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Project Information Document/ Integrated Safeguards Data Sheet (PID/ISDS)

Concept Stage | Date Prepared/Updated: 10-Apr-2017 | Report No: PIDISDSC19714

BASIC INFORMATION

A. Basic Project Data

Country	Project ID	Parent Project ID (if any)	Project Name
Papua New Guinea	P159840		Papua New Guinea Grid Electrification Project (P159840)
Region	**Estimated Appraisal Date**	**Estimated Board Date**	**Practice Area (Lead)**
EAST ASIA AND PACIFIC	Mar 14, 2018	Jul 26, 2018	Energy & Extractives
Lending Instrument	**Borrower(s)**	**Implementing Agency**	
Investment Project Financing	Department of Treasury	PNG Power Limited	

Proposed Development Objective(s)

The development objective is to increase access to grid electricity in the country.

Financing (in USD Million)

Financing Source	Amount
International Development Association (IDA)	150.00
Total Project Cost	**150.00**

Environmental Assessment Category	Concept Review Decision
B-Partial Assessment	Track II-The review did authorize the preparation to continue

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Other Decision (as needed)

B. Introduction and Context

Country Context

1. Papua New Guinea (PNG) is a lower-middle income country with a per capita GDP in 2015 of US$ 2,745, and arguably one of the most culturally and geographically diverse resource rich countries in the world. Its vast and varied geography includes mountains, tropical forests, grasslands, rivers, deltas, islands, and atolls. It has a wide variety of natural resources including petrochemicals and mineral deposits such as gold, copper, and nickel, as well as other non-mineral renewable resources such as fisheries, forests, and agricultural products such as coffee, cocoa, and palm oil. PNG ranks 32nd in subsoil wealth per capita globally. For energy, PNG has abundant hydropower potential in excess of 15,000MW and also solar power, natural gas, geothermal and other resources. With a population of around 7.5 million[1] and 848 languages, it is also one of the world's most culturally diverse nations.

2. While extractive industries have been the main driver of growth, there is a distinct dichotomy in the economy with the large majority of the population living in rural communities with limited access to public services. Extractives continue to account for an increasing share of exports and output. Natural resources, in 2015, were estimated to account for 47 percent of GDP. This represents an increase over 2013 of 7 percent. The increase in the contribution of natural resources to GDP and revenue receipts is due to the production and export of liquefied natural gas (LNG) in 2014.[2] Completion of the US$19 billion ExxonMobil LNG project has changed the structure of the economy. Mining and petrochemicals now account for 24 percent of GDP, almost the same as all other primary sectors combined, and 75 percent of exports. However, the mining and petroleum sectors only account for around 7 percent of total employment. In contrast, 87 percent Papua New Guineans live in rural communities, engaging in traditional subsistence and semi-subsistence agriculture in the informal sector. Anecdotal evidence also suggests the presence of a large informal economy centered mainly on the betel nut trade. Access to public services in these rural communities, including access to electricity, is extremely limited.

3. Limited services and economic opportunities in rural areas contribute to migration, increase stress on the urban population, and undermine the potential for inclusive growth. PNG has a young and growing, predominantly rural population which is urbanizing rapidly, and is mostly engaged in the informal sector.[3] With an age-dependency ratio for the young at 64 percent of the working population, the job creation challenge becomes critical, particularly because of the link between youth, limited educational opportunities, unemployment and lawlessness.[4] With limited services and economic opportunities in the rural areas, migration from rural to urban areas is increasingly putting stress on the norms of social cohesion and contributing to attendant problems (such as crime and violence) in the urban environment. A rapid and an increasing rate of urbanization is leading to overcrowding, poor housing conditions, high rents, poor sanitation and mushrooming development of informal settlements. The increase in urbanization is contributing to a range of problems threatening social cohesion, consequently undermining the potential for inclusive growth. In Port Moresby, about 40 percent of the population lives in settlements, 80 percent of which are unplanned. The lack of well-functioning inclusive institutions in the urban centers and lack of formal access to land, may be contributing to the exclusion of the informal settlements from access to basic delivery of public services and economic opportunities. It is therefore increasingly important to improve delivery of services, including electricity, in rural areas as well as in urban informal settlement areas.

[1] World Bank, World Development Indicators, July 2015.
[2] In May 2014, the first LNG exports were shipped from a massive project, led by ExxonMobil of the US, in the Western and Southern Highlands provinces.
[3] The country possesses a relatively young population with 38 percent of the total population below the age of 15 years and this is expected to grow rapidly in the next 20 years. Approximately 94 percent of the working-age population are employed in informal sector.
[4] Overall age-dependency ratio of 69 percent (World Bank, WDI).

4. Low capacity and weak governance may be hampering the ability of PNG's institutions to deliver public services for its population. PNG's Country Policy and Institutional Assessment (CPIA) score (a measure of a country's institutional strength) in 2016 is 3.0, which is below the average for International Development Assistance (IDA) countries (3.30). PNG, according to the World Governance Indicator (WGI), when compared to its peers across all measures of governance performs poorly at 28th percentile across the world and below 5 out of the 10 comparator countries.[5] This is a clear indication of the poor quality of state institutions in the country and suggests limited institutional capacity in PNG to formulate and effectively implement policies for sustainable and inclusive development.

5. Gender disparity, across a number of dimensions, is widespread. There are gender gaps in education, health, and nutrition influenced both *by gender-biased household actions* and *service delivery failures*. Girls and women do not enjoy the same level of literacy, school participation and health care. PNG's very high level of maternal mortality is another clear indication of significant gender disparity and inequity. Women suffer from weak voice and agency, are under-represented in the formal workforce and in political decision-making, and suffer from high rates of gender-based violence (GBV). Globally there is evidence to suggest an increased risk of HIV/AIDS among victims of gender based violence.

Sectoral and Institutional Context

6. Institutional setup of the power sector in PNG. Policy formulation for the power sector is managed by the Ministry of Petroleum and Energy (MPE) through the Energy Division of the Department of Petroleum and Energy (ED-DPE). ED-DPE monitors, reviews, and provides recommendations on fuel pricing, electricity tariffs, and Government charges and subsidies.[6] From an operational point of view, PNG Power Limited (PPL), the electricity utility, is a State Owned Entity (SOE) and is licensed under the Electricity Industry Act to generate, transmit, distribute and sell electricity in PNG and it also has exclusive right to supply small customers (<10 MW load) within 10 km of its network throughout PNG. It was established with the power and responsibilities to plan, develop, generate, transmit, distribute and sell electricity throughout PNG. A number of Independent Power Producers (IPPs) are also active in the country. The Department of Public Enterprise under the Ministry of Public Enterprises and State Investment is the delegated owner of all state owned Entities/Enterprises (SOEs) for and on behalf of the state, including PPL. Its role is to drive investments, productivity and transformation in SOEs so as to drive growth and industrialization through the Kumul Consolidated Holdings Limited (KCHL) - a trustee owner and all-encompassing authority for all state owned assets and enterprises.[7]

7. Despite having large energy resources, PNG suffers from low access to electricity, which limits opportunities for growth. PNG has significant underutilized indigenous energy sources such as hydropower, natural gas,

[5] Countries such as Ghana, Mongolia, Zambia, Lao PDR and Bolivia all perform better than PNG, while Mauritania, Nigeria, the Republic of Congo and Uzbekistan perform more poorly.

[6] It is also intended that DPE will take over the technical regulation function of the sector from PPL subject to the approval from the independent consumer competition committee (ICCC).The Independent Consumer Competition Commission (ICCC) is the principal economic regulator and the consumer watchdog.

[7] Kumul Consolidated Holdings (KCH) formerly the Independent Public business Corporation (IPBC) was formed in 2015 to act as trustee owner and all-encompassing authority for all state owned assets and enterprise's and to exercise, on behalf of the government and the benefit of the state, the trustee ownership, overarching business management, and provision of financial resources for certain state assets. The KCHL holds the shares for corporatized state entities as trustee of the General Business trust. The KCHL acts as the sole shareholder on behalf of the Government. The Minister for State Enterprises appoints a PPL Board that reports to KCHL. PPL, through the Board provides regular financial and operational reports and a Five-year Business Plan to KCHL on an annual basis.

geothermal, and solar-based power systems.[8] At the same time, the country has one of the lowest per capita consumption ratios of electricity in the world. It is estimated that only about 12.4% of the population has access to electricity in PNG, concentrated around the main urban centers with very limited access in rural areas. The lack of access to affordable and reliable power supply is also limiting economic growth in urban areas and smaller urban centers and contributing to poverty in rural areas. Low levels of access to an adequate supply of electricity limits the ability of children to study and to access school and health services, and exacerbates already severe personal security problems. More generally, it also hinders economic activities and the potential for growth, for example, by refrigeration of fish, pumped irrigation, processing of produce, and development of the tourism industry. The development of mining, for example, has been constrained by the lack of reliable power.

8. The current electricity network consists of several separate grids, with limited capacity and reach, and quality of service is low. PNG has about 580 megawatts (MW) of installed generation capacity, including hydropower (230 MW, or 39.7%), diesel (217 MW, or 37.4%), gas fired (82 MW, or 14.1%), and geothermal (53 MW, or 9.1%). PPL manages about 300 MW capacity and IPPs manage 280 MW. The 300 MW managed by PPL include two main grids located in Port Moresby, and in the Lae-Madang-Highlands area (the Ramu grid). In addition, 26 other smaller urban centers are serviced through 19 independent power systems. These independent provincial electricity grids are clustered around the regional population centers and isolated due to the rugged terrain of the country and long distances between centers making interconnectivity uneconomic. PPL has entered into power purchase agreements with a number of IPPs to supply PPL grids. Because of the unreliability of the power supply, there is considerable expensive and inefficient self-generation and back-up generation capacity in the urban areas. The network suffers from frequent power cuts, disrupting people's lives and businesses. The utility has also been unable to respond to the growing loads in demand on the main power grids (the Port Moresby and Ramu grids). Large industrial users, particularly mining sites, also operate off-grid self-generation. All these point to the need for better planning in the sector and the need for investment in generation and network capacities.

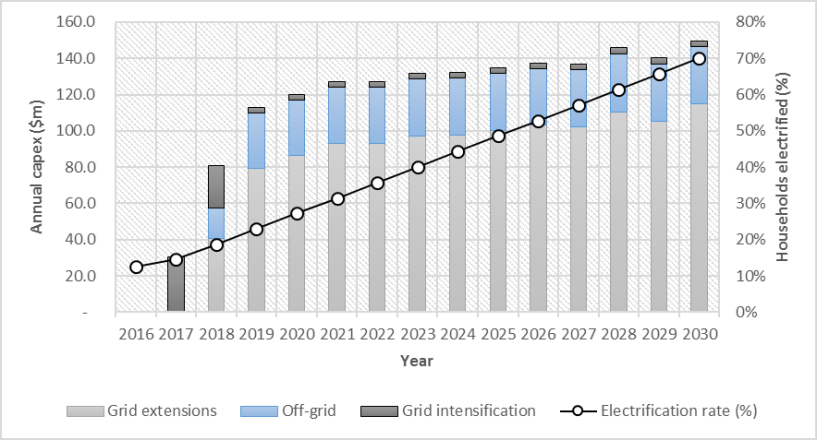
9. Recognizing the challenges ahead, Government has developed a National Electrification Roll-Out Plan (NEROP) with the Bank's support. The Government of PNG, under its Electricity Industry Policy (EIP) of 2011, Development Strategic Plans (DSP 2010-2030) and Vision 2050, has expressed the goal of attaining 70% access by 2030. Reaching that goal, however, needs careful and strategic planning. Geographical spread of the market for electricity in rural PNG, coupled with rugged terrain and very thin population density, makes it techno-economically unviable to develop grid connected rural electrification infrastructure in many parts the country.[9] With Bank support, the government has embarked on an exercise to prepare the NEROP for the country, and recently concluded the geospatial least-cost modeling, to understand how best to approach electrification in an efficient and cost effective manner. The study is currently being finalized for adoption by government. NEROP concluded that currently, about 12-13% of households in PNG are connected to the grid. An additional 6% could be easily

Results of spatial query	Current Grid Access (2016)				Program for 100% Electricity Access (Grid & Off-Grid) by 2030				
	Access Categories	Population (Households)	Percent		Recommended Type of Access and Investments	Population (Households)	Per-cent	Capex per HH	Total Capex (M)
Within range of LV connection: <1 km	**Customers:** grid access **with** PPL account	460,000	6%	19%	**EasyPay meters** for existing customers	460,000	4%	$260	$22
		90,000				90,000			
	Consumers: grid access **w/o** PPL account	460,000	6%		**Improved connections + EasyPay meters** for consumers	460,000	4%	$450	$39
		90,000				90,000			
	No grid access (calculated by difference)	540,000	7%		**Grid Intensification** (LV line + connection)	1,680,000	14%	$990	$272
		100,000				280,000			
Beyond range of LV connection: >1 km	**Requires new access** (grid or off-grid determined by geospatial model)	6,030,000	81%		Grid extension (MV, LV, connection)	6,790,000	55%	$1,680	$2,200
		1,160,000				1,320,000			
					Off-grid / Mini-Grid	2,950,000	24%	$1,160	$660
						570,000			
	Population	**7,630,000**	**100%**		**Population**	**12,330,000**	**100%**	**$1,370**	**$3,200**
	(Households)	**1,440,000**			**(Households)**	**2,330,000**			

[8] For example, less than 250MW of hydropower potential has been harnessed against the potential for more than 15,000 mentioned above.
[9] The task of rural electrification is made difficult by the fact that rural PNG is spread over a land mass with an area of 452,860 km2 and population density of just 15 persons per km2.

connected, as they are within 1 km of existing transformers. The remaining 81% are more distant (see Table for an indicative breakdown for the current population and projected population by 2030). Given the geography and settlement patterns of PNG's population, its growth projections for 2030, the exercise also concluded that grid electrification is the least-cost option for approximately ~75% of the nation's future population; while off-grid systems are recommended for the other ~25%.

10. Implementation of the NEROP will require large financial envelopes and the concerted efforts of various partners. The total cost of achieving government's access target of 70% electrification by 2030 is US$1.4 - 1.7 billion[10]. This investment cost equates to an average annual cost ranging between US$104 million and US$130 million from 2017 to 2030; and between US$1,035 and US$1,274 per household connected on average (see Figure). These figures are indicative; the more efficient PPL becomes, the lower the costs for rollout. At present PPL does not have the incentives to expand electrification to low income households and the current electrification program is dependent on externally funded programs ordered and financed explicitly by certain MPs for their constituencies. It is also unlikely that the utility will be able to generate sufficient resources through its normal operation to drive electrification levels anticipated by the government. Funds to cover investment costs for this program could be obtained by a combination of connection charges, government grants, and development partner grants or concessionary loans. Local governments could be able to top-up or fully cover the available funding for a particular scheme in their province, bringing forward the scheme to the top of the queue. Lowering or partially covering connection charges for low income households could also go a long way in facilitating access take up. Off-grid investments will constitute additional costs. Recovery of operating costs through the tariffs to be charged to end users is essential, and tariff adjustments may be needed to achieve this goal. In addition, it is also estimated that the NEROP will increase electricity demand by about 300MW by 2030, excluding additional commercial, industrial and mining projects which might appear from the country's electrification. The NEROP financial estimates are based on the assumption that generation continues to be available at US$0.10-0.12/kWh.[11] In the medium to long term the Government, possibly in partnership with the private sector, will need to invest in generation and transmission to be able to meet this increase in demand. Costing for generation and transmission is not included in the envelope above. Given the sheer scale of the required investments, concerted efforts of various partners will be needed.



11. Several partners are already active in the sector, and are eager to support NEROP implementation. Beyond the Bank, several partners are supporting PPL, namely the Asian Development Bank (ADB), JICA, Australian Government and New Zealand Government, in the areas of planning, grid reinforcement and extension, and financing of connections to households.[12] IFC is also supporting the private sector in rolling out modular solar homes systems in the

[10] These figures assume that PPL can reduce its cost by 20% and that generation continues to be available at US$0.10-0.12/kWh. They include both grid and off-grid, although the costs for off-grid are more uncertain as they will depend on the delivery model chosen (solar home system, diesel mini-grid, hybrid system etc.

[11] PNG Power currently produces power at an average cost of generation of about US$0.10-0.12/kWh (US$0.17/KWh total cost), a high cost primarily due to diesel fuel based power generation. Current domestic tariff is at US$0.30/kWh. Lower generation cost should contribute to reducing this tariff.

[12] ADB is providing support through the Town Electrification Investment project (TEIP) and the Port Moresby Grid reinforcement project; JICA is supporting the development of a transmission line master plan for the Ramu Grid and identified the need to reinforce the existing 132 kV between

central province and exploring grid connected commercial and industrial roof top solar systems. The Government plans to organize a partner roundtable over the next few [?] to present the final NEROP and gather support from partners for electrification scale-up in the country. Various partners have already expressed keen interest in contributing to NEROP's implementation. The program to be supported would most likely take the form of a series of projects financed by various partners over time.

12. There is a need for additional analytical work to complement NEROP. In order to operationalize NEROP in the medium term, government and the relevant institutions need to perform additional work on selection of technical standards for grid and off-grid extension, developing a detailed implementation plan, as well as prioritization, packaging and preparation of bidding documents, and studying the best mechanism to ensure financial sustainability of the program. Planning for generation and transmission investments is also required as several options and scenarios could be considered to meet this goal: further sector analysis is required to make load forecasts and determine the least-cost generation and transmission options required to meet PNG's power needs nationwide. The institutional arrangements for NEROP implementation will also need to be put in place, with adequate resources and capacity to deliver. ED-DPE is called to play an important role in planning and possibly in coordinating off-grid investments, but its capacity and ability to deliver is significantly constrained, with limited qualified staff. The Bank has secured funds from Australia to provide technical assistance in this regard, and it is expected that the support would start by mid-2017. The proposed complementary studies would establish the medium to long term planning for the sector and set the basis for future investments in generation, transmission, distribution and off-grid access that could be supported by government or by the Bank and other partners in future operations.

13. Immediate recommended focus for electrification and possibly additional generation. Despite the need for the additional analytical work mentioned above, and given the current extreme low electricity access rate, there is a possibility of initiating a program of investments, to be undertaken on the grid side in the immediate short term. In January 2016 the Bank received a request from the government to support the energy sector in the development of transmission and associated investments contributing to reaching 70% access by 2030.While developing the plans to be implemented in the years to come, there is a clear indication that the most cost-effective expansion of access and higher return investments stem from the connection of end-users that are within 1 km of existing grid lines and transformers. The investments to be supported by the project would therefore focus on connecting these customers. The proposed focus for the project is therefore to finance primarily extensions/rehabilitation of the distribution networks, household connections, and any reinforcements of transmission and distribution infrastructure that may be needed to handle the additional load. PPL is currently working on a data collection and initial screening exercise to identify sub-projects for grid extensions, including sub-projects to reach households. On the generation side, the least cost solution for the country would be determined through the studies to be launched soon. Meanwhile, the government could explore the addition of generation from financially sustainable sources, such as grid-connected solar, to be launched in a competitive manner.

14. PPL's operational performance and implementation capacity are weak and need support. PPL's operational performance is weak. The utility suffers from frequent changes in management, weak planning and implementation, and has seen its credibility decrease over time. Total losses currently stand at 20 percent. In order to minimize the investment and recurring costs for the project it will be important to improve PPL's efficiency and operational performance, and to reinforce planning and implementation capacity. Strong support will be provided under the project for planning and implementation capacity. Some actions are also proposed under the current project that would have an impact on PPL's

Ramu Hydropower station and the Taraka substation to enhance power supply reliability and stability of the Ramu grid; New Zealand is supporting the government and partnering with the ADB under the TEIP program by subsidizing the cost of household connections in certain areas and is also supporting the extension of distribution lines on the Port Moresby Grid in the central province, targeted at increasing energy access.

technical performance, but implementation of a more comprehensive program of reforms would need strong champions and clear government leadership.

C. Proposed Development Objective(s)

Note to Task Teams: The PDO has been pre-populated from the datasheet for the first time for your convenience. Please keep it up to date whenever it is changed in the datasheet.

15. The development objective is to increase access to grid electricity in the country.

Key Results (From PCN)

Progress will be measured against the following results indicators:

- Number of People provided with new electricity service through the project (number)
- Number of km of transmission and distribution lines constructed or rehabilitated

D. Concept Description

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SAFEGUARDS

A. Project location and salient physical characteristics relevant to the safeguard analysis (if known)

PNG Power Limited (PPL) two main grids located in Port Moresby, and Lae-Madang-Highlands areas (the Ramu grid) and 26 other smaller urban centers through 19 independent power systems. Component 1 will involve connection of new customers residing within one kilometre of the existing grid with the location of investments to be determined during implementation. Selection of investment locations will be in accordance with set criteria and this will include limited environmental and social impacts (eg. minimizing vegetation clearing or need to remove food crops). Eligible investment locations will be those that have existing rights of way/road connections between the transmission grid and the new customers.

B. Borrower's Institutional Capacity for Safeguard Policies

PPL's overall institutional capacity for project delivery is very weak and this extends to implementation of safeguards policies. Significant support for safeguards implementation will be provided through the hiring of an Owner's Engineer whom will be responsible for preparation of the environmental and social impact assessments and associated impact management plans, and monitoring of compliance and reporting. Specific support will also be provided for safeguards capacity building, including community engagement and consultations, to strengthen the capacity of PPL and other stakeholders in the management of environmental and social assessment and mitigation of impacts associated with distribution and substation projects. Specific support will also be provided through this component to address and

measure the gender dimensions of the project. The capacity of future civil works contractors will need to be demonstrated through the bid process in accordance with the environmental, social, health and safety (ESHS) provisions of the revised Standard Procurement Documents.

C. Environmental and Social Safeguards Specialists on the Team

Caroline Mary Sage, Ross James Butler, Nicholas John Valentine

D. Policies that might apply

Safeguard Policies	Triggered?	Explanation (Optional)
Environmental Assessment OP/BP 4.01	Yes	The Project is proposed as category B Partial Assessment as the potential environmental impacts are likely to be limited and reversible. Residual impacts can be readily mitigated by following good international industry practice. Civil works are relatively minor will mainly involve construction of medium voltage and low voltage lines to connect new customers; with siting along existing roads or other rights of way. Land acquisition or resettlement is not anticipated with impacts limited to minor vegetation removal to allow construction of poles and distribution lines. Within villages food trees may require removal and, if so, these would be compensated. Extensive citizen engagement will be required both in determining investment locations and siting of distribution infrastructure. As the specific locations for investments are not expected to be determined prior to appraisal an Environmental and Social Management Framework (ESMF) and Resettlement Policy Framework (RPF) will be prepared.
Natural Habitats OP/BP 4.04	No	Proposed investments will be screened to ensure that natural habitats are not significantly impacted by infrastructure siting. This will largely be achieved by siting infrastructure in existing disturbed corridors (eg. roads).
Forests OP/BP 4.36	No	Proposed investments will be screened to ensure that distribution infrastructure does not traverse natural forests.
Pest Management OP 4.09	No	The project will not involve the purchase or use of pesticides. All vegetation clearance during construction and operation will be undertaken manually.

Physical Cultural Resources OP/BP 4.11	Yes	This policy is triggered as a precaution. Although investments will be screened and designed to avoid areas of cultural or historical importance the possibility of PCR chance finds exists.
Indigenous Peoples OP/BP 4.10	Yes	The overwhelming majority of beneficiaries are expected to be Indigenous Peoples. A separate Indigenous Peoples' Plan (IPP) is not required, with IPP elements instead included in the overall project design, including steps for inclusive engagement, a participatory community needs assessment process, screening criteria, and documentation of broad community support and consensus.
Involuntary Resettlement OP/BP 4.12	Yes	The proposed new distribution infrastructure will be sited within existing rights-of-way such as roads. While these rights-of-way are likely to be situated on customary land it is anticipated that the voluntary land donation mechanism will be utilized to situate infrastructure such as distribution poles. Any crops and trees required to be removed to site distribution infrastructure will be compensated.
Safety of Dams OP/BP 4.37	No	NA
Projects on International Waterways OP/BP 7.50	No	NA
Projects in Disputed Areas OP/BP 7.60	No	NA

E. Safeguard Preparation Plan

Tentative target date for preparing the Appraisal Stage PID/ISDS

Feb 01, 2018

Time frame for launching and completing the safeguard-related studies that may be needed. The specific studies and their timing should be specified in the Appraisal Stage PID/ISDS

ESMF, plan to finish by February 2018.

A social assessment will be undertaken during project preparation to inform the project design and safeguard instruments. This assessment would be combined with the barriers to entry and gender survey. The social assessment will also include an assessment of the social acceptability of the proposed interventions.

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APPROVAL

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