example of GIIP: World Bank Good Practice Note: Asbestos: Occupational and Community Health issues. Reference for preparing the asbestos management plan: https://www.dfat.gov.au/sites/default/files/environmental-and-social-safeguard-asbestos-guideline.pdf

See Secretariat of the Basel Convention publications for various guidance on PCB management, such as Updated technical guidelines for the environmentally sound management of wastes consisting of, containing or contaminated with polychlorinated biphenyls (PCBs), polychlorinated terphenyls (PCTs) or polybrominated biphenyls (PBBs): http://www.basel.int/Portals/4/Basel%20Convention/docs/pub/techguid/tg-PCBs.pdf

Subcomponent	Phase	Potential E&S Risks / Impacts	Mitigation Methods	E&S Risk Management Tools
	Operation	Land and/or water pollution from transformers leaking oil.	The foundations for the new transformers will be designed to capture leaks and prevent spills to ground.	Included in project design
Subcomponent 1.2: Grid densification and expansion for new household connections LV and MV extensions	Construction	Typical construction related risks/impacts such as dust, noise and disposal of excess excavated soil materials associated with installation of power poles. Sourcing of construction materials and aggregate could contribute to unsustainable extraction of resources. Minor disruption to traffic, pedestrians and roadside stalls, etc during construction works in urban and peri-urban areas. Potential clearing of greenfield land for MV extensions (and access roads) that could result in: - in habitat loss, although this is unlikely to be significant given the LV and MV lines will typically be installed along roads within existing rights-of-way. - impacts to site of cultural value, although this is unlikely given the LV and MV lines will typically be installed along roads within existing rights-of-way and impacts to known cultural heritages sites will be avoided through the screening process. Land and/or water pollution from improper waste disposal. Typical OHS construction risks and OHS risks related to working at heights, and working with	PPL to prepare and implement an EMSP. Contractor to develop and implement a C-ESMP in line with requirements in the ESMP that also addresses the OHS risks associated with their scope. E&S management measures to manage typical construction-related risk/impacts are provided in the E&S Management and Monitoring Table (Annex 10), and include measures to mitigate impacts from sourcing of construction materials and disruption of communities. These are to be included in the ESMP and C-ESMP where applicable to the scope of work. Significant impacts relating to habitat loss be avoided through E&S screening, with subprojects likely to cause significant impacts ineligible for funding. Impacts on tangible cultural heritage will be avoided through E&S screening with subprojects likely to cause significant impacts ineligible for funding. Contractor to include Chance Find Procedures (based on those provided as Annex 6) in their C-ESMP to address unknown archaeological or historical remains and objects, including graveyards and/or individual graves. Contractor to develop and implement a C-ESMP in line with requirements in the ESCoP or ESMP/ESIA that also addresses the OHS risks associated with their scope and waste management measures. PPL has an existing comprehensive OHS system that can be referred to. Hunting and gathering of bush materials by non-local	ESIA/ESMP and C-ESMP E&S Management and Monitoring Table E&S Screening Tool Chance Find Procedures Existing PPL OHS management system

Subcomponent	Phase	Potential E&S Risks / Impacts	Mitigation Methods	E&S Risk Management Tools
		live power lines and magnetic fields. Hunting and gathering of bush materials by workers from outside the local area (for food etc.) contributes to loss of flora/fauna.	workforce to be prohibited.	
		Land and livelihood impacts associated with the establishment of sites/easements where Project sites cannot be contained along existing road corridors, within PPL or public owned rights-of-way, or where gardens and structures have been established within such areas.	Land and livelihood impacts to be assessed as part of the subproject screening process and avoided where practicable. Where resettlement is required, a RP will be developed and implemented as per requirements set out in the Land Access and Resettlement Framework, which aligns with the existing PPL processes.	E&S Screening Tool Land due diligence and/or Resettlement Plan (RP)
		Inequitable expansion to access electricity services within communities (i.e. ability to afford access to expanded electricity services and products), particularly for vulnerable social groups.	Inclusive stakeholder engagement as per SEP and implementation of subcomponent 2.2 (i.e., to mitigate inequitable access to expanded electricity).	Social analysis included in ESMP/ESIA SEP – engagement with vulnerable groups
		Social tensions, conflict and civil unrest between groups/ communities resulting from real or perceived inequities concerning selection of target sites/communities for grid access.	This risk will be taken into consideration in the selection of subprojects and potential impacts to be assessed as part of the E&S Screening Tool with subproject specific mitigations developed and implemented as required. Mitigations may include additional stakeholder engagement, including awareness to such communities of the off-grid solar RBF facility (i.e., subcomponent 2.2).	E&S Screening Tool Social analysis included in ESMP/ESIA SEP – communication of grid expansion master plan and other access programs (e.g., subcomponent 2.2)

Subcomponent	Phase	Potential E&S Risks / Impacts	Mitigation Methods	E&S Risk Management Tools
		Community health and safety risks associated with construction and labour influx (i.e. antisocial behaviour, transmissible disease and sexual exploitation and abuse and sexual harassment). Where works are done away from major towns, there may be a need to rent small houses from (and within) the community to accommodate workers. This provides income to the community but also increases construction and labour influx risks.	Implementation of LMP, including Code of Conduct (CoC) for workers. Implementation of the Worker GRM and Project GRM. Implementation of SEA/SH Action Plan. Subproject-specific mitigations to be included in the C-ESMP, which may include items such as a requirement for workers to be back in their accommodation by a certain time each evening.	LMP, including CoC Worker GRM Project GRM SEA/SH Action Plan
		Fire and/or electrocution risk if installations are not done by qualified personnel using suitable materials.	Follow PPL's existing QA/QC system for installations, which includes a requirement for the installation contractor to be licensed (i.e., have an electrical licence and contractor licence) and for an inspector to verify the works.	PPL's existing QA/QC system for installations
		Asbestos related risks to workers (and community) if meters will be installed on asbestos containing walls. There is potential for all buildings build before around 2000 to contain asbestos.	Prepare and implement an asbestos management plan[15] for meter installers. Plan to cover: • Asbestos identification • Procedures for working with asbestos • Asbestos disposal • Training • Supply of appropriate PPE	Asbestos management plan
	Operation	Sustainability issues with new infrastructure if there is no ongoing suitable access for maintenance crews. PPL are not responsible for road maintenance and often carry out a temporary fix of a road to enable to access by	Assessment of access is included in the subproject E&S Screening Tool. If suitable access is not currently available, then the maintenance of roads should be committed to by the relevant party (e.g., District Development Authority) as a condition of funding the subproject.	E&S Screening Tool

[15] Example reference for preparing the asbestos management plan: https://www.dfat.gov.au/sites/default/files/environmental-and-social-safeguard-asbestos-guideline.pdf

Subcomponent	Phase	Potential E&S Risks / Impacts	Mitigation Methods	E&S Risk Management Tools
		construction crews (as suitable machinery is on site for the grid construction), however, if the road is not maintained then the maintenance teams (who drive light vehicles) cannot access the infrastructure to carry out repairs and maintenance.		
		Data protection and privacy risks associated with the management of personal information collected for HH connections	Management of personal data as per the principles set out in the WB's Personal Data Privacy Policy as a GIIP	Data protection procedures within the PIM
		Community safety risks associated with the supply and use of electricity in communities that are not familiar with electrical safety.	Implement PPL's existing community electrical safety awareness program.	PPL's existing community electrical safety awareness program
Subcomponent 1.3: Mini-grids Establishment of solar power generation to support one or more existing mini-grids in an urban area, to partially displace the current use of diesel powered generation and increase generation capacity to improve reliability and expand distribution. Scope also includes refurbishment/replacement of existing diesel generation system and transformers, although this is not funded by the	Construction	Typical construction related risks/impacts such as dust, noise and disposal of excess excavated soil materials associated with installation of power poles. Typical OHS construction risks, security risks and OHS risks related to working at heights, and working with live power lines and magnetic fields. Potential clearing of greenfield land for the solar PVs, BESS and transmission lines for mini-grid, resulting in: - habitat loss - erosion and sedimentation - spread of weeds/pests - impacts to sites of cultural value Land and/or water pollution from improper waste disposal, including possible asbestos, PBC	Concessionaire to develop and implement its Environmental and Social Management System (ESMS) in accordance with the WB Group PS and this will be specified in the concession agreement. Activities to be assessed in detail through the ESIA process. Concessionaire to develop and implement a ESMP in line with requirements of this ESMF and its ESMS that also addresses the OHS risks associated with their scope and waste management measures (including the management of spent batteries and solar panels). Contractor to develop and implement a C-ESMP in line with requirements in the ESMP that also addresses the OHS and security risks associated with their scope and waste management measures (including recycling of waste oil where practicable). Impacts on tangible cultural heritage will be avoided where practicable through planning/design process and impacts	ESMS Concession agreement ESIA/ESMP Bid documents C-ESMP Chance Find Procedures Asbestos management

Subcomponent	Phase	Potential E&S Risks / Impacts	Mitigation Methods	E&S Risk Management Tools
subsidy. Mini-grids will have a capacity of around 10 to 15 MW (made up of solar and diesel generation - around 5 to 8 MW each), plus around 1 to 2 MW of battery storage. The land required for the solar PVs is expected to be around 10 to 20 ha and the system will service around 5,000 to 10,000 households. The exact parameters will vary depending on which subprojects are selected for investment.		contaminated waste oil and contaminated land which may be present at the diesel generation sites to be upgraded.	assessed in the ESIA. Contractor to include Chance Find Procedures (based on those provided as Annex 6) in their C-ESMP to address unknown archaeological or historical remains and objects, including graveyards and/or individual graves. Concessionaire to prepare and implement and ESMP that includes specific procedure/s for the handing, treatment and disposal of asbestos, PCB contaminated waste oil and contaminated land (as applicable to the scope of work) in line with GIIP and PNG requirements[16]. Procedures to be reviewed and approved by the WB prior to commencement of works.	procedure PCB management procedure Contaminated land management procedure
		Land access and economic displacement associated with the mini-grid land requirements. The potential impacts to land and livelihoods could include direct or indirect changes of land use; loss of income through temporary or permanent change in land or other resource use; and the need for land access. Some people may be physically displaced, depending on which mini-grid sites are selected for redevelopment, although this will be avoided where practicable. The Land Access and Resettlement Framework (LARF) allows	Land and physical and/or economic displacement to be assessed as part of the ESIA. Land due diligence will be conducted and implemented as per requirements set out in the LARF and Resettlement Plans prepared where required.	ESIA LARF Land Due Diligence / Resettlement Plan

[16] Example of GIIP: World Bank Good Practice Note: Asbestos: Occupational and Community Health issues. Reference for preparing the asbestos management plan: https://www.dfat.gov.au/sites/default/files/environmental-and-social-safeguard-asbestos-guideline.pdf

See Secretariat of the Basel Convention publications for various guidance on PCB management, such as Updated technical guidelines for the environmentally sound management of wastes consisting of, containing or contaminated with polychlorinated biphenyls (PCBs), polychlorinated terphenyls (PCTs) or polybrominated biphenyls (PBBs): http://www.basel.int/Portals/4/Basel%20Convention/docs/pub/techguid/tg-PCBs.pdf

Subcomponent	Phase	Potential E&S Risks / Impacts	Mitigation Methods	E&S Risk Management Tools
		for this should it be needed in exceptional cases. The land required for the solar PVs is expected to be around 10-20 ha, depending on which mini-grid sites are selected for investment Additional land is not anticipated for the diesel generation sites.		
		Social issues relating to land acquisition, past compensation agreements and cleared state-lease titles relating to the transfer of land to support the mini-grids.	Undertake detailed land due diligence investigations as part of site selection	Land due diligence report
		Community health and safety risks associated with construction and labour influx (i.e., antisocial behaviour, transmissible disease and sexual exploitation and abuse and sexual harassment). There may be a need to rent small houses from (and within) the community to accommodate workers. This provides income to the community but also increases construction and labour influx risks.	Implementation of LMP, including Code of Conduct (CoC) for workers. Implementation of the Worker GRM and Project GRM. Implementation of SEA/SH Action Plan. Subproject-specific mitigations to be included in the C-ESMP, which may include items such as a requirement for workers to be back in their accommodation by a certain time each evening.	LMP CoC Worker GRM Project GRM SEA/SH Action Plan
		Labour and working condition risk for concessionaire and contractor workforce. Labour and working condition risk within the PV panel supply chain concerning polysilicon suppliers.	Incorporate labour and working condition requirements of LMP in Concession Agreement. Concessionaire to obtain declarations and qualification requirements regarding forced labour from their suppliers of solar panels and solar components and this will be specified in the Concession Agreement.	LMP Bid Documents Concession Agreement
		Management of existing PPL workers associated with the mini-grid when the control of the mini-grid is transferred to the concessionaire.	PPL to engage with workforce at mini-grid site to provide information about the transfer and potential implications for workers. Concessionaire to adopt and implement a roadmap for managing workforce engagement and collective dismissal (if	SEP Concession Agreement

Subcomponent	Phase	Potential E&S Risks / Impacts	Mitigation Methods	E&S Risk Management Tools
			applicable) that is aligned with the requirements in PS2. Concessionaire to adhere to the requirements for project-provided accommodation as set out in PS2 and described in the LMP. Concessionaire to adopt human resource policies and procedures set out in PS2 and described in the LMP.	
		Fire and/or electrocution risk if electrical works are not done by qualified personnel using suitable materials.	Installations to be carried out by a contractor that is licensed (i.e., has an electrical licence and contractor licence) and an inspector is to verify the works.	
		Asbestos related risks to workers (and community) if meters will be installed on asbestos containing walls. There is potential for all buildings build before around 2000 to contain asbestos.	Prepare and implement an asbestos management plan[17] for meter installers. Plan to cover: • Asbestos identification • Procedures for working with asbestos • Asbestos disposal • Training • Supply of appropriate PPE	Asbestos management plan
		Potential disruption to existing service during works and changes to billing practices.	Concessionaire to undertake engagement with existing customers to communicate potential service disruptions and changes to billing practices.	SEP
		Inequitable expansion to access electricity services within communities (i.e. ability to afford access to expanded electricity services and products), particularly for vulnerable social groups.	Inclusive stakeholder engagement as per SEP and implementation of subcomponent 2.2 (i.e., to mitigate inequitable access to expanded electricity).	Social analysis included in ESMP/ESIA SEP – engagement with vulnerable groups

[17] Example reference for preparing the asbestos management plan: https://www.dfat.gov.au/sites/default/files/environmental-and-social-safeguard-asbestos-guideline.pdf

Subcomponent	Phase	Potential E&S Risks / Impacts	Mitigation Methods	E&S Risk Management Tools
	Operation	Typical operational risks associated with the solar PVs and BESS: - potential risks to wildlife (e.g., birds and bats) related to collision, electrocution, and glare from solar PVs. - potential nuisance glare from the solar PVs to local residents. - fire risk. - hazardous waste generation from batteries and used solar PVs (there is currently no in-country solution for disposal of these waste types aside from potential disposal in a private landfall). - need for sustainable water supply for use in cleaning PVs.	Potential impacts to be assessed in the EISA and mitigation developed, if required. The concessionaire will include operational risks and impacts in the ESIA/ESMP, and prepare a detailed Operational ESMP (O-ESMP) prior to commissioning, which will include processes for the collection, storage, and disposal of solar PV and batteries. To further support the concessionaire, options for adequate disposal will be explored by NEA as part of the wider Project.	ESIA/ESMP O-ESMP
		Typical risks associated operating large diesel generators: - noise (and potential to affect nearby receptors) - emissions to air (and potential to affect nearby receptors) - handling, storage and usage of hazardous materials and wastes	The concessionaire will include operational risks and impacts in the ESIA/ESMP, and prepare a detailed Operational ESMP (O-ESMP) prior to commissioning. The ESIA will include assessment of operational noise and emissions to air in alignment the WB General EHS Guidelines.	ESIA/ESMP O-ESMP
		Labour and working condition risks associated with the concessionaire workforce	Concessionaire to manage workforce in accordance with human resource policies and procedures and GoPNG labour laws. OHS risks to be managed in accordance with O-ESMP and ESMS	Human resource policies and procedures O-ESMP and ESMS

Subcomponent	Phase	Potential E&S Risks / Impacts	Mitigation Methods	E&S Risk Management Tools
		Community safety risks associated with the supply and use of electricity in communities that are not familiar with electrical safety.	Concessionaire to develop and implement community electrical safety awareness program and roll this out to all newly connected households. PPL has existing material that the concessionaire may be able to access.	O-ESMP and ESMS Community electrical safety awareness program
		Fire and/or electrocution risk if electrical works are not done by qualified personnel using suitable materials.	Installations to be carried out by a contractor that is licensed (i.e., has an electrical licence and contractor licence) and an inspector is to verify the works.	O-ESMP and ESMS Concession agreement
Subcomponent 2.1: Renewable energy micro-grids Establishment of micro-grids in urban/peri-urban areas that lack on-grid access. Micro-grids to utilise solar and/or hydropower combined with battery storage, and have a capacity of a few hundred kW (maximum of 1 MW). Most solar micro-grids will require around 500 to 1,000 m^2 of land and service a few hundred households.	Construction	Typical construction related risks/impacts such as dust, noise and disposal of excess excavated soil materials associated with installation of power poles. Typical OHS construction risks and OHS risks related to working at heights, and working with live power lines and magnetic fields. Potential clearing of small areas of greenfield land for micro-grid, resulting in: - in habitat loss - erosion and sedimentation - spread of weeds/pests - impacts to sites of cultural value Disturbance to aquatic habitat and increased turbidity from hydropower system. Negligible risks to wildlife (e.g., birds and bats) related to collision, electrocution, and glare from solar PVs.	High-risk activities to be screened out using the E&S Screening Tool. Potential impacts relating to disturbance to aquatic habitat to be assessed through the E&S Screening Tool and specific mitigations developed, if required. E&S management measures to manage typical construction-related risk/impacts are provided in the E&S Management and Monitoring Table (Annex 10). These are to be included in the ESMP and C-ESMP where applicable to the scope of work. Service provider to develop and implement a ESMP in line with requirements of this ESMF that also addresses the OHS risks associated with their scope and waste management measures (including the management of spent batteries and solar panels). Contractor to develop and implement a C-ESMP in line with requirements in the ESCoP or ESMP/ESIA that also addresses the OHS risks associated with their scope and waste management measures. Significant impacts relating to habitat loss will be avoided	E&S Screening Tool ESIA/ESMP (see Annex 12b for outline) Bid documents. C-ESMP Chance Find Procedures

Subcomponent	Phase	Potential E&S Risks / Impacts	Mitigation Methods	E&S Risk Management Tools
		Negligible nuisance glare from the solar PVs to local residents.	through E&S screening, with subprojects likely to cause significant impacts ineligible for funding. Impacts on tangible cultural heritage will be avoided through E&S screening with subprojects likely to cause significant impacts ineligible for funding. Contractor to include Chance Find Procedures (based on those provided as Annex 6) in their C-ESMP to address unknown archaeological or historical remains and objects, including graveyards and/or individual graves.	
		Land and livelihood impacts associated with the micro-grid land requirements. The potential impacts of subprojects to land and livelihoods could include direct or indirect changes of land use; loss of income through temporary or permanent change in land or other resource use; and the need for land acquisition. The footprint of subprojects is generally small and it is not expected that people would need to relocate or resettle, although the Land Access and Resettlement Framework (LARF) allows for this should it be needed in exceptional cases. The land required for most solar-micro grids (for the solar panels and power station) is expected to be less than 200 m^2 and the solar panels may be installed on existing rooftops where practicable (i.e., considering the size, location and strength of the roof).	Land and livelihood impacts to be assessed as part of the subproject screening process. Involuntary land acquisition and resettlement will be screened out. Land due diligence will be conducted and implemented as per requirements set out in the LARF and Resettlement Plans prepared where required. The Project will be implemented only with the support of the community and any specific agreements between the community and the developer will be specified in the contract between the community and the developer, as per the contract template provided in the PNG Off-Grid Regulation for Small Power Systems.	E&S Screening Tool LARF Land Due Diligence / Resettlement Plan Agreement between developer and community
		Inequitable access to expanded electricity services within communities (i.e. ability to afford access to micro-grids, and risk of indebtedness), particularly for vulnerable social groups.	The selection process will be used to identify and optimise the potential social benefits that each subproject could contribute within the communities where it will be implemented. Hence some individuals may not initially be able to afford the tariff,	Micro-grid selection process Micro-grid design

Subcomponent	Phase	Potential E&S Risks / Impacts	Mitigation Methods	E&S Risk Management Tools
			however, will still benefit from the project as the project will benefit the social infrastructure within the community. All properties in community that are within vicinity of micro-grid and feasible (economically and technically) to connect, will be connected. Therefore, if some households may not be initially able to purchase electricity as they cannot afford the tariff, they will still be connected and have the option to purchase electricity at a later date. The selection criteria for the micro-grids will a include consider the percentage connection coverage within community.	
		Community health and safety risks associated with construction and labour influx (i.e., antisocial behaviour, transmissible disease and sexual exploitation and abuse and sexual harassment). There may be a need to rent small houses from (and within) the community to accommodate workers. This provides income to the community but also increases construction and labour influx risks.	Implementation of LMP, including Code of Conduct (CoC) for workers. Implementation of the Worker GRM and Project GRM. Implementation of SEA/SH Action Plan. Subproject-specific mitigations to be included in the C-ESMP, which may include items such as a requirement for workers to be back in their accommodation by a certain time each evening.	LMP CoC Worker GRM Project GRM SEA/SH Action Plan
		Labour and working condition risk for contractor workforce. Labour and working condition risk within the PV panel supply chain concerning polysilicon suppliers.	Incorporate labour and working condition requirements of LMP in Grant Agreement. Developers to obtain declarations and qualification requirements regarding forced labour from their suppliers of solar panels and solar components and this will be specified in the Grant Agreement.	LMP Bid Documents Grant Agreement/Contract
	Operation	Hazardous waste generation from batteries and used solar PVs. The batteries have an expected useable life of around 8 years and the solar panels	The service provider will include waste management in their ESMP, including processes for the collection, storage, and disposal of solar panels and batteries, in alignment with	ESIA/ESMP (see Annex 12b for outline)

Subcomponent	Phase	Potential E&S Risks / Impacts	Mitigation Methods	E&S Risk Management Tools
		have an expected usable life of around 20 to 30 years. This is an indicative timeframe and some products may need to be replaced (and therefore disposed of) prior to this. There is currently no in-country solution for disposal of these waste types (aside from potential disposal in a private landfall) and the collection of these waste from remote areas could be challenging.	Annex 2 of the PNG Off-Grid Regulation for Small Power System[18]. To further support the developers on the feasibility to collect the waste batteries and solar panels, options for setting up a mechanism to collect used batteries and solar panels and centrally arrange for adequate disposal will be explored by NEA as part of the wider Project. This will also consider the management of waste beyond the developer's involvement in the Project (i.e., if the micro-grid is handed over to the community to self-run).	
		Variable governance and capacity within community, which can affect the quality of implementation of the micro-grid and the level of benefits achieved. Vandalism and/or tribal fighting leading to damage of micro-grid infrastructure.	The overall selection process for the micro-grids considers security risk (i.e., it is one of the selection criteria). The developer should discuss potential security risks with the community during the planning phase for the micro-grids and develop site-specific mitigations to address this if warranted and include these in the project design and costings. Measures may include items such as fencing, strategic placement of the infrastructure, ongoing guardianship payments, etc.	Micro-grid selection process Micro-grid design
		Social tensions, conflict and civil unrest between groups/ communities resulting from real or perceived inequities concerning selection of target sites/communities for micro-grids.	These risks will be taken into consideration in the selection of subprojects and potential impacts to be assessed as part of the E&S Screening Tool with subproject specific mitigations developed and implemented as required. Mitigations may include additional stakeholder engagement, including awareness to such communities of the off-grid solar RBF facility (i.e., Component 3).	E&S Screening Tool ESIA/ESMP (social analysis)

[18] Version 7, April 2022

Subcomponent	Phase	Potential E&S Risks / Impacts	Mitigation Methods	E&S Risk Management Tools
		Fire and/or electrocution risk if installations are not done by qualified personnel using suitable materials.	Installations to be carried out by a contractor that is licensed (i.e., has an electrical licence and contractor licence) and an inspector is to verify the works.	ESIA/ESMP C-ESMP
		Community safety risks associated with the supply and use of electricity in communities that are not familiar with electrical safety.	Developer to develop and implement community electrical safety awareness program and roll this out to all households. PPL has existing material that the developer may be able to access.	Community electrical safety awareness program
Subcomponent 2.2: Rural energy market development Support growth off-grid solar market through a grant facility to support companies expand their services, prioritizing underserved and rural areas.	Supply & Installation	Community health and safety risks associated with construction and labour influx (i.e. antisocial behaviour, transmissible disease and sexual exploitation and abuse and sexual harassment).	Incorporate LMP requirements in Grant Agreement, including Code of Conduct (CoC) for workers. Implementation of the Worker GRM and Project GRM. Implementation of SEA/SH Action Plan.	LMP CoC Worker GRM Project GRM SEA/SH Action Plan To be included in PIM and grant agreements
		Inequitable access to off-grid solar market (i.e. ability to afford access to products; and risk of indebtedness), particularly for vulnerable social groups.	Inclusive engagement with all social groups to ensure they understand the different products on offer (and varying price ranges) and the details of any loan or pay-as-you-go payment scheme offered.	SEP To be included in PIM and grant agreements
		Labour and working condition risk for Grantee workforce. Labour and working condition risk within the PV panel supply chain concerning polysilicon suppliers.	Include labour and working condition requirements in RPF agreements. RBF participants to obtain declarations and qualification requirements regarding forced labour from their suppliers of solar panels and solar components.	To be included in PIM and grant agreements

Subcomponent	Phase	Potential E&S Risks / Impacts	Mitigation Methods	E&S Risk Management Tools
	Operation	Fire and/or electrocution risk if SHS installations are not done by qualified personnel using suitable materials.	Installations to be carried out by a contractor that is licensed (i.e., has an electrical licence and contractor licence) and an inspector is to verify the works.	To be included in PIM and grant agreements
		Hazardous waste generation from battery and used solar PVs.	The supplier will include waste management in their proposal, including processes for the collection, storage, and disposal of solar panels and batteries and ability to implement this will be part of the selection process for participating the scheme. To support the suppliers on the feasibility to collect the waste batteries and solar panels**,** options for setting up a mechanism to collect used batteries and solar panels and centrally arrange for adequate disposal will be explored by NEA as part of the wider Project. This will also consider the management of waste beyond the supplier's operations (i.e., if the supplier ceases operations).	To be included in PIM and grant agreements
		Community safety risks associated with the supply and use of electricity in communities that are not familiar with electrical safety.	Supplier to develop and implement community electrical safety awareness program and roll this out to all households. PPL has existing material that the supplier may be able to access.	Community electrical safety awareness program
Subcomponent 3.1: NEA Institutional Development and Technical Assistance Build institutional capacities in NEA through recruitment of specialists and training. Technical assistance for the preparation of policy and regulatory instruments.	Project implementation	TA on policy and regulatory instruments may have potential downstream E&S risks.	ToRs for TAs need to be reviewed to ensure its compliance with ESSs and the final documents prepared will be reviewed by NEA and the WB to ensure it is consistent with the ToR.	To be included in PIM and grant agreements

Subcomponent	Phase	Potential E&S Risks / Impacts	Mitigation Methods	E&S Risk Management Tools
Subcomponent 3.2: PPL Institutional Development and Technical Assistance Build institutional capacities in PPL through recruitment of specialists and training. Technical assistance for the design of new small HPPs with expected maximum capacity of a few MW.	Project implementation	TA supporting the design of small HHPs and solar projects may have potential downstream environmental and social impacts, such as: • Dam safety risks • Land inundation and associated loss of forest and gardens • Changes to aquatic habitat and species • Changes to downstream water availability and quality • Land and resettlement requirements • Damage to sites of cultural value	Indicative ToR for E&S assessment of the small HPP is developed as part of this ESMF to ensure downstream E&S risks and its mitigation measures are identified. Once further details of the potential locations and scale of the proposed new HPPs are known, the indicative ToR for E&S Assessment will be revised and finalised.[19] The final ToR will be used for the contracting of specialist consultants to undertake the E&S Assessment. The final E&S assessment and associated documents (i.e. resettlement plans) will be reviewed by PPL and the WB to ensure it is consistent with the ToR.	Indicative ToR for E&S Assessment

[19] The scale of the E&S assessment proposed is in alignment with a feasibility-level investigation. If the TA provided is of a smaller scale, then the scope of the E&S assessment may be reduced accordingly.

5. PROCESS TO SCREEN SUBPROJECTS AND DETERMINE INSTRUMENTS

This chapter describes the process used to screen subprojects and determine the instruments that need to be prepared and implemented to manage the E&S risks associated with the subproject. The screening process also includes an exclusion list (refer screening forms) to identify subprojects that are ineligible for financing under the Project. The screening process also identifies potential associated facilities.

Screening and assessment of activities under Component 4 are not required as this component is limited to project management.

5.1 Process for subcomponents 1.1 and 1.2

Subcomponents 1.1 and 1.2 of the Project will be implemented by PPL and comprises:

- **Grid rehabilitation, resilience improvement, and modernization** – Substations, and grid digitalization upgrades within the boundaries of existing power generation and transmission infrastructure.
- **Grid densification and expansion** – LV and MV extensions.
- **New household connections** – PPL's project scope or subsidy scheme covering all areas with grid access.

The process for screening and determination of instrument for each of these activities is described in the following sections.

5.1.1 Grid rehabilitation, resilience improvement and modernization

At the time of preparing scopes for work, the relevant E&S Screening From (Annex 9) should be completed to identify potential environmental and social impacts in or near the area of the areas where the proposed works will occur. The screening form helps alert PPL's EPM of the more evident environmental risks, including the need to manage PCB waste.

The screening forms are submitted to the PPL EPM for review along with designs and other materials prepared for the activity. For scope of work, the PPL EPM determines what additional documentation is needed.

The PPL EPM will work with the appropriate PPL staff to prepare the documentation as needed and to carry out consultations and negotiations with people affected by the activities. An ESMP will be required for each subproject under this subcomponent as PPL submits a NOI to CEPA for each subproject and the EMSP is used to support the NOI. The EMSP will also go through the WB's review, approval, and disclosure process. An example EMSP outlines is provided as Annex 12a and this will be supported by the E&S Management and Monitoring Table provided in Annex 10.

5.1.2 Grid densification and expansion

At the time of initial surveys for the grid access expansion works, the relevant E&S Screening From (Annex 9) should be completed to identify potential environmental or social impacts in or near the area of the areas where the proposed works will occur. The screening form helps alert the PPL EPM of the more evident environmental risks.

The screening forms identify environmental and social sensitive areas (e.g., areas prone to erosion, swampy areas, large water course crossing, etc) that may be affected by the civil works. These areas are typically avoided due to engineering reasons during the initial route selection process and therefore it is unlikely that a proposed MV line would traverse such areas, however, this is still a risk for the LV lines. The social issues covered help identify nearby communities, people living along the right of way, land uses by nearby communities, houses or other structures that may need to be moved.

The screening form also addresses the potential requirement for an environment permit under PNG legislation.

The screening forms are submitted to the PPL EPM for review along with designs and other materials prepared for the activity. For every segment of the MV/ LV lines, the PPL EPM determines what additional documentation is needed.

The PPL EPM will work with the appropriate PPL staff to prepare the documentation as needed and to carry out consultations and negotiations with people affected by the activities. At a minimum an ESMP will be required for each subproject under this subcomponent as PPL submits a NOI to CEPA for each subproject and the EMSP is used to support the NOI. The EMSP will also go through the WB's review, approval and disclosure process. An example EMSP outline is provided as Annex 12a and this will be supported by the E&S Management and Monitoring Table provided in Annex 10.

5.1.3 New household connections

There is no screening required for the household connection subsidy scheme. The applicable mitigations are identified in Table 5, specifically:

- QA/QC system for installations (existing PPL system)
- Community electrical safety awareness program (existing PPL system)
- Asbestos management procedure (new procedure)

The PPL EPM will work with the appropriate PPL staff to prepare the asbestos management procedure and implement these mitigations.

5.1.4 Procurement/contracting

The E&S relevant requirements, including copies of the ESMF, LARF and SEP, will be included in the bidding documents and contractors will be contractually required to implement them and any subproject specific documents prepared for the subproject (e.g., ESMP). This process aligns with the World Bank Procurement Framework. In some instances, PPL staff would undertake the work in-house rather than engage contractors and in these instances the team assigned to the scope will be provided with copies of the relevant E&S documents.

5.1.5 Implementation and monitoring of mitigation measures

The E&S Management and Monitoring Table (Annex 10) provides measures for managing the risk and impacts associated with subcomponents 1.1 and 1.2 and will be used by PPL and their contractors in the preparation of ESMPs and/or C-ESMPs. The table also includes guidance on how to verify that the mitigations have been or are being implemented, the frequency that the monitoring should be done and who is responsible for the implementation of the mitigations and providing oversight.

5.1.6 Contractor reporting

The bidding documents include the requirements for contractors to prepare periodical reports and submit these to the PPL EPM. The reports would include status of implementation of the C-ESMP and other E&S related documents, grievances, incidents, training undertaken, results of inspections and monitoring, etc. Where physical works are undertaken in-house the team assigned to the scope will provide such information to the PPL EPM.

5.2 Process for Subcomponent 1.3

Subcomponent 1.3 of the Project will be implemented by PPL and involves the refurbishment of one or more existing PPL mini-grids in an urban environment. The scope of work will include the construction of a solar PV and BESS to support an existing diesel mini-grid and refurbishment/

replacement of the existing infrastructure. Diesel generators and transformers may also be refurbished/replaced, although this will not be funded by the capital subsidy. The micro-grids have yet to be selected, although will be either Alotau, Kavieng, Kimbe, Lorengau, and/or Wewak. Once redeveloped, these mini-grids will have a capacity of around 10 to 15 MW.

The subprojects will be carried out under a BOOT arrangement, whereby PPL provides long-term rights to a private organisation (Concessionaire) to develop, finance, operate, and maintain the mini-grid for a defined period, after which is it handed back to PPL.

5.2.1 Mini-grid development process and E&S assessment

This section describes the process for the mini-grid development and E&S assessment.

Pre-feasibility study reports (technical, economic, financial, legal) and a draft E&S screening assessment have been prepared for the potential mini-grid investments with IFC transaction advisory assistance. A summary of the results of the draft E&S screening assessment is provided in Annex 2. The IFC will provide further planning assistance, including screening of the solar PV site options based on mitigation hierarchy, preparation of a detailed labour study, E&S scoping report and ESIA TOR.

The potential subprojects (i.e., Alotau, Kavieng, Kimbe, Lorengau, and Wewak) will be further scrutinised by PPL and the WB, and a decision made on which to proceed with based the results of technical, economic, financial, legal, E&S aspects. The E&S criteria that will inform the decision are:

- No significant impact to natural habitat and/or critical habitat.
- Landowners/lease holders are willing to provide access.
- No land disputes exist.
- No significant resettlement impacts.
- No significant impacts to cultural heritage.

The PPL EPM will prepare bidding documents drawing on information from the pre-feasibility study reports and additional work during preparation. Bidding will be organized in two stages. Stage 1 will be pre-qualification to prepare a shortlist of qualifying companies; Stage 2 will be a request for proposals from shortlisted companies. Bidders will need to supply a copy of their ESMS as part of the bidding process.

The shortlisted companies will be requested to prepare separate technical and financial proposals (two envelop approach). Shortlisted companies must pass the evaluation of the technical proposals. Selection criteria of the technical proposal include, among other, the level of services that the operator must provide. Only financial proposals will be opened of shortlisted companies that pass the technical evaluation. The financial proposal is for the lowest capital subsidy required (reverse auction).

The successful bidder (i.e., concessionaire) will prepare a detailed ESIA/ESMP (including applicable subplans, such as asbestos management plan, waste management plan, etc.) for the mini-grid construction and operation (addressing the ESIA ToR prepared by the IFC during project preparation), and obtain any permits required for the subproject. The ESMS submitted during pre-qualification will also need to be revised at this stage based on the findings of the ESIA/ESMP and to ensure it meets the requirements of the PS[20]. Prior to commissioning of the new solar PVs and battery storage system, the concessionaire will prepare an O-ESMP and submit this to the WB for “no-objection”. The ESMS

[20] The ESMS will incorporate the following elements: (i) policy; (ii) identification of risks and impacts; (iii) management programs; (iv) organizational capacity and competency; (v) emergency preparedness and response; (vi) stakeholder engagement; and (vii) monitoring and review.

may also require further update to incorporate key aspects of the O-ESMP and ensure it is suitable for the operational stage of the project.

If a RP is required, it will be prepared by the PPL EPM or the concessionaire (to be confirmed) and undergo review/clearance by the WB and implemented prior to any physical displacement.

The subproject will be considered complete when the mini-grid is commissioned, connected customers can use electricity through the modernized grid, and conditions of provision of the capital subsidy (which will form part of the concession agreement) are met. Relevant ESMPs, O&M manuals, etc., for the mini-grid that are prepared, approved by relevant parties and adopted by the developers, will be implemented during the operations and maintenance phase.

5.2.2 Concession agreement

The E&S relevant requirements, including copies of the ESMF, LARF, LMP and SEP, will be included in the concession agreement and concessionaire will be contractually required to implement them and the documents they prepared to support the subproject (e.g., ESIA/ESMP). The concession agreement will also include additional measures to manage engagement with existing PPL workforce that are developed as part of the detailed labour study to be undertaken during project planning and minimum standards for project-provided accommodation as per PS2.

5.2.3 Training

The E&S specialist of the concessionaire is expected to have sound knowledge and prior experience of E&S management, however, the PIU/EPM E&S specialists may provide additional training to the concessionaire (in particular to construction supervisors) on environmental and social requirements of the project, workers' code of conduct, and the GRM.

5.2.4 Monitoring and reporting

Overall responsibility for monitoring and evaluation is with the PIU/EPM, who will monitor the subproject and assure the concessionaire adhere to the conditions of the contract and agreement.

The concessionaire may engage contractors to carry out aspects of project construction and operation, and will be responsible for overseeing the contractors' performance. The concessionaire will prepare periodical reports, which include reports of adherence to the ESMP and any environmental or social plans, including progress in any actions required. The concession agreement will also include requirement of Independent Engineer for verifying the E&S requirements of the agreement.

The PIU E&S specialists reviews the reports from the concessionaire and provides comments and requests additional information as needed. The PIU/EPM E&S specialists should join the wider PIU team on field visits to subprojects to confirm adherence to the ESMP, and adequate implementation of any other E&S instruments (e.g., C-ESMP, RP). If the PIU/EPM has serious questions about adherence to the ESMP, or if grievances on environmental or social matters are brought to the attention of the PIU/EPM, a field visit and assessment to the subproject is required.

Following commissioning, the subproject will continue to be monitored as per national requirements by relevant government agencies, such as CEPA, NEA and PPL.

5.3 Process for Subcomponent 2.1

Subcomponent 2.1 of the Project will be implemented by NEA and involves the establishment of micro-grids in peri-urban, rural and remote areas that lack on-grid access. The proposed micro-grids will utilise solar and/or hydropower combined with or without battery storage, and have a maximum capacity of 1 MW, with most having a capacity of a few hundred kW.

For every micro-grid subproject, NEA's PIU/OE determines the following:

- What are the potential environmental or social impacts, either direct or indirect?
- Based on the assessment of these impacts, what is the associated level of E&S risk?
- What additional documentation is needed, such as an ESMP, and Resettlement Plan?

5.3.1 Micro-grid development process and E&S assessment

This section describes the indicative process for the micro-grid development and E&S assessment. The details of the timings, order and 'name' of each stage is yet to be finalised and therefore may be subject to change. **The final process will be detailed in a PIM and will include a requirement to complete the E&S screening form and prepare an ESMP.** The subcomponent will consist of a pilot phase where five micro-grid sites will be developed, and the second phase will expand the scope to more sites. The assessment process will be reviewed after the pilot phase and updated on the basis of lessons learned.

The potential micro-grid sites in the 'mini-grids map book' will be reviewed by NEA to select a priority list of approximately five sites for further investigation as part of the pilot phase, and later an additional approximately 15 sites for further investigation as part of Phase 2. The selected sites will be subject to a pre-feasibility study. This will be undertaken by a consultant for the pilot phase and by the EPM for Phase 2. The pre-feasibility will include descriptions of the proposed subproject, including descriptions of the communities, land potentially available for the micro-grids, energy demand and proposed sources of energy, high-level design, and potential for productive and community use of electricity. As part of the pre-feasibility study, the screening form to indicate the possible environmental and social impacts of the subproject (Annex 9) will also be completed.

The OE engaged by the NEA PT will review the pre-feasibility study and provide feedback and recommendations on all aspects, including the screening form and specific E&S issues that will need to be managed. The OE will also advise whether the subproject requires an environment permit under PNG legislation. The WB will also be invited to comment at this stage.

For subprojects that progress to the next stage, the EPM will prepare bidding documents, and launch the bids to Build Own and Operate (BOO) the micro-grids. World Bank No Objection for E&S aspects of the bid documents will be required before the launch of bids. Developers will be able to bid for one, more than one or all sites. The successful bidder(s) (i.e., the developers) will sign an exclusivity agreement with the community's ILG to enable to detailed design process to commence. A detailed ESMP will also be prepared as part of the detailed design and relevant E&S consideration included within the detailed design documents (e.g., with respect to site layout, waste management, etc). An outline for an ESMP for a micro-grid subproject is provided as Annex 12b and this is also supported by a E&S Management and Monitoring Table (Annex 10). If a RP is required, it will also be provided with the detailed design. If an Environment Permit is required for the works, it will also be obtained by the Developer.

The NEA PT/OE reviews the detailed design documents including the ESMP and land due diligence / RP - assuring the documentation is sufficient and the compliance mechanisms are adequate to mitigate any of the expected impacts. The documents can be sent back to the developer for revision if any aspects are not adequately addressed. This can be done any number of times until the PT/OE is satisfied. Once approved by the PT/OE, evaluation report of the detailed design is sent to the WB for approval - comments and possible further revisions may be required at this point. Approval from both the PT/OE and the World Bank is required before the project can proceed.

Once final approval is given to the subproject, the tripartite agreement with the developer, community and NEA will include all the implementation plans (ESMP, RP, etc., as required) and the LMP.

The subproject will be considered complete when the micro-grid is commissioned, and connected customers can use electricity through the micro-grids. Relevant ESMPs, O&M manuals, etc., for the micro-grid that are prepared, approved by relevant parties and adopted by the developers, will be implemented during the operations and maintenance phase.

5.3.2 Grant agreement

The E&S relevant requirements, including copies of the ESMF, LMP and SEP, will be included in the tripartite agreement and companies participating in the Project contractually required to implement them and the documents they prepared to support the feasibility study (e.g., ESMP).

5.3.3 Training

The E&S specialist of the developer is expected to have sound knowledge and prior experience of E&S management, however, the PIU/EPM E&S specialists may provide additional training to the developers (in particular to construction supervisors) on environmental and social requirements of the project, workers' code of conduct, and the GRM.

5.3.4 Monitoring and reporting

Overall responsibility for monitoring and evaluation is with the PT/OE, who will monitor the subprojects and assure the developer adhere to the conditions of the contract and agreement.

The developer may engage contractors to carry out aspects of project construction, and will be responsible for overseeing the contractors' performance. The developer will prepare periodical reports, which include reports of adherence to the ESMP and any environmental or social plans, including progress in any actions required.

The PT/OE E&S specialists reviews the reports from the developer and provides comments and requests additional information as needed. The PT/OE E&S specialists should join the wider PT/OE team on field visits to subprojects to confirm adherence to the ESMP, and adequate implementation of any other E&S instruments (e.g., C-ESMP, RP). If the PT/OE has serious questions about adherence to the ESMP, or if grievances on environmental or social matters are brought to the attention of the PT/OE, a field visit and assessment to the subproject is required.

5.4 Process for Subcomponent 2.2

Subcomponent 2.2 will be implemented by a Grant Administrator contracted by NEA and involves supporting the growth of the SHS market through provision of catalytic and RBF grants support companies expand their services, prioritizing underserved rural areas.

5.4.1 Selection and screening process

Companies that apply to participate in the program will also go through a selection and screening process that will be detailed in the PIM. The selection and screening criteria will include:

- Bidder declarations and qualification requirements regarding forced labour (to mitigate risk within global supply chain for solar panels and solar components).
- Product quality and longevity, and ease of repair.
- Product safety.
- Product sale price to consumer.
- Product suitability for proposed markets in PNG.
- QA/QC and OHS systems for installations.
- Ability to implement the ESCoP (Annex 11).
- Evidence of, and ability to implement a Community Engagement Plan.

- Evidence of, and ability to implement a GRM.
- Evidence of, and ability to implement LMP requirements.
- Details of loan or pay-as-you-go payment schemes offered.
- Ability to roll out a community electrical safety awareness program.
- Ability to manage used batteries and solar PVs.
- After sales assistance offered.

The PIM will also include a selection process to narrow down the locations that are being targeted for this program which would consider aspects such as distance from grid, population size, potential for micro-grid, percentage of population that will likely be costumers, etc.

5.4.1 Grant agreement

The E&S relevant requirements, including copies of the ESCoP, LMP and SEP, will be included in the Grant Agreement and companies participating in the Project contractually required to implement them.

5.4.2 Training

The Grant Administrator will include E&S resources and should provide training to the companies (in particular to the supervisors of installation) on environmental and social requirements of the project, the ESCoP, including the workers' code of conduct, and the grievance redress mechanism. This training should be after the contractors have been selected, but before they begin installing the solar home systems or selling the cookstoves.

5.4.3 Monitoring and evaluation

Inspection and verification of installation is done by an IVA and recorded in the project's database. Surveys conducted by the IVA are to include questions on adherence to the ESCoP.

These documents are reviewed by the PT E&S specialists to evaluate if the SHS program is complying with the environmental and social standards.

5.5 Process for Component 3

Component 3 of the Project comprises:

- **NEA energy sector institutional development** - Build institutional capacities in NEA through recruitment of specialists and training. Technical assistance for the preparation of policy and regulatory instruments.
- **PPL energy sector institutional development** - Build institutional capacities in PPL through recruitment of specialists and training. Technical assistance for the design of new small HPPs with expected maximum capacity of a few MW.

The specific scope of most of the TA activities is not yet known and therefore a general process for screening and assessing E&S risks and risk management for the TA activities is provided. Further details are provided regarding the TA for the design of new small HPPs.

5.5.1 General technical assistance activities

The process for inclusion of E&S assessment within the TA terms of reference (TOR) is as follows:

1. PIU E&S Specialist reviews all the TA TORs and provides the required clauses or scope of work for the TA to comply with the WB ESS, ESMF, SEP, LMP, IPPF and LARF and any other relevant instruments.

2. PIU E&S Specialist assists in the evaluation of consultants or contractors for TA that includes E&S risk assessment or mitigation, to ensure that the team/individual has the correct skills and experience.
3. PIU E&S team reviews draft and final outputs against the WB ESS, ESMF, SEP, LMP, IPPF and LARF and any other relevant instruments and make any recommendations to the PIU for improvements or changes.

5.5.2 Technical assistance for the design of new small HPPs

The TA activities for the design of potential new small HPPs may include detailed environmental, social, and engineering preparation and/or design aspects. The Project will not finance the actual HPP development,[21] however, the downstream E&S impacts for the proposed new HPPs need to be assessed as per the ESSs, depending on the level of design undertaken.

An indicative ToR for the environmental and social assessment that will be undertaken as part of these actives for each potential new small HPP is provided as Annex 14[22]. The E&S Specialist within the PIU will prepare detailed ToR for the environmental and social assessment for each new small HPP based on Annex 14 and once further details of the HPP and scope of the design is available. The ToR will need to be cleared by the WB E&S Team prior to engaging the consultant to do the studies. The E&S assessment will also be reviewed by the PPL PIU E&S Specialists and the WB E&S Team.

[21] If the small HPP projects progress, they may be financed as part of a future WB-supported project or different entity.

[22] The scale of the E&S assessment proposed is in alignment with a feasibility-level investigation. If the TA provided is of a smaller scale, then the scope of the E&S assessment may be reduced accordingly.

6. STAKEHOLDER ENGAGEMENT PLAN OVERVIEW

A stand-alone SEP has been developed to describe the Project's program for stakeholder engagement, public information disclosure and consultation. The SEP outlines the ways in which the project team will communicate with stakeholders and provides a mechanism through which people can raise concerns, provide feedback, or make complaints about the project or any activities related to the project. A summary of the SEP is provided in the following sections.

6.1 Stakeholder Identification and Analysis

Stakeholder analysis determines the likely relationship between stakeholders and a project and assists to identify the appropriate consultation methods for each stakeholder group during the life of the project. Stakeholders of projects can typically be divided into the following categories:

- **Affected Parties** – people, groups and entities who will be impacted or will likely to be impacted – directly or indirectly, positively or adversely – by the Project.
- **Vulnerable Groups** – affected parties who may be disproportionately impacted or further disadvantaged by the Project as compared with any other groups due to their vulnerable status, and that may require special engagement efforts to ensure their equal representation in the consultation and decision-making process associated with the Project. The vulnerability may stem from a person's origin, gender, age, health, economic and social status, access to land, natural resources, level of voice and influence in decision-making processes etc.
- **Other Interested Parties** – individuals/groups/entities that may not experience direct impacts from the Project but who consider or perceive their interests as being affected by the Project and/or who could affect the Project and the process of its implementation in some way. This also includes stakeholders that contribute to the execution and implementation of a project.

Stakeholders identified for the Project and their interest in the project are provided in Table 6.

Table 6: Stakeholders and their Interest in the Project

Group	Organisation	Interest in the Project
Affected parties		
People in the project area of influence	Individuals and community groups[23]/organizations/businesses that will directly benefit from the Project	These people/groups have the potential to be Project beneficiaries and those near the location of physical works may be potentially affected by the social impacts associated with construction works.
	Individuals affected by land access	Potential for their land to be acquired for the project
	Existing workforce at site to be rehabilitated/upgraded as part of Subcomponent 1.1	Potential disruption to work environment, potential OHS risks, potential change in operational practices.
Project workers (as defined by LMP)	Direct workers	Project progress, OHS, employment terms and conditions
	Various contractors to be contracted or subcontracted to undertake construction works associated with grid expansion, household connections, mini-grids, micro-grids, etc.	

[23] In this Project, indigenous peoples (IPs) are expected to be the sole or the overwhelming majority of project affected people.

Group	Organisation	Interest in the Project
	Various consultants contracted or subcontracted to undertake studies for the Project.	
	Primary supply workers / supply chain workers (e.g., workers involved in solar panel supply chain).	
	Community workers that may be involved in construction of micro-grids associated with subcomponent 2.1.	
Vulnerable or disadvantaged groups	Including, but not limited to: • elderly • children • youth • poor households • single-parent households • residents in remote areas • people with disabilities • survivors of, and those vulnerable to GBV, SEA/SH and VAC	These people/groups have potential to be Project beneficiaries, however, there is potential for project benefits to not reach such groups. They may also be disproportionately potentially affected by the social impacts associated with the works and it is important to ensure such people/groups are included in the project planning process through mainstreaming or targeted activities.
Other interested parties		
World Bank	International Development Association	Financing agency
	International Finance Corporation	Undertaking feasibility and other studies for the mini-grid subprojects
	Energy Utility Performance and Reliability Improvement Project (EUPRIP) team	Project involves support of existing EUPRIP as part of Component 1
National-level Government departments and organizations	PNG Power Limited	Project Proponent (Implementing Entities)
	National Energy Authority	
	Department of Treasury	Borrower
	Kumul Consolidated Holdings	Delegated owner of PPL, interest in commerciality of initiatives implemented by PPL as part of the Project.
	National Executive Committee Central Agencies Coordination Committee --------- Department of Finance and National Planning Department of Petroleum and Energy Department of State Enterprises Department of Provincial and Local-level Government Affairs Climate Change and Development Authority Department of Works and Highways Independent Consumer & Competition Commission National Institute of Standards & Industrial Technology Consultative Implementation & Monitoring Council	Part of the energy sector government structure
	Conservation and Environment Protection Authority Department of Physical Lands and Planning	Environmental permitting and land access for select investments (if required)
Subnational-level Governments	Provincial Governments District Development Authorities Local-Level Governments Ward Development Authorities	Interested in Project planning, site selection, project benefits, potential risks/impacts, etc. as they pertain to their geographical area of governance
Private sector	Business Council of PNG – Energy Working	Interested in the benefits and potential

Group	Organisation	Interest in the Project
	Group PNG Chamber of Commerce Australia-PNG Business Council Solar Energy Association of PNG	impacts/risk associated with the Project
Development agencies	Australian Department of Foreign Affairs and Trade, including the Australian Infrastructure Financing Facility for the Pacific Export–Import Bank of China Asian Development Bank Japan International Cooperation Agency New Zealand Ministry of Foreign Affairs and Trade United Nations Development Programme United States Agency for International Development United States Trade and Development Agency	These development partners are engaged in the energy sector in PNG and may be interested in the outcomes and benefits of the Project. Potentially interested in collaboration with activities. Potentially interested co-financing the grid access expansion to be undertaken as part of Component 1
Non-Government Organizations (NGOs)	South Pacific Region Environment Programme Eco Custodian Advocate PNG National Research Institute Individual Community Rights and Advocacy Forum PNG Eco-forestry Forum Foundation for People and Community Development Habitat for Humanity PNG Young Women's Christian Association Pacific Women Nature Conservancy Conservation International UPNG Centre for Renewable Energy Consultative Implementation and Monitoring Council Kokoda Track Foundation / Village Connect Wildlife Conservation Society PNG Council of Churches Adventist Development and Relief Agency	Interested in the benefits and potential impacts/risk associated with the Project
Educational institutions	University of PNG PNG University of Technology	Interested in the solar technologies and the energy sector in PNG
Independent Power Producers	Zenith Energy Ltd NiuPower Limited PNG Biomass PNG Hydro Development Limited PNG Forest Products Hydro POSCO International New Britain Palm Oil Shenzhen Energy Hydro- power Development Co Ltd	Part of the energy sector in PNG Potential concessionaires for the mini-grid subprojects
Existing micro-grid developers	To be determined	Potential to invest in or provide services as part of the sustainable micro-grids. May be able to provide advice and/or lessons learned from their experiences developing micro-grids.
Existing distributors of off-grid solar products	To be determined	Potential grant recipients as part of subcomponent 2.2

6.2 Stakeholder Engagement Plan Summary

A summary of the proposed stakeholder engagement and disclosure activities are provided in Table 7. This builds on from the engagement that was undertaken during the development of the NEROP implementation strategy and investment plan and by PPL through implementation of EUPRIP.

Table 7: Indicative Stakeholder Engagement Plan and Disclosure Summary

Project stage	Topic of consultation / message	Method used	Target stakeholders	Responsibilities
Subcomponents 1.1 and 1.2: On-grid electrification and network resilience				
Planning / design	Coordination of grid rehabilitation and modernization works	Meetings, emails	EUPRIP team and other internal PPL stakeholders	PPL
Planning / design	Land access process and requirements (refer to LARF for detail)	Face-to-face meetings	Individuals who own land or occupy land that may need to be accessed for the project	PPL
Planning / design Prior to and during construction works	Project awareness Access to the Project GRM How to access the grid (including reference to subsidy scheme) Project timing Potential E&S risks/impacts and mitigation measures Community safety Electrical safety	Face-to-face meetings, posters, brochures	Households and businesses likely to be served as part of the grid access expansion Communities, households and businesses that may be impacted by the works	PPL Contractors
Prior to and during construction works	Awareness of the Project Coordination of works OHS	Focus group discussions	Workers at the sites to be rehabilitated/modernized	PPL Contractors
Operation	Project awareness, Access to the Project GRM Eligibility for scheme Application process Physical process for connection Connection and supply costs Electrical safety	Face-to-face meetings, posters, brochures	Households that may be able to access the household connection subsidy scheme.	PPL
Subcomponent 1.3: Mini-grids				

Project stage	Topic of consultation / message	Method used	Target stakeholders	Responsibilities
Planning / design	Information gathering to support preparation of the additional studies, such as E&S scoping study, labour risk assessment, ESIA, and various engineering and design studies	Meetings, emails	Communities, households and businesses that may be impacted by the works Existing workers at mini-grids	IFC Consultants PPL Concessionaires
Planning / design	Land access process and requirements (refer to LARF for detail)	Face-to-face meetings	Individuals who lease or occupy land that may need to be leased or otherwise used for the project	PPL Concessionaires
Planning / design	Confirmation of permitting requirements under *Environment Act 2000*[24]	Face-to-face meetings, emails	CEPA	PPL Concessionaires
Planning / design Prior to and during construction works	Project awareness Access to the Project GRM How to access the grid (including reference to subsidy scheme) Project timing Potential E&S risks/impacts and mitigation measures Community safety Electrical safety Potential service interruptions during works Changes to billing arrangements (if applicable)	Face-to-face meetings, posters, brochures	Households and businesses likely to be served as part of the mini-grid expansion Communities, households and businesses that may be impacted by the works	Concessionaires Contractors
Prior to construction works	Workforce requirements, worker entitlements, etc., relating to management of existing PPL employees	Face-to-face meetings, emails	Existing workforce	PPL Concessionaires
Prior to and during construction works	Awareness of the Project Coordination of works OHS	Focus group discussions	Workers at the sites to be upgraded	Concessionaires Contractors

[24] additional consultation may be necessary to meet the requirements under the *Environment Act 2000* if an Environment Permit is required for the subproject

Project stage	Topic of consultation / message	Method used	Target stakeholders	Responsibilities
Subcomponent 2.1: Renewable energy micro-grids (note: further detail included in CCF)				
Planning	Awareness of project and application process	Meetings, emails, media	Potential micro-grid developers	NEA
Planning / design	Project awareness Information gathering to support preparation of pre-feasibility study Input from community to conduct an E&S screening	Face-to-face meetings, focus group discussions	Communities at potential micro-grid sites	Pre-feasibility consultant
Planning / design	Project awareness Information gathering to support preparation of detailed design Input from community to prepare E&S instrument	Face-to-face meetings, focus group discussions	Communities at potential micro-grid sites	Proposed developer
Planning / design	Land access process and requirements (refer to LARF for detail)	Face-to-face meetings	Individuals who own land or occupy land that may need to be accessed for the project	Proposed developer
Planning / design	Project updates (i.e., update on selection process and outcomes)	Face-to-face meetings	Communities at potential micro-grid sites	Proposed developer
Prior to and during construction	Project GRM Project timing Potential E&S risks/impacts and mitigation measures Electrical safety	Face-to-face meetings, posters, Brochures	Communities around selected micro-grid sites	Proposed developer Contractors
Operation	Electrical safety Operational support Maintenance and troubleshooting	Phone, face-to-face meetings, posters, brochures		Proposed developer
Subcomponent 2.2: Rural energy market development				
Planning / design	Awareness of project and application process	Meetings, emails, website, newspaper	Providers of off-grid solar products	NEA
Planning / design	Project awareness Business feasibility (e.g., potential market assessment)	Face-to-face meetings, posters, brochures	Communities in the target areas	Providers of off-grid solar products who apply to access the Project grant
Implementation phase	Project awareness	Face-to-face meetings, posters,	Communities in the target areas	Providers of off-grid solar products

Project stage	Topic of consultation / message	Method used	Target stakeholders	Responsibilities
	Upfront costs Ongoing costs Product uses and limitations Product life	brochures, newspaper		who access the Project grant
Component 3: Energy sector institutional development				
Implementation	Input to and feedback on preparation of policy and regulatory instruments	Meetings, emails, website	Energy-sector stakeholders	NEA and consultants
Implementation	Demand for power generated by small HPPs Design and feasibility Environment/social baseline data collection	Face-to-face meetings	Communities, businesses and other stakeholders	PPL and consultants
Component 4: Project management				
Annually throughout the implementation phase	Key project updates and reports on the subprojects	Websites (PPL and NEA)	All stakeholders	PIUs
Disclosure				
Prior to implementation	Disclosure of final E&S Instruments (SEP, ESMF, LAPF)	Websites (WB, PPL and NEA)	All stakeholders	WB, PPL and NEA
Planning / design	Disclosure of subproject specific E&S tools (e.g., ESMPs, ESIAs, RPs)	Websites (WB, PPL and NEA)	All stakeholders	WB, PPL and NEA
Prior to commencement of construction works	Disclosure of C-EMPs and GRM	Face-to-face meetings and on community noticeboards.	Communities and businesses near construction works	PPL and/or NEA Contractors

6.3 Project Grievance Redress Mechanism

The Project GRM is a mechanism to receive and facilitate the resolution of stakeholder's concerns, complaints, and grievances about the Project, including concerns relating to environmental and social impacts and issues. The Project GRM allows stakeholders to comment on or express concern on matters relating to project implementation. It is intended to allow these various stakeholders to pass on important information to higher levels of project oversight and management in a neutral and, if necessary, anonymous way. A Project GRM will be implemented by the PIUs and will be used for project-related grievances.

7. IMPLEMENTATION ARRANGEMENTS

7.1 Implementing Entities

The Project's implementing entities are NEA and PPL. Specific responsibilities for the various project components are:

- Component 1 will be implemented by PPL
- Component 2 will be implemented by NEA
- Component 3 will be implemented by NEA (leading Subcomponent 3.1) and PPL (leading Subcomponent 3.2)
- Component 4 will be implemented by NEA (leading Subcomponent 4.1) and PPL (leading Subcomponent 4.2)

Implementing partners include the Provincial Governments and District Development Authorities, through the Ministry for Provincial and Local-level Governments.

Each implementing entity will establish a Project Implementation Unit (PIU). For PPL, this will be an EPM under the Project Director of PPL. For NEA, this will be a core Project Team (PT) within NEA. Each of these are described below.

7.1.1 PPL Employers Project Manager

PPL's EPM will be established under the Project Director of PPL. The EPM will consist of external experts will be responsible for supporting PPL in all aspects of Component 1, subcomponent 3.2 and subcomponent 4.2. The Project Director of PPL will initially recruit individual consultants (technical, environmental, and social/gender) to help PPL recruit an EPM. EPM will assist PPL in ensuring technical (grid planning, electric design, construction, contractors performance management, inspection), fiduciary (procurement, financial management), environmental and social/gender-related activities, M&E (progress reporting), and other aspects of project management. The EPM will be a firm equipped with qualified subject matter experts. This implementation arrangements incorporate lessons learned from the implementation of two recent World Bank-funded transport projects in PNG, which utilize a full-support of consulting firm as EPM. Over time, experts will train selected PPL staff who will have responsibility for planning, design, project management, accounting, and procurement tasks. Household connections under subcomponent 1.2 will be verified by an IVA to be recruited by PPL. Prior to the EPM being established, E&S support for PPL's scope will be provided by EUPRIP resources.

7.1.2 NEA Project Team

For NEA, project implementation will be led by a core PT in NEA and will be enhanced by recruiting an OE, a Grant Administrator, and an IVA. The PT within NEA comprises internal staff (project manager, procurement specialist, FM specialist, E&S specialists, community engagement specialist, administrative staff) who will manage Component 2 and subcomponents 3.1 and 4.1. The E&S specialists will include a part-time international E&S Specialist and three PNG E&S personnel (Social Specialist, Environment Specialist and GBV Specialist). The PT in NEA will recruit technical subject matter experts as OE with specific experience and expertise including in electrification planning, distribution system design, conventional distribution construction & inspection, rural market analysis, geospatial analysis and database management, mini/micro-grid design and analysis/management of off grid solar financing incentives. OE will support NEA in updating electrification planning; providing technical support for micro-grids projects (site identification, preliminary technical design, procurement support, construction supervision, contractual negotiations and management, inspection); market surveys for off-grid solar products; environmental and social/gender-related activities; project implementation support including M&E (progress reporting). E&S resources will be included in the TORs for each of these contracts as required. A Grant Administrator will manage

fiduciary aspects of Component 2 and subcomponents 3.1, and 4.1 to provide capital grant support for Component 2. An IVA will be recruited for results verification of subcomponent 2.2 activities.

7.1.3 Key Roles

The overall responsibly for implementing the Project in accordance with the requirements of the WB's ESF, Project ESCP and PNG legal requirements lies with the NEA Project Manager (for NEA's scope) and PPL Project Director (for PPL's scope). E&S specialists in each of the PIU will provide support to achieve this. The E&S Specialist' role is to:

- Lead the implementation of the Project's ESMF and associated instruments in accordance with the World Bank ESF, ESCP and PNG legal requirements.
- Develop and deliver E&S training for the PIU and other relevant stakeholders (e.g., construction contractors).
- Prepare and review of E&S Screening Forms.
- Prepare site-specific instruments (e.g., for subcomponent 1,1, 1.2).
- Review site-specific instruments (e.g., Component 1.3, 2.1).
- Input to contractor's scope of works and contract to ensure environmental, social, health and safety (ESHS) aspects are included.
- Review contractors' documents (e.g., scope of work, C-ESMP).
- Preparation of quarterly monitoring reports on the environmental, social, health and safety (ESHS) performance of the Project.
- Notification, reporting and management of incidents or accidents related to the Project which have, or are likely to have, a significant adverse effect on the environment, the affected communities, the public or workers.
- Oversee the implementation of the SEP in close collaboration with the Project Manager/Director, including consultation and information dissemination activities with relevant stakeholders.
- Oversee the implementation of the LARF in close collaboration with the Project/Program Manager, including consultation and information dissemination activities with relevant stakeholders.

The PIUs will prepare and submit regular (quarterly) monitoring reports on the environmental, social, health and safety (ESHS) performance of the Project, including but not limited to, the implementation of the ESCP, status of preparation and implementation of the Project's environmental and social documents, stakeholder engagement activities and grievances log, LMP, C-ESMPs and OHS implementation, EHS incidents, and the functioning of the grievance mechanism.

7.1.4 Current Capacity

NEA has only recently been established and as such it is not yet fully staffed. The organisational structure for NEA comprises of seven divisions, including a dedicated Community Outreach Division. There are two environmental roles in the organisation, which both sit within the Research Policy and Planning Division. At the time of preparing this ESMF the environment roles had not year been filled.

PPL has existing E&S staff, has implemented projects with the WB (and other donor agencies) and has experience with fiduciary and safeguard policies. PPL is the Implementing Entity for the WB-financed EUPRIP although this project is in the early implementation stage, it's PIU is yet to be established and it is not being managed under WB ESF (as the WB ESF came into force in 2018, after the EUPRIP had commenced). PPL's ESMS has recently been updated as part of the TA activity supported by the AIFFP for the Pacific and is currently being rolled out. Within PPL, the environmental, social and OHS staff sit within a Health, Safety, Environment and Wellbeing Group (Figure 15).

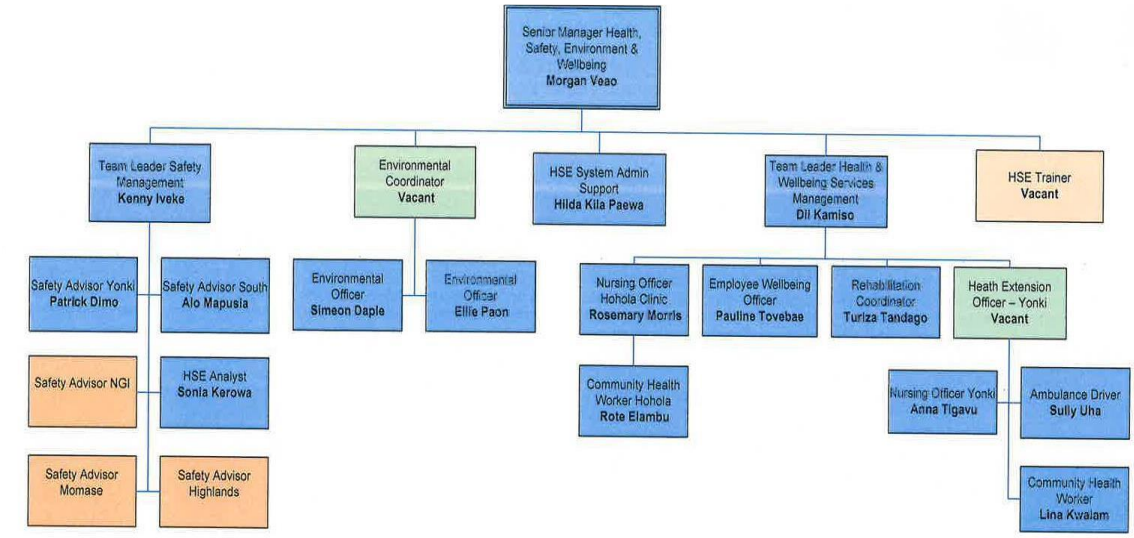


Figure 15: Organisational Chart – PPL's Health, Safety, Environment & Wellbeing Group

As neither NEA or PPL have experience with the WB's ESF and both are expected to require support from the WB E&S team during project preparation and implementation. Under Component 4, the Project aims to support the institutional capacity development of NEA and PPL to plan, coordinate, and implement the Project as well as the overall institutional development, including in building environment and social capacities through the establishment of PIUs for both implementing agencies (including E&S specialists) and capacity building.

7.2 Construction Contractors

Construction contractors will be used for construction works under Component 1 and Component 2. Contractors will be required to comply with the Project's E&S instruments, and this will be specified in the contractor agreements. Contractors will need to prepare C-ESMPs that meet the requirements set out in the Project E&S instruments.

Contractors will need to disseminate and create awareness within their workforce of E&S risk management compliance and undertake any staff training necessary for their effective implementation. Some contractors may not have existing E&S staff and therefore the PIU E&S Specialists may need to provide capacity building within the contractor's workforce. PPL often use the same contactors and therefore some contractors have more experience implementing PPL's E&S system than others.

Contractors will provide monthly reports to the environmental, social, health and safety (ESHS) performance of their scope of work. Contractor's will also need to respond to and report all incidents as set out in this ESMF.

Where physical works are undertaken by PPL in-house (which may be the case for some subprojects under Component 1) this will be done internally by the PPL team response for delivering the subproject.

7.3 Concessionaire

The concessionaire will be responsible for:

- Managing workforce engagement and collective dismissal (if applicable) in alignment with the requirements in PS2 (in conjunction with PPL).
- Maintaining and implementing an ESMS.
- Preparing the ESIA/ESMP and OESMP.

- Transfer of any relevant existing environment permits into their name (from PPL) and adhering to permit conditions.
- Obtaining a new environment permit or amendment of an existing permit if required to support the project and adhering to any permit conditions issued.
- Arranging land access required as per the LARF and any RPs prepared for the subproject (in conjunction with PPL).
- Undertaking community engagement as per the SEP.
- Managing any construction contractors engaged to construct the solar PVs, BESS and refurbishment of the existing portions of the mini-grid to ensure compliance with the requirements of the Project E&S instruments (including ESIA), environment permit and national electrical standards.
- Appropriately managing solar PVs, battery systems and diesel generators and associated waste generated through the construction/refurbishment and operation of the mini-grid.

The concessionaire is yet to be identified; however, it is expected that they have experienced environmental and social expertise within their team. It is also expected that they will engage a consultancy to lead the preparation of the ESIA, ESMP and O-ESMP.

7.4 Micro-grid Developer

The micro-grid developers will be responsible for

- Preparing detailed design documents, including an ESMP and RP (if required).
- Obtaining an environment permit from CEPA (if required) and adhering to any permit conditions issued.
- Arranging land access required as per the LARF.
- Undertaking community engagement as per the SEP, including community electrical safety awareness.
- Managing any construction contractors engaged to construct the micro-grids to ensure compliance with the requirements of the Project E&S instruments and national electrical standards.
- Appropriately managing spent batteries and solar panels, and other waste generated through the construction and operation of the micro-grids.

The potential micro-grid developers are yet to be identified; however, they may require support from NEA to fulfil their obligations. This could be provided in the forms of workshops, information packs and one-on-one support for preparing specific E&S instruments.

7.5 Catalytic and RBF Grant Recipient Companies

The catalytic and RBF grant recipient companies will be responsible for implementing the E&S requirements in the Grant Agreement, which will include the ESCoP, LMP and SEP, and any commitments made as part of the screening and selection process. Key responsibilities of recipient companies include engagement and the management of waste (e.g., batteries and solar panels) generated from the products that they supply.

The recipient companies are yet to be identified; however, it is likely they may require support from NEA to fulfil their obligations, particularly with stakeholder engagement and waste management.

7.6 World Bank Environmental and Social Team

The WB's Task Team's environment risk and social risk specialists will provide regular E&S risk management compliance monitoring and support for the duration of the Project. This will be provided

remotely and in-person during missions. The WB will also review the ESMPs, ESIAs, RPs and ToRs prepared as part of the Project.

7.7 Capacity Building

A summary of the indicative training and capacity building requirements is provided in Table 8.

Table 8: Indicative E&S training and capacity building requirements

Provided by	Received by	Topic	Timing
WB	Implementing entity staff PIU E&S Specialists	WB ESF	Throughout project preparation and implementation
PIU E&S Specialists	Wider PIU Team	Project E&S Instruments	Throughout project implementation
PIU E&S Specialists	Contractors	Project E&S Instruments GBV, SEA/SH	Prior to construction
Contractors (with support from PIU E&S Specialists if required)	Wider contractor team	C-ESMP GBV, SEA/SH	Prior to and during construction
PIU E&S Specialists	Concessionaire	Project E&S Instruments Responsibilities of the concessionaire Community engagement requirements Land access process Environment permit application process	After the pre-qualification process, and once concessionaires have been selected.
PIU E&S Specialists	Micro-grid developers	Project E&S Instruments Responsibilities of the micro-grid developers How to prepare subproject specific E&S risk management tools Community engagement requirements Land access process Environment permit application process	As part of awareness for the bidding process, and once micro-grid developers have been selected.
PIU E&S Specialists	Grant beneficiaries	Project E&S instruments Responsibilities of the grant beneficiaries Relevant ESHS requirements, including the ESCoP	As part of awareness for the grant selection process, and once grant beneficiaries have been selected.

7.8 E&S Risk Management Budget

An indicative budget for implementing the ESMF and other E&S risk management tools is provided in Table 9. E&S risk management costs for the contractors; micro-grid developers; and catalytic / RBF grant recipient companies will be incorporated into their own costs. The costs for environmental management items such as waste management and sediment control are included in the project construction costs. The project will review and reassess its resource needs throughout Project implementation. If additional resources are required, additional resources will be recruited.

Table 9: Indicative Implementation budget

Budget Item	Detail	Cost Estimate (USD) per Year	Cost Estimate (USD) Total for Project
PPL PIU/EPM E&S Team	1 x E&S Specialist part-time (100 days/year) for 4 years (international recruitment) 1 x PNG Social and GBV Specialist fulltime for 4 years (national recruitment) 1 x PNG Environment Specialist fulltime for 4 years (national recruitment) (The E&S specialists engaged for EUPRIP will support NEAT for the first 3 years of the Project)	140,000 (includes travel, visas, per diem, etc) 60,000 60,000	1,040,000
NEA PIU/EPM E&S Team	1 x E&S Specialist part-time (100 days/year) for 7 years (international recruitment) 1 x PNG Social Specialist fulltime for 7 years (national recruitment) 1 x PNG Environment Specialist fulltime for 7 years (national recruitment) 1 x PNG GBV Specialist full-time for 7 years (national recruitment)	140,000 (includes travel, visas, per diem, etc) 60,000 60,000 60,000	2,240,000
Site visits for Component 1 for PIU E&S Specialist	Flights, car hire, accommodation, etc. Assumes average of 8 trips for 5 days each per year	36,000 (8 trips @ 4,500 per trip)	252,000
Site visits for Component 2 NEA PIU E&S Specialists	Flights, car hire, accommodation, etc. Assumes average of 2 trips for 5 days each for 3 years & 15 trips for 5 days each for 3 years	9,000 for 3 years (2 trips @ 4,500 per trip) 67,500 for 4 years (15 trips @ 4,500 per trip)	297,000
Stakeholder consultations for Components 1 and 3.2	Catering, venue hire, media, materials Assumes 4 consultations per year	8,000	56,000
Stakeholder consultations for Components 2 and 3.1	Catering, venue hire, media, materials Assumes 6 consultations per year	12,000	84,000
Printing	For handouts for community, posters, brochures etc	10,000	70,000
Contingency	Miscellaneous costs	10,000	70,000
Total			***4,109,000***

7.9 Progress Reporting

The PIUs will prepare and submit monitoring reports to the WB every quarter. The reports will include information on the environmental, social, health and safety (ESHS) performance of the Project, including items such as:

- implementation of the ESCP
- status of preparation and implementation of required E&S instruments (e.g., ESMPs, RPs, etc)
- recruitment of E&S personal for the PIUs
- stakeholder engagement activities
- functioning of the Project and Worker GRMs
- summary and status of grievances
- summary and status of incidents
- summary of contractor performance

7.10 Incident Management and Reporting

Despite efforts to manage environmental and social risks, there is potential for incidents to occur. An incident is defined as an accident or negative event resulting from failure to comply with the WB E&S requirements, or conditions that occur because of unexpected or unforeseen events during project implementation.

In addition to existing NEA and PPL internal incident management procedures, the Project will report all incidents to the WB team as soon as practicable, with all Serious and Severe incidents to be reported within 24 hours of their occurrence. The PIU and/or contractor involved in the incident are responsible for also reporting the incident to the relevant regulatory authority if required.

The incident classifications are as follows[25]:

- Indicative:
    - Relatively minor and small-scale localized incident that negatively impacts a small geographical areas or small number of people
    - Does not result in significant or irreparable harm
    - Failure to implement agreed E&S measures with limited immediate impacts
- Serious:
    - An incident that caused or may potentially cause significant harm to the environment, workers, communities, or natural or cultural resources
    - Failure to implement E&S measures with significant impacts or repeated non-compliance with E&S policies incidents
    - Failure to remedy indicative non-compliance that may potentially cause significant impacts
    - Is complex and/or costly to reverse
    - May result in some level of lasting damage or injury
    - Requires an urgent response
    - Could pose a significant reputational risk for the WB
- Severe:
    - Any fatality

[25] Source: Environmental and Social Incident Response Toolkit for Word Bank Staff

- Incidents that caused or may cause great harm to the environment, workers, communities, or natural or cultural resources
- Failure to remedy serious non-compliance that may potentially cause significant impacts that cannot be reversed
- Failure to remedy serious non-compliance that may potentially cause severe or complex impacts and/or be costly to reverse
- May result in high levels of lasting damage or injury
- Requires an urgent and immediate response
- Poses a significant reputational risk to the WB.

Upon request of the WB, the PIU (with support of the contractor involved, if applicable) shall prepare a report detailing the incident. The report should include the following information:

- Classification of the incident
- What was the incident? What happened? To what or to whom?
- Where and when did the incident occur?
- When and how did the PIU find out about it?
- Are the basic facts of the incident clear and uncontested, or are there conflicting versions? What are those versions?
- What were the conditions or circumstances under which the incident occurred (if known at this stage)?
- Is the incident still ongoing or is it contained?
- Is loss of life or severe harm involved?
- What has been the response to date?
- What remedial action, if any, is required?
- What measures have been or are being implemented to prevent reoccurrence?

The carrying out of any remedial action or implementation of preventive measures to prevent recurrence should be tracked to closure and progress included in the regular progress reports to the WB.