



# Appraisal Environmental and Social Review Summary

## Appraisal Stage

### **(ESRS Appraisal Stage)**

Date Prepared/Updated: 02/06/2024 | Report No: ESRSA03185



I. BASIC INFORMATION

A. Basic Operation Data

Operation ID	Product	Operation Acronym	Approval Fiscal Year
P173194	Investment Project Financing (IPF)	PNG NEAT	2024
Operation Name	National Energy Access Transformation Project (NEAT)		
Country/Region Code	Beneficiary country/countries (borrower, recipient)	Region	Practice Area (Lead)
Papua New Guinea	Papua New Guinea	EAST ASIA AND PACIFIC	Energy & Extractives
Borrower(s)	Implementing Agency(ies)	Estimated Appraisal Date	Estimated Board Date
Independent State of Papua New Guinea	National Energy Authority, PNG Power Limited	02-Feb-2024	17-Jun-2024
Estimated Decision Review Date	Total Project Cost		
28-Sept-2023	204,200,000.00		

Proposed Development Objective

To increase access to renewable energy and enhance the reliability of the electric supply.

B. Is the operation being prepared in a Situation of Urgent Need of Assistance or Capacity Constraints, as per Bank IPF Policy, para. 12?

No

C. Summary Description of Proposed Project Activities

[Description imported from the PAD Data Sheet in the Portal providing information about the key aspects and components/sub-components of the project]

This project supports the Government of Papua New Guinea (GoPNG) in achieving its energy access target through investments in on-grid electrification, sustainable renewable energy mini-grids, private sector-led off-grid market promotion, and institutional development. The National Energy Policy for 2018-2028 outlines an ambitious target of 70 percent electrification by 2030. In 2019, the GoPNG adopted the National Electrification Roll-out Plan (NEROP) and prepared a detailed NEROP implementation strategy and investment plan to prioritize a project-by-project roll-out plan covering the entire country based on a geo-spatial and least-cost planning tool. The proposed National Energy Access



Transformation Project (NEAT) will directly support the implementation of several priority investments identified in NEROP. The proposed project comprises four main components: Component 1: Rehabilitation, reliability enhancement of PPL infrastructure, and on-grid electrification. This component aims to rehabilitate eroded assets to improve the capacity and reliability of supply in PPL's distribution infrastructure at the Port Moresby and Ramu systems and increase on-grid household connections for electrification. This component consists of three sub-components: - Subcomponent 1.1: Rehabilitation and modernization of distribution networks. This sub-component includes the rehabilitation and modernization of selected substations, MV distribution network, warehouse system, enhancements in control, automation, metering functionality, and mobile substations. It complements and continues priority investments identified for EUPRIP, which jointly are expected to improve the efficiency and reliability of electricity supply and the RE integration. - Subcomponent 1.2: Grid densification and expansion for household connections. This subcomponent supports MV/LV grid expansion and the densification to increase on-grid electrification at selected locations. Households (HH) who cannot afford to install internal house wiring, a minimum supply kit (MSK) will be made available on a results-based finance scheme upon verification by an independent verification agent (IVA). In addition, a connection subsidy will be provided for HHs within 100 m of an LV feeder line. - Subcomponent 1.3: Public Private Partnerships (PPP) in PPL mini-grids clean energy modernization. This aims to provide viability gap financing (VGF) as a capital subsidy to a private project company through PPL that acts as a PPP administrator to modernize obsolete small and isolated mini-grid (s) which are located far from main grids, as a clean energy modernization on Build-Own-Operate-Transfer (BOOT) scheme. 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. VGF aims to improve reliability of supply, provide affordability by maintaining the project tariff for residential customers and render the project financially viable, provide capital subsidy to non-diesel components, however will require a private project company to maintain RE share by setting a RE floor in the PPP scheme. The IDA credit will be on-granted from the GoPNG to PPL. VGF grant arrangements will be detailed in the PPL's PIM. Component 2: Renewable energy micro-grids and rural energy market development. This component aims to expand energy access in remote communities that PPL does not serve. This component consists of two sub-components: - Subcomponent 2.1: Micro-grid systems: This aims to provide investment grants through the NEA to private service providers who will be competitively selected and will install, operate, and maintain renewable energy-based micro-grids systems in rural PNG, typically targeting a settlement of up to a few thousand customers. A typical micro-grid system is expected to comprise solar PV arrays of a few hundred kW, a battery with an inverter, LV (and MV as the case may be) reticulation of up to several kilometers, and household connections (service drop, and meter box) . - Subcomponent 2.2: Solar-home systems (SHSs) and products. This sub-component aims to increase the uptake of quality-verified solar home systems and solar products in PNG. It will establish a funding mechanism to provide investment grant (catalytic fund and/or results-based financing (RBF) to eligible solar companies to extend their supply chains, develop markets, and scale-up the sales of Verasol-certified off-grid solar energy kits. Component 3: Energy sector and 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 in conducting strategic studies for the energy sector. This component consists of two sub-components: - Subcomponent 3.1: NEA institutional development. This sub-component will fund key studies for project implementation and sector policy development, and related capacity building programs to be conducted by NEA. - Subcomponent 3.2: PPL institutional development. This sub-component will provide small hydropower and other variable RE potential site identification or pre-feasibility studies, and will support technical capacity development of PPL. Component 4: Project management. This component aims to support the management of the project by NEA and PPL. - Subcomponent 4.1. NEA project implementation support: This sub-component will support project implementation and coordination. This will include a Project Team (PT) within the NEA



to manage the NEROP investment program. As part of the project design, it will also finance the Owner’s Engineer (OE), Grant Administrator, an IVA, and related capacity building and incremental operating expenses. - Subcomponent 4.2. PPL project implementation support. This sub-component will help PPL establish an Employer’s Project Manager (EPM) under PPL’s project director. The EPM will support PPL in its role as public authority (PPP concession administrator). As part of the project design, it will also finance an IVA to verify new connections under sub-component 1.2, as well as related capacity building and incremental operating expenses.

#### D. Environmental and Social Overview

##### D.1 Overview of Environmental and Social Project Settings

*[Description of key features relevant to the operation’s environmental and social risks and opportunities (e.g., whether the project is nationwide or regional in scope, urban/rural, in an FCV context, presence of Indigenous Peoples or other minorities, involves associated facilities, high-biodiversity settings, etc.) – Max. character limit 10,000]*

PNG (population of 8.8 million) is one of the most culturally diverse countries with more than 1000 ethnic clans and 800 languages. It has 22 provinces and 87 districts across 4 regions - Highlands, Islands, Momase, and Southern. Over 85% of the population lives in remote and hard-to-reach rural areas presenting significant challenges for infrastructure and service provision. Prevalence of extreme poverty in PNG is high (around 38% in 2010) and the impact of COVID-19 on livelihoods has been severe, particularly for the poor and vulnerable. Forests cover 71% of total land area, comprising of rainforest, evergreen forest, swamp forest, and mangroves. The non-forest area includes lowland, shrubland, grassland, settlements, and water bodies. 36 species are classified as critically endangered in the country.

About 15% of the population has access to on-grid electricity, concentrated around main urban areas. Where on-grid electricity is available, reliability is low, connection fees are high, and the price of electricity is high. PNG relies on thermal generation using imported oil products - around 37% of total generation in 2015-2017. Over the past 5 years the country has seen substantial growth in the adoption of off-grid solar products. The majority of these products are PV pico-lights of unknown quality. Plug and play solar home systems (PnP SHS) and component-based systems are rarely used in PNG but hold significant promise for future development.

On-grid electrification activities (C1) will be located around urban and peri-urban areas served by the PPL distribution network. PPL service area includes three main grids (Port Moresby, Ramu, and Gazelle). Project financed substation and transmission rehabilitation and upgrades and digitalization upgrades will take place within the boundaries of existing infrastructure. Densification will involve minor extension of MV/LV distribution networks around the existing distribution grid (approx. less than 5 km); and the grid expansion will require extension of MV feeders to around 70km and installation of new distribution transformers beyond the existing infrastructure. The implementation of a household connections subsidy will cover all areas with grid access. Mini-grid development (C1.3.) will be located at an existing PPL mini-grid (either Alotau, Kavieng, Kimbe, Lorengau, and Wewak), with some expansion to greenfield area for solar PV. IFC is currently providing transaction advisory services including E&S scoping. Site selection will be finalized during implementation.

Sustainable micro-grid activities (C2.1) are expected to be developed in urban/peri-urban areas that lack on-grid access; and will maximize utilization of locally available renewable sources such as solar combined with battery technology. The NEROP implementation plan identified 57 potential micro-grid sites in 15 provinces. Additional sites may be identified during project implementation. NEA will do the prioritization of the sites and conduct preliminary analysis of the site



conditions. Site selection will be finalized during implementation. The activities under C1 and C2 may require land access arrangements or land acquisition, and the development of greenfield sites. Project activities to support growth off-grid solar will set up catalytic and results-based financing framework grants to support energy access companies in expanding their services, prioritizing underserved rural areas. Targeted provinces/districts will be finalized during project implementation.

The policy and regulatory instruments supported (C3) are likely on service and technical standards, tariff and subsidy, and monitoring and evaluation arrangements. C3 will also include TA for the design of several new small HPPs with expected maximum capacity of a few MW (Type 1). The site selection will be finalized in implementation. TA activities (C4) seeks to build institutional capacities in NEA and PPL through specialists recruitments and training.

## **D.2 Overview of Borrower’s Institutional Capacity for Managing Environmental and Social Risks and Impacts**

*[Description of Borrower’s capacity (i.e., prior performance under the Safeguard Policies or ESF, experience applying E&S policies of IFIs, Environmental and social unit/staff already in place) and willingness to manage risks and impacts and of provisions planned or required to have capabilities in place, along with the needs for enhanced support to the Borrower – Max. character limit 10,000]*

The project’s implementing agencies (IAs) NEA (C2, C3.1 and C4.1) and PPL (C1 and C3.2, and C4.2).

NEA has only recently been established, is yet to be fully staffed and has very limited capacity to implement the project or manage environmental and social risks. Under C4.1, the Project will finance a Project Team (PT) within NEA that will be fully equipped with qualified staff to manage project implementation including environmental and social management specialists. The NEA PT E&S specialists will lead the implementation of the project’s Environmental and Social Management Framework (ESMF) including overssing the preparation of the Project’s site-specific environmental and social instruments during project implementation. For C2, NEA will contract a grant administrator to support the implementation of the grant facility and provide TA to participating companies as well as an independent verification agency (IVA) to verify connections conducted by companies participating in the RBF grants.

PPL has existing environmental and social staff, has implemented projects with the World Bank, and has experience with fiduciary and safeguard policies, however its implementation capacity is weak. Under C4.2, PPL will establish an employer’s project manager (EPM) that will be fully equipped with qualified staff to manage project implementation including environmental and social management specialists. The EPM will support all PPL led sub-components including PPL in its role as public authority (PPP concession administrator) for the PPL mini-grid (C1.3).

C1.3, 2.1 and 2.2 will involve grant beneficiaries including micro-grid developers, private project company(s) (mini-grid concessionaire), catalytic grant beneficiaries and RBF grant beneficiaries; and PPL and NEA have committed through the Environmental and Social Commitment Plan (ESCP) to ensuring that the selected beneficiaries have adequate capacity to manage E&S requirements.

Neither NEA or PPL have experience with the Bank’s Environmental and Social Framework (ESF) and PPL has limited experience with the Performance Standards which will apply to C1.3. Both IAs will require support from the World Bank E&S team during project implementation. Capacity development for NEA and PPL will be supported under the Project.



Capacity building and training for both PT/EPMs, including the E&S specialists, on E&S requirements and the instruments prepared is included in the ESCP.

## II. SUMMARY OF ENVIRONMENTAL AND SOCIAL (ES) RISKS AND IMPACTS

### A. Environmental and Social Risk Classification (ESRC)

Substantial

#### A.1 Environmental Risk Rating

Substantial

*[Summary of key factors contributing to risk rating, in accordance with the ES Directive and the Technical Note on Screening and Risk Classification under the ESF – Max. character limit 4,000]*

The Project is expected to deliver environmental benefits through the uptake of electricity generation from renewable sources to serve underserved areas. However, there are also environmental risks associated with the Project. The environmental risks include risks and impacts associated with construction activities under C1 and C2, such as soil erosion, increased dust and noise, sedimentation, soil and water pollution from inappropriate construction materials use and waste management spills associated with the replacement of oil-filled transformers (e.g. PCB containing transformers oil) and refurbishment of existing diesel generation infrastructure at existing mini-grid - in the context of limited facilities and services available in PNG to manage hazardous waste, as well as community and occupational health and safety risks (e.g. risk working with live power lines and magnetic fields, as well as working at height). The risks related to the use of resources includes the sourcing of construction materials and aggregates. Potential habitat loss/natural habitat fragmentation related to land clearing on greenfield development for on-grid expansion and development of mini-grid. These risks can be avoided, minimized/mitigated by applying site screening criteria for location selection and the application of mitigation measures for the civil works, proportional to its scale. The risks during operations include risk of soil and water contamination from inappropriate waste management and spillage, fire risk from faulty wiring, electrocution risk if installations are not done by qualified personnel, as well as risks to wildlife (e.g., birds and bats) related to collision, electrocution, and glare from solar panels. The mini-grid (C1.3), micro-grid (2.1) and off-grid SHS operations (C2.2) may also result in impacts related to hazardous waste generation from battery and used solar photovoltaic (PV), including during decommissioning, as well as minor nuisance impacts (i.e., glare). TA activities supporting policy and regulatory instrument and supporting design and E&S instruments for small HPP (with expected maximum capacity of a few MW), may have potential downstream environmental impacts. The environmental risks and impacts are expected to be limited in scale and the activities are not complex. The grid expansion under C1 will be around 70 km, while the densification will occur less than 5km from existing distribution grid. The peak loads of mini-grid (C1.3) is expected to be ranging from 10 KW to 26 MW and the capacity of micro grids (C2.1) may vary with maximum around few hundred KW. The risks are also mostly temporary, low in magnitude, predictable, can be easily mitigated, and has low of probability of serious adverse effects to human health and/or the environment. However environmental risks are assessed to be remain substantial due to limited IA experience and capacity to managing environmental risks – particularly within the newly established NEA; and current uncertainty regarding the location of project activities. The Environmental and Social Management Framework (ESMF) is developed and contains a mitigation hierarchy for these risks, including the screening process for subprojects and guidance on the preparation of site-specific environmental and social instruments.

#### A.2 Social Risk Rating

Substantial

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*[Summary of key factors contributing to risk rating, in accordance with the ES Directive and the Technical Note on Screening and Risk Classification under the ESF – Max. character limit 4,000]*

The Project is expected to result in long-term positive social impacts associated with the provision of reliable electricity supply in target communities across PNG including in health, education, safety and economic development. However there are a number of social risks associated with the project that will require assessment and management during project implementation. These include: i) minor land and livelihood impacts associated with the establishment of sites/easements for on-grid, mini-grid and micro-grid electricity generation, storage and distribution infrastructure; ii) inequitable access to expanded electricity services 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); iii) social tensions, conflict and civil unrest between diverse cultural groups/communities resulting from real or perceived inequities concerning selection of target sites/communities; iv) community health and safety risks associated with construction and labor influx (i.e. antisocial behavior, transmissible disease and sexual exploitation and abuse and sexual harassment), as well as safety risks associated with the supply and use of electricity in communities; and v) labor and working condition risks including risks within the PV panel supply chain concerning polysilicon suppliers and risks associated with the privatization of existing mini-grid. Project TA activities, particularly TA for small HPP design (Type 1) have the potential for downstream social impacts and these impacts will require assessment during the design phase. Social risks are expected to be medium in scale and magnitude, predictable and readily mitigated and have a low to moderate probability of serious adverse effects to human health and safety. However social risks have been assessed as substantial due to limited IA experience and capacity to managing social risks – particularly within the newly established NEA; and current uncertainty regarding the location of project activities. These risks and potential impacts and resourcing/capacity needs will be managed through the implementation of the project’s ESMF, Land Access and Resettlement Framework (LARF), Indigenous Peoples Policy Framework (IPPF), Labor Management Procedures (LMP) and Stakeholder Engagement Plan (SEP). Sub-project instruments will be developed alongside detailed subproject design once specific investments and their locations have been confirmed during implementation.

*[Summary of key factors contributing to risk rating. This attribute is only for the internal version of the download document and not a part of the disclosable version – Max. character limit 8,000]*

## **B. Environment and Social Standards (ESS) that Apply to the Activities Being Considered**

### **B.1 Relevance of Environmental and Social Standards**

**ESS1 - Assessment and Management of Environmental and Social Risks and Impacts**

Relevant

*[Explanation - Max. character limit 10,000]*

The Project will be implemented in accordance with the World Bank’s Environmental and Social Standards (ESSs) with the exception of C1.3 which will be implemented in accordance with OP 4.03 Performance Standards for Private Sector Activities (PSs). OP 4.03 applies because C1.3 will involve the selection of a private entity as a concessionaire to upgrade and operate a PPL mini-grid on a BOOT concession basis. IFC transaction advisory services to support design are ongoing; and PSs are being applied through this process. Roles and responsibilities for E&S management will be confirmed during design and outlined in the concession agreement. The private entity is expected to be responsible





for the majority of E&S assessment and management associated with the mini-grid. Prospective private entities in PNG are expected to be familiar with the PSs. The E&S capacity of private entities will be confirmed through the bidding process and VGF grant agreement (concession agreement). Key social risks and potential impacts associated with the Project include: i) land and livelihood impacts associated with the establishment of sites/easements for on-grid, mini-grid and micro-grid electricity generation, storage and transmission infrastructure; ii) inequitable access to expanded electricity services 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); iii) social tensions, conflict and civil unrest between diverse cultural groups/communities resulting from real or perceived inequities concerning selection of target sites/communities; iv) community health and safety risks associated with construction and labor influx (i.e. antisocial behavior, transmissible disease and sexual exploitation and abuse and sexual harassment), as well as safety risks associated with the supply and use of electricity in communities; and v) labor and working condition risks including risks within the PV panel supply chain concerning polysilicon suppliers and risks associated with the privatization of existing mini-grid. Key environmental risks and potential impacts associated with the project include: i) risks and impacts associated with construction activities such as soil erosion, increased dust and noise, sedimentation, pollution from inappropriate construction materials use or waste management, as well as community and occupational health and safety risks; ii) resources used during construction, such construction materials and aggregates; iii) potential habitat loss/natural habitat fragmentation particularly related to the development of mini-grid and micro-grid network which targeting rural areas that may be located in Greenfields area; iv) potential risks during operations including soil and water contamination from inappropriate waste management, fire risk from faulty wiring and battery storage system, electrocution risk if installations are not done by qualified personnel, risks to wildlife (e.g., birds and bats) related to collision and electrocution, as well as minor nuisance impacts (i.e., glare); v) operations and decommissioning of mini grids, micro-grids and SHS may also result in impacts related to hazardous waste generation from battery and used solar PV; and vi) disposal of old transformers (i.e. potential of PCB containing transformers oil). Project TA activities supporting policies and regulatory standards and TA for small HPP design (with expected maximum capacity of a few MW), have the potential for downstream environmental and social impacts and these impacts will require assessment in accordance with relevant ESSs. As subproject prioritization (C1 and C2) and design of catalytic and RBF grant facility (C2) will be confirmed during project implementation, an ESMF has been prepared which outlines the principles, rules, guidelines, procedures, and tools to assess and manage environmental and social risks and potential impacts alongside Project design. The ESMF includes the guidance to identify associated facilities (based on criteria set out in the ESF) and the process to screen types of activities and locations that are going to be supported under the Project, as well as to also determine the assessment and preparation of further site-specific E&S instruments for the subprojects. The existing procedures and tools that are outlined in the EURPIP ESMF and the current PPL's ESMS have been reviewed and considered in the NEAT's ESMF for C1 activities. For mini-grid (C1.3), the ESMF outlines E&S assessment requirements and commitments, including criteria for site selection based on the pre-feasibility study reports and E&S scoping assessment that are being prepared with IFC transaction advisory assistance, as well as the exclusion criteria in the ESMF. PPL have committed through the ESCP to ensure the private project company (mini-grid concessionaire) demonstrate E&S capacity through a documented Environmental and Social Management System (ESMS) consistent with PSs requirements and develop relevant site-specific E&S assessment (e.g. ESIA/ESMP, and operational ESMP). The relevant E&S requirements, are outlined in the ESMF, LARF, LMP, SEP and will be included in the VGF grant agreement (concession agreement). The ESMF also outlines an E&S risk screening process for micro-grid development (C2.1) and the selection and screening criteria, including E&S criteria, for companies that are going to participate in the results-based financing scheme for solar home system (C2). The ESMF also includes





indicative E&S risks management tables for C1, and C2 which outlines the potential risks and mitigation measures for the subproject activities. The tables serve as guidelines for the development of site-specific E&S instruments under C1 and C2. The companies selected under C2 will also require to implement the mitigation measures in the E&S risks management table and its compliance will be verified as part of completion verification. For TA type 1, supporting the design of small HPPs (C4), the ESMF provides indicative TOR for the E&S assessment, and for type 2 activities supporting the preparation and adoption of key policy and regulatory instruments (C4), the ESMF includes guidelines on providing inputs on relevant ESSs requirements to the activity-specific TOR, as well as the review of the TA output for compliance with the ESS requirements. A number of other tools have also been developed as part of the ESMF and its annexes, including COVID-19 Protocol, SEA/SH Action Plan, Labor Management Procedure (including Workers Grievance Redress Mechanism), Environmental and Social Code of Practice (ESCOP), and Chance Finds Procedure. A LARF has been prepared to guide the management of potential land acquisition and resettlement impacts associated with sub-projects. The LARF establishes the principles, objectives, procedures and rules to be used to manage land acquisition and associated impacts. This includes processes and tools for negotiated settlement, voluntary land donation, and involuntary resettlement. A Stakeholder Engagement Plan (including Grievance Redress Mechanism) and an Indigenous Peoples Policy Framework have also been prepared. The ESMF outlines institutional arrangements, roles and responsibilities and reporting procedures for environmental and social management and monitoring, provides indicative plan for training, capacity building and technical assistance needed to successfully implement the provisions of the ESMF and associated instruments, as well as establishes a budget for the implementation of the ESMF and associated instruments. The requirements and actions emanating from the ESMF, including on the requirements to develop site-specific E&S instruments, is captured in the Environmental and Social Commitment Plan (ESCP). The ESCP outlines the Borrower’s commitments to develop the required E&S instruments and tools, implement appropriate mitigation measures, report on performance related to application of ESSs and PSs where relevant, and conduct training and capacity building activities. The ESMF, ESCP and associated instruments has been disclosed on NEA and PPL websites prior to appraisal.

**ESS10 - Stakeholder Engagement and Information Disclosure**

Relevant

*[Explanation - Max. character limit 10,000]*

Project stakeholders were identified during project preparation and include: i) affected parties and target beneficiaries (i.e., households/communities who lack access to modern/reliable energy services, and SMEs expanding energy products and services); ii) vulnerable groups including widows, single mothers, disabled, elderly as well as people living outside their traditional communities; and iii) other interested parties including other sectoral agencies, NGOs, the private sector and the public at large. A Stakeholder Engagement Plan has been prepared and consulted for the project in accordance with ESS10 and PS1 where applicable. The SEP identifies and analyzes 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 outlines the Project’s Grievance Redress Mechanism (GRM) which will enable stakeholders to raise project related concerns and grievances. The GRM includes a procedure for managing and addressing project related grievances including lodgment channels, governance structure, roles and responsibilities, investigation and feedback processes taking into account different stakeholders needs, social risks, and implementing arrangements for each project component. The GRM has been designed to handle SEA/SH complaints. The SEP (and GRM) ensures consistency with ESS7 and PS7 where applicable, promoting the inclusion of Indigenous Peoples, and outlining a

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strategy for engagement with indigenous peoples and culturally appropriate approaches for consultation and information dissemination. It also outlines a strategy for engaging vulnerable and disadvantaged groups. The SEP outlines roles and responsibilities for implementing the SEP – including responsibilities for contractors, private project company (mini-grid concessionaire), micro-grid developers, and catalytic grant beneficiaries and RBF grant beneficiaries. The SEP (and GRM) has been disclosed on NEA and PPL’s websites. The ESCP outlines a requirement for PPL and NEA to implement the SEP throughout Project implementation and for the GRM to be operational within 3 months of project effectiveness.

**ESS2 - Labor and Working Conditions**

Relevant

*[Explanation - Max. character limit 10,000]*

A Labor Management Procedure (LMP) has been prepared for the project which sets out the way in which project workers and labor and working condition risks will be managed in accordance with the requirements under PNG law, ESS2 and PS2 – Labor and Working Conditions, where applicable. The LMP has identified the following types of workers: i) direct workers including government staff and consultants engaged directly by the IAs and the private project company (mini-grid concessionaire) (under PS2); ii) contracted workers employed or engaged through third parties such as, design and supervision consultants, contractors, micro-grid developers, catalytic grant beneficiaries and RBF grant beneficiaries; iii) primary supply workers including workers in the polysilicon/PV panel supply chain; and community workers who chose to volunteer to support the construction and/or operation of micro-grids. The LMP addresses the way labor and working condition risks will be managed for each category of worker. This includes principles of non-discrimination and equal employment opportunities; requirements for documented contracts for direct and contracted workers; provisions to prevent sexual exploitation and abuse and sexual harassment of all project workers; requirements for addressing occupational health and safety risks for all project workers; a minimum project workforce age of 18 years; and procedures to manage the risk of COVID-19 transmission. The LMP also outlines a grievance redress mechanism for project workers. As many of the project investments are likely to involve solar power generation with the use of photovoltaic panels, risks of forced labor in the polysilicon/PV panel supply chain will be addressed in accordance with the World Bank’s Mandatory Note to Borrowers on IPF Solar Procurement. The LMP outlines measures for managing risks associated with primary supply workers in the polysilicon/PV panel supply chain who may supply the off-grid solar products (C3) on an ongoing basis. IFC is conducting a preliminary assessment of labor and working condition risks which will inform C1.3. This will include a road map for managing worker engagement, restructuring, and retrenchment with the objective of identifying alternatives to worker retrenchment. The LMP outlines additional requirements under PS2, including adopting and implementing an agreed road map; minimum standards for accommodation, and the adoption and implementation of human resource policies and procedures. PPL through the ESCP has committed to including requirements for managing PPL mini-grid workforce (C1.3) in accordance with PS2 in the VGF grant agreement (concession agreement). Each implementing agency is responsible for ensuring that project workers engaged to deliver activities under their respective components are managed in accordance with the LMP. Any third parties (i.e., contractors or beneficiaries) engaged by the IA’s are also required to manage their workforce (including community workers) in accordance with the project’s LMP.

**ESS3 - Resource Efficiency and Pollution Prevention and Management**

Relevant

*[Explanation - Max. character limit 10,000]*

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The Project will promote renewable energy related investments which will increase the uptake of electricity from renewable sources. However, the Project will also potentially result in environmental degradation and pollution from the use of resources, improper management of waste generated (including during transportation, handling, storage, and end-of-life use) as well as accidentals spill associated with the replacement of transformers (e.g., PCB or solvents used for degreasing). The use of resources during construction includes the sourcing of construction materials and aggregates. During construction, there are pollution from dust, noise, improper management of waste, including hazardous waste such as used oil and batteries associated with the use of construction machineries. Measures and actions to manage these risks, consistent with ESS3 and PS3 – Resource Efficiency and Pollution Prevention, where applicable, have been included in the ESMF. General mitigation measures related to the environmental degradation and pollution risks from construction and implementation of Project activities is included in the ESMF. The ESMF includes E&S management tables which outlines the potential risks and impacts as well as the mitigation measures for each of the subprojects activities. Under C1, the rehabilitation of substations may entail the replacement of old transformers. Some of old transformers in PPL operations might be using PCB containing transformers oil which require specific management and disposal which is also a potential source of pollution. There are limited facilities and services available in PNG to manage hazardous waste. Several private waste companies, provide limited service of storage, treatment, and disposal of hazardous waste such as waste oil, contaminated metals, etc. The current viable safe disposal of PCB contaminated oil and equipment is to export it to licensed facility overseas. For the identification of PCB in transformers oil, the ESMF prescribes the requirements to conduct PCB test using a sampling kit as part of the E&S screening of subprojects. If the existence of PCB is confirmed, the subproject is required to include the management of PCB waste in the site specific management plan, including to allocate budget for the management of the waste. The Conservation and Environment Protection Agency (CEPA) and South Pacific Regional Environment Programme (SPREP), have an ongoing program on the identification and inventory of PCB containing oils in PNG, as well as managing its disposal. The inventory has been developed, however, it is not yet included all PPL's operations. Due to limited funding, the program will not include more equipment in this time being. If inclusion of additional PCB contaminated oil and equipment under CEPA-SPREP program is possible in the future, the Project will explore this opportunity during implementation. For the upgrade of transformer, the new transformer will use non PCB-containing oil. During operation, there will be a risk of oil spill during the maintenance activities as well as spill due to equipment failure (e.g., leaking). The new infrastructure is designed to include bund wall to prevent oil spill to the surrounding environment. The development of mini-grids (C1.3) and micro-grids (C2.1) requires the use of battery storage which may result in soil and water pollution if the handling and disposal is not done properly. Used solar panels from replacement or decommissioning of the solar plants (C1.3 and C2), as well as the solar home system (C3) may also lead to environmental pollution. PNG has limited local recycling facilities or electronic waste recovery facilities. For the management of e-waste (i.e., used batteries and used solar panels), the requirement to collaborate with the suppliers to manage the waste are outlined in the ESMF. The ESMF also requires the developer for mini-grid (C1.3) and companies participate in RBF scheme (C2) to provide a safe storage area to collect the e-waste prior to disposal. The development of mini-grids (C1.3) under PPP scheme will also require the private project company (mini-grid concessionaire) to have an approved ESMS in place, and develop site-specific ESIA/ESMP and Operational ESMP which also include requirement to managed resources as well as pollution prevention measures such as management of hazardous waste and its disposal. The project will include TA to explore options for setting up a mechanism to collect used batteries and solar panels and centrally arrange for adequate management. Commitments to implement approaches in the ESMF as well as preparation of investment-specific E&S instruments is included in the ESCP. In the event contractors are engaged for construction of any project activities, the contractors will be required to develop C-ESMP that is in line with ESMF. TA activities supported under the Project (both on the development of policy and



regulations, as well as small HPP design and E&S instruments), may entail downstream pollution impacts, such soil and water contamination and resource efficiency issues. The ESMF includes guideline for providing inputs on relevant ESSs requirements to the activity-specific TOR, as well as the review of the TA output for compliance with the ESS requirements. The project will also generate climate and environmental benefits in the form of avoided GHG emissions due to the displacement of fuelwood, diesel, or other more carbon-intensive alternatives. Overall, there will be a net GHG emission reduction of 0.33tCO<sub>2</sub>e over the economic life of the project. The Bank provided assistance to borrower in estimating the GHG emissions of the Project.

**ESS4 - Community Health and Safety**

Relevant

*[Explanation - Max. character limit 10,000]*

The ESMF assesses and outlines measures for managing community health and safety risks associated with the Project consistent with ESS4 and ESS2; and PS2 and PS4 – Community Health, Safety and Security, where applicable. The Project is expected to result in health and safety benefits in beneficiary communities through the provision of electricity for social infrastructure. Community health and safety risks associated with the expansion and densification of on-grid electrification (C1) and the development of sustainable mini grids (C1.3) and micro-grids (C2.1) include community exposure to: i) physical hazards on sites where the community has access; ii) water-borne/vector-borne diseases which may result from poor site management (e.g., stagnant water); iii) communicable diseases such as COVID-19 and HIV/AIDS and anti-social behavior and SEA/SH risks associated with project workforce; vi) nuisance level noise, dust and vibration impacts; and vii) health impacts associated with poor management of hazardous materials such as batteries at end of life in community environments. Sub-project ESMPs will assess and outline measures for managing these risks. Relevant requirements will be outlined in works contracts; and works contractors will be required to develop and implement C-ESMPs. TA for small hydropower design and E&S planning will also assess these risks in accordance with ESS4. The supply of electricity also presents safety risks for members of the community, particularly vulnerable groups (i.e., children) who have low awareness of electricity safety. Sub-project ESMPs will assess and outline measures for managing this risk. Real or perceived inequities regarding access to project services, and particularly the selection of target sites/communities for on-grid electrification, mini-grids and micro grids have the potential to lead to social tensions, conflict and civil unrest within and between diverse cultural groups/communities. The ESMF and SEP outlines procedures and strategies for assessing and managing this risk during sub-project design, selection and preparation. Equitable access to expanded electricity services within communities, particularly for vulnerable groups will be promoted through project design measures – i.e. C1 connection subsidies; C2 criteria for % of households with access and variety of different products/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. PNG has high rates of gender inequity and gender-based violence and the risk of project workforce related sexual exploitation and abuse and sexual harassment has been assessed as moderate. A GBV action plan has been developed including measures to prevent, manage and respond to the risk of negative impacts associated with behavior change interventions as well as SEA/SH associated with the project workforce. The resilience of new infrastructure related to climate and exposure to extreme weathers has been included in the ESMF and will be addressed through project design.

**ESS5 - Land Acquisition, Restrictions on Land Use and Involuntary Resettlement**

Relevant

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[Explanation - Max. character limit 10,000]

The project will require land for i) the expansion and diversification of on-grid MW and LV distribution networks (C1.2); ii) upgrade of a select PPL mini-grids (C1.3); and iii) establishment of micro-grids (C2.1) including power generation/storage facilities and distribution infrastructure). No land is expected to be required for rural energy market development solar home systems (C2.2). TA (type 1) for upstream design and E&S assessment/planning for small hydropower projects (C4.2) may also involve assessment/planning of land and resettlement impacts. Land required is expected to be a mixture of customary and alienated land (state land or private-freehold land). The locations and details of subprojects will be identified during project implementation, as will the associated land related risks and issues. As such, a Land Access and Resettlement Framework has been prepared in accordance with ESS5 and PS5 – Land Acquisition and Involuntary Resettlement where applicable, which establishes the principles, objectives, procedures and rules to be used to manage land access or land acquisition (if required) and associated impacts. It is anticipated that the vast majority of land required for project infrastructure will be secured through land access agreements (e.g., lease, access/easement, land use agreements). The negotiation of land access agreements will not result in a change of land ownership, nor will it result in the alienation of customary land. The LARF outlines processes for negotiated settlement, voluntary land donation, and involuntary resettlement (if necessary). Given the intrinsic linkages between land and indigenous communities in PNG, the risks will be managed in a coordinated manner with those outlined for ESS7 and PS7 – Indigenous Peoples where applicable, which will include, among other things, meaningful consultation and where necessary a process to obtain free, prior and informed consent. NEA and PPL have committed, through the ESCP to ensuring land due diligence and/or resettlement plans are prepared prior to the commencement of works for all relevant activities as per the LARF. For C1.2, MV distribution lines require slim corridors of land no wider than 6 metres. The development of new MV lines will utilize existing road corridors where possible. Land access/easement agreements will be negotiated where required. Land use will be restricted in these corridors to maintain safe distances and access to the infrastructure and this is likely to impact economic assets and associated livelihoods. Physical displacement will be avoided where possible; and where required is expected to be limited to in situ displacement (i.e., moving residences back). LV distribution lines do not have the same clearance requirements as MV lines and therefore are expected to have negligible impacts on land, residences and economic assets. The alignment and locations of the utility poles of LV distribution lines will utilize existing roads, tracks and fence lines and be agreed with local government representatives, village leaders – in consultation with the wider community. For C1.3 mini-grids, land will be required for the development of new solar PV generation/battery storage and MV distribution infrastructure. Likewise for C2.1 micro-girds, land requirements will include small sites for power generation, storage and distribution. Land for both mini and micro grid project infrastructure will be sourced through land access agreements between landowners and micro-grid power developers and private project company (mini-grid concessionaire). Availability of land (that avoids/minimizes displacement) will be a key selection criteria for both micro-grid and mini-grid subprojects. Physical displacement and significant livelihood impacts will be avoided/mitigated through sub-project selection and design. Technical Assistance under C4 will support the feasibility of small hydropower projects. While TA work will not involve land acquisition during the Project, TORs for upstream feasibility and assessment work will stipulate the need to identify land requirements with scope to avoid displacement through design. Resettlement plans developed during feasibility are required to be developed in accordance with the LARF and ESS5.

**ESS6 - Biodiversity Conservation and Sustainable Management of Living Natural Resources**

Relevant





*[Explanation - Max. character limit 10,000]*

The ESMF assesses and outlines measures for managing biodiversity conservation natural resource risks associated with the Project consistent with ESS6 and PS6 – Biodiversity Conservation where applicable. The clearing of vegetation on greenfield area for construction of power generation components and facilities may cause risks associated with habitat loss, disturbance of terrestrial biodiversity, degradation and fragmentation of natural habitat, as well as introduction of invasive alien species. Under the grid expansion activities, the development of new MV line will require the clearing of vegetation of a 6 meter easement. Where possible, existing road easements will be utilized which will reduce vegetation clearance. Distribution densification activities will involve additional LV lines, which are likely to be located near the consumers (e.g., housing) areas. Only minimal space is required for LV lines. The development of micro-grids (C2.1) will require a plot of land for the solar panels as well as control rooms (e.g., for batteries storage). To-date 57 potential micro-grids sites have been identified – all solar PV with the majority with photovoltaic solar panel footprints under 400 square metres, but with several over 1,000 square metres. The location of this development will likely to be inside a community compound/village which is likely to be modified habitat. Based on these types and scale of these activities, the impact of clearing of vegetation under the subprojects will likely to be limited. The construction activities may lead to negative environmental impacts through noise pollution, sedimentation, inappropriate disposal of waste leading to soil and water contamination, which all have the potential to impact existing biodiversity values on the site and surrounding area. Transmission lines may also affect the wildlife (e.g., bats and birds) related to collision and electrocution. To avoid or minimize the disturbance to sensitive natural habitat from clearing of vegetation, a site selection screening criteria has been included as part of the ESMF. The selection criteria will help identify if the sensitive/critical habitat is present in the site location. The ESMF also provides general mitigation measures to avoid or minimize impacts to biodiversity from construction and operations of Project activities. The requirements under the ESMF will also included in C-ESMP if contractors are engaged for construction. For development of mini-grids under C1.3, a preliminary E&S screening assessment has been conducted by IFC. The assessment included screening and scoping of potential E&S issues including biodiversity and habitat. To avoid significant impacts to biodiversity, site selection for mini-grids will take into account this preliminary assessment and will also apply the exclusion criteria as prescribed in the ESMF, including avoiding sites with identified critical habitats in the area. TA activities supported under the Project ,particularly on small HPP design and E&S instruments, may entail impacts on biodiversity and habitat. The ESMF includes guideline for providing inputs on relevant ESSs requirements to the activity-specific TOR, as well as the review of the TA output for compliance with the ESS requirements.

**ESS7 - Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities**

Relevant

*[Explanation - Max. character limit 10,000]*

PNG is one of the most culturally diverse countries in the world with over 800 languages and over 1,000 distinct ethnic groups. The project is expected to be implemented in diverse communities across several provinces and districts. ESS7 is relevant and the standard applies for this project since ethnic groups (Indigenous Peoples - IPs) possessing the four characteristics listed in para 8 of ESS7 are present in the project area. An Indigenous Peoples Policy Framework has been prepared in accordance with ESS7 and PS7 – Indigenous Peoples where applicable, and includes requirements for subprojects, and other activities, where necessary, to identify the ethnic groups that are present in the sub-project 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 IPPF also outlines requirements for consultation and engagement consistent with the SEP including stakeholder analysis and engagement planning; disclosure of information; and meaningful consultation in a culturally appropriate and gender and intergenerational inclusive manner - to identify and address any economic or social constraints that may limit opportunities for IPs to benefit from, or participate in, the project. The IPPF also outlines a process to obtain free, prior and informed consent in the event that involuntary land acquisition is required. TA activities supported under the Project, particularly on small HPP design and E&S instruments (type 1), are likely to impact indigenous peoples. The IPPF includes guidance for providing inputs on ESS7 requirements to the activity-specific TOR, as well as the review of the TA output for compliance with the ESS requirements.

**ESS8 - Cultural Heritage**

Not Currently Relevant

*[Explanation - Max. character limit 10,000]*

This standard is not considered relevant at this stage. Impacts on tangible cultural heritage will be avoided during project screening. A chance finds procedure is included in the ESMF and it will be implemented if during project implementation tangible cultural heritage is discovered. No intangible cultural heritage is expected to be impacted by the project.

**ESS9 - Financial Intermediaries**

Not Currently Relevant

*[Explanation - Max. character limit 10,000]*

This standard is not considered relevant as the project will not involve financial intermediaries.

**B.2 Legal Operational Policies that Apply**

**OP 7.50 Operations on International Waterways**

No

Small hydropower assessments are not expected to take place in the provinces or waterways bordering Indonesia.

**OP 7.60 Operations in Disputed Areas**

No

Project activities are not expected to be in disputed areas.

**B.3 Other Salient Features**

**Use of Borrower Framework**

No

*[Explanation including areas where "Use of Borrower Framework" is being considered - Max. character limit 10,000]*

No area where "Use of Borrower Framework" is being considered. PNG legislative requirements have been incorporated into project E&S instruments.

**Use of Common Approach**

No

*[Explanation including list of possible financing partners – Max. character limit 4,000]*

N/A

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#### B.4 Summary of Assessment of Environmental and Social Risks and Impacts

*[Description provided will not be disclosed but will flow as a one time flow to the Appraisal Stage PID and PAD – Max. character limit 10,000]*

The Project 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 GHG (Green House Gas) emissions resulting from the electricity generation from renewable sources. The E&S risks and potential impacts associated with the project have been assessed as Substantial due to the associated E&S impacts of the proposed activities, limited implementing agencies' experience and capacity in managing these risks, and the current uncertainty on the project locations.

The Project will be implemented in accordance with the World Bank's Environmental and Social Standards with the exception of Sub-Component 1.3 which will be implemented in accordance with OP 4.03 Performance Standards for Private Sector Activities (PSs).

Key social risks and potential impacts associated with the Project include: (i) land and livelihood impacts associated with the establishment of sites/easements for on-grid, mini-grid and micro-grid electricity generation, storage and Medium/Low Voltage distribution infrastructure; (ii) inequitable access to expanded electricity services 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); (iii) social tensions, conflict and civil unrest between diverse cultural groups/communities resulting from real or perceived inequities concerning selection of target sites/communities; (iv) community health and safety risks associated with construction and labor influx (i.e. antisocial behavior, transmissible disease and sexual exploitation and abuse and sexual harassment), as well as safety risks associated with the supply and use of electricity in communities; and (v) labor and working condition risks, including risks within the Solar PV panel supply chain concerning polysilicon suppliers and risks associated with the privatisation of existing mini-grid(s).

Key environmental risks and potential impacts include potential generation of hazardous waste, particularly PCB-contaminated waste, from the substation upgrade under sub-component 1, potential habitat loss/fragmentation particularly related to the development of micro-grid which may be in greenfield area, construction related risks such soil erosion, dust and noise, pollution from inadequate waste management, occupational and community health and safety. The potential risks during operations include pollution from inappropriate waste management (e.g., used solar PV), fire risk from faulty wiring, electrocution risk for worker, and risk to wildlife (e.g., birds and bats) related to collision and electrocution. TA activities under sub-component 4 may have downstream E&S impacts, particularly on the activities supporting technical studies for small HPP, downstream environmental impacts include sedimentation, loss of terrestrial habitats, disturbance to aquatic life, and dam safety risks.

As subproject prioritization and design will be confirmed during project implementation, an ESMF has been prepared which outlines the principles, rules, guidelines, procedures, and tools to assess and manage E&S risks and potential impacts. The ESMF also outlines institutional arrangements, roles and responsibilities and reporting procedures for E&S management and monitoring, provides indicative plan for training, capacity building and technical assistance and budget needed to successfully implement the provisions of the ESMF and associated instruments. A number of other tools have also been developed as part of the ESMF and its annexes, including E&S screening forms for eligible investments, SEA/SH



Action Plan, Labor Management Procedure (including Workers Grievance Redress Mechanism), Indigenous People Policy Framework and Chance Finds Procedure.

A Land Access and Resettlement Framework has been prepared to guide the management of potential land acquisition and resettlement impacts associated with sub-projects. The LARF establishes the principles, objectives, procedures and rules to be used to manage land acquisition and associated impacts. This includes processes and tools for negotiated settlement, voluntary land donation, and involuntary resettlement. A Stakeholder Engagement Plan (including Grievance Redress Mechanism) and an Indigenous Peoples Policy Framework have also been prepared.

The requirements and actions emanating from the ESMF, including on the requirements to developed site-specific E&S instruments, is captured in the Environmental and Social Commitment Plan (ESCP).

For mini-grid development under C1.3, E&S requirements, are outlined in the ESMF, LARF, LMP, SEP and the ESCP. This includes criteria for site selection based on the pre-feasibility study reports and E&S scoping assessment that are being prepared with IFC transaction advisory assistance, as well as the exclusion criteria in the ESMF. PPL have committed through the ESCP to ensure the private project company (mini-grid concessionaire), through the bidding process and VGF grant agreement (Concession Agreement), demonstrate E&S capacity through a documented Environmental and Social Management System (ESMS) consistent with PSs requirements and develop and implement relevant site-specific E&S assessment (e.g. ESIA/ESMP, operational ESMP and land due diligence and/or resettlement plans). PPL through the ESCP has also committed to including requirements for managing PPL mini-grid workforce (C1.3) in accordance with PS2 in the VGF grant agreement (concession agreement).

### **C. Overview of Required Environmental and Social Risk Management Activities**

#### **C.1 What Borrower environmental and social analyses, instruments, plans and/or frameworks are planned or required by implementation?**

*[Description of expectations in terms of documents to be prepared to assess and manage the project’s environmental and social risks and by when (i.e., prior to Effectiveness, or during implementation), highlighted features of ESA documents, other project documents where environmental and social measures are to be included, and the related due diligence process planned to be carried out by the World Bank, including sources of information for the due diligence - Max. character limit 10,000]*

An ESMF, LARF, LMP, SEP and other associated instruments have been prepared during project preparation in accordance with relevant ESSs and PSs as applicable. The ESMF describes the process to screen subprojects under each component/sub-component and the instruments required to be prepared and implemented to manage E&S risks. These instruments will be prepared during project implementation. The project’s ESCP outlines material actions and requirements in accordance with the ESSs and PSs as applicable, to be implemented by the GoPNG through the IAs during project implementation.

For subcomponent 1.3, IFC transaction advisory support is ongoing. The World Bank and IFC are coordinating throughout this process. This work, including the E&S scoping study, ESIA TOR and labor study with roadmap for worker engagement, restructuring and retrenchment will inform the selection and design of the mini-grid concession,



including ESHS requirements and responsibilities which will be documented in the VGF grant agreement (concession agreement) to the satisfaction of the World Bank and PNG regulatory authorities.

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