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INTEGRATED SAFEGUARDS DATA SHEET
APPRAISAL STAGE

Report No.: ISDSA2447

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I. BASIC INFORMATION

1. Basic Project Data

Country:	Papua New Guinea	**Project ID:**	P101578
Project Name:	PNG Energy Sector Development Project (P101578)		
Task Team Leader:	Wendy E. Hughes		
Estimated Appraisal Date:	17-Feb-2011	**Estimated Board Date:**	21-Feb-2013
Managing Unit:	EASNS	**Lending Instrument:**	Specific Investment Loan
Sector:	Other Renewable Energy (100%)		
Theme:	Infrastructure services for private sector development (70%), Rural services and infrastructure (30%)		
Is this project processed under OP 8.50 (Emergency Recovery) or OP 8.00 (Rapid Response to Crises and Emergencies)?	No		

Project Financing Data (in USD Million)			
Total Project Cost:	9.25	Total Bank Financing:	7.30
Total Cofinancing:		Financing Gap:	0.90

Financing Source	**Amount**
BORROWER/RECIPIENT	1.05
International Development Association (IDA)	7.30
Global Environment Facility	0.90
Total	9.25

Environmental Category:	B - Partial Assessment
Is this a Repeater project?	No
Is this a Transferred project?	No

2. Current Project Development Objectives

Project Development objective:

The proposed Project development objectives (PDO) are to (i) strengthen policy development and

strategic framework for renewable energy and rural electrification; and (ii) to attract investors for sustainable development of new hydropower generation to supply to the Port Moresby electricity grid.

3. Project Description

The project would consist of two components:

- Component 1: Institutional and Policy Development for Renewable Energy and Rural Electrification would be implemented by the Department of Petroleum and Energy, the Energy Division. This would focus on policy development (Renewable Energy and Rural Electrification), institutional and strategy development (Strategic Environmental and Social Assessment and Rural Electrification Strategy), and capacity strengthening for the GoPNG's role in development of the Naoro Brown hydropower project and other hydropower projects that may be considered in the medium term. Strong emphasis would be placed on an inclusive, gender-sensitive consultation process as an integral part of the policy and strategy development. Component 1 includes an allocation for operating costs which could contribute to the initial establishment of these three Energy Division regional offices. Key activities would include:

Energy Policy Development
- o Renewable Energy policy.
- o Rural Electrification Policy.

Institutional and Strategy Development
- o Rural Electrification Strategy.
- o Strategic Environment and Social Assessment.

Capacity Strengthening for GoPNG role in hydropower
- o Specialist support for targeted activities related to GoPNG role in hydropower development.

Project Management Support
- o Assistant PMU manager.
- o Procurement specialist.
- o Financial management specialist.

- Component 2: Technical Assistance for Preparation and Planning for Port Moresby Hydropower Supply will be implemented by PNG Power Ltd., with two sub-components. The first focuses on activities required to prepare the Naoro Brown hydropower project (approximately 80MW) to supply the Port Moresby grid. The concept proposed for development of the Naoro Brown hydropower project is a private sector-led approach. This is in line with the Electricity Industry Policy, and reflects the fact that PNG Power does not have the resources to develop this as a public sector project. The second sub-component focuses on activities to improve PNG Power's planning with respect to hydropower:

- o Preparation of the Naoro Brown hydropower project for Port Moresby.

- o Improved project management and planning related to hydropower supply for Port Moresby.

Component 1: Institutional and Policy Development for Renewable Energy and Rural Electrification.
Implementing Agency: Department of Petroleum and Energy (Energy Division).

Energy Policy Development

o Renewable Energy Policy. The GoPNG is preparing a plan for Climate-Compatible Development. An Office of Climate Change and Development (OCCD) has been created. An Interim Action Plan for Climate Compatible Development was prepared in June 2010 and has been circulated for public consultation. It prioritizes readiness activities for a future Reduction in Emissions from Deforestation and Forest Degradation (REDD) while seeking economic growth opportunities that minimize future emissions. The Renewable Energy Policy will be developed within the framework of the overall Climate-Compatible Development plan. This activity would support consultations and consensus-building among stakeholders including the OCCD's technical working group on Low Carbon Growth, and drafting of the policy document.

o Rural Electrification Policy. A draft policy was prepared in 2004 but never finalized. This activity would include review and updating of the draft policy, taking into account the many developments in the sector since the draft was prepared. It includes support for consultations and consensus-building among stakeholders.

Institutional and Strategy Development

• A Strategic Environmental and Social Assessment (SESA) would be prepared as an input to downstream implementation of both the Renewable Energy Policy and the Rural Electrification Policy. The SESA would assess the implications of these policies and make recommendations regarding (i) the establishment of the requisite institutional, regulatory and decentralization framework, (ii) integration of the management of any environmental and social issues into subsequent planning decisions for the location and scale of energy investments, alternatives, mitigation measuresand monitoring activities.

o Preparation of a Rural Electrification Strategy. In the GoPNG planning documents and the Electricity Industry Policy (EIP), increasing access to affordable reliable electricity supply is highlighted as a priority to achieve broad-based economic development and improved standards of living. While there is room for improvement in the urban centers, the supply of electricity in rural areas is very limited. The rural electrification strategy will consider the full range of options for increasing access, including grid extension, mini-grid and off-grid approaches, and the roles of public sector, private sector and NGO and community organizations. One aspect of the strategy – in line with the EIP –would likely include efforts to attract private sector to supply non-commercially viable areas through a competitive process based on the lowest level of subsidy required. Important elements to be included in the rural electrification strategy include (i) a reasonable definition of the projects / opportunities to be offered and (ii) an assessment of the different cost structures and levels of service provision characteristic of the range of resources and supply models that might be appropriate across PNG, as an input to the tariff-setting process; (iii) a process for screening social and environmental aspects of rural electrification projects.

A number of entities are already involved in implementing electrification projects in areas outside the main grids. Incorporating the experience from on-going initiatives would be an important element in developing the strategy. Input from potential participants and beneficiaries would be critical. Elements of the strategy preparation would include:

o GIS Stocktaking and Development of a Stage 1 "Potential Rural Electrification Projects" Database. This would involve preparation of Geographic Information System (GIS) database overlays

of population, infrastructure (e.g., roads, energy infrastructure, telecoms) and possible renewable energy resources (e.g., for small scale hydropower).

o Analysis of alternative models of community and rural electrification projects including cost structure, as an input to the ICCC (Independent Consumer and Competition Commission) process of developing tariffs for electricity supply in areas outside the PNG Power exclusive supply areas.

o Environmental and Social Screening methodology for rural electrification projects.

Strong emphasis would be placed on an inclusive, gender-sensitive consultation process as an integral part of the policy and strategy development. DPE intends to open regional offices in Kokopo, Mt. Hagen and Lae as part of fulfilling DPE's mandate under the Electricity Industry Policy. These regional offices will provide a full-time presence for the Energy Division of DPE in the regions and, among other functions, will serve as the regional centers for coordinating consultations on the policy and strategy development supported under the proposed Project. Component 1 includes an allocation for operating costs which could contribute to the initial establishment of these three Energy Division regional offices.

Capacity Strengthening.

- Preparing for DPE / GoPNG role in new hydropower power generation developments. In the future, GoPNG as the custodian of the national water resources will likely play a pivotal role in several aspects of the development of new hydropower, including the Naoro Brown Hydropower Project, which could require specialist expertise. This activity would provide initial specialist support for targeted activities related to GoPNG's role in hydropower development. Additional specific activities including training would be defined as and when new projects move forward.

- Project Management Support, including, hiring an Assistant PMU manager, Procurement specialist, and Financial Management specialist as needed.

Component 2: Technical Assistance for Preparation and Planning for Port Moresby Hydropower Supply. Implementing Agency: PNG Power.

Past studies have established the potential for hydropower development on both the Brown River and the adjacent Vanapa River. As demand for electricity in Port Moresby grows, it is anticipated that a series of hydropower plants may be developed. Taking into account the long lead times in developing hydropower projects, initial activities to prepare the Naoro Brown Hydropower Project and assess the potential for and optimal sequencing of subsequent projects are included in the proposed project. Two sub-components are proposed.

Preparation of the Naoro Brown Hydropower Project for Port Moresby.

Generation from new hydropower will be significantly less expensive than the cost of generating electricity from diesel, the only feasible alternative currently available (as there is currently no provision for domestic natural gas supply in Port Moresby). The GoPNG and PNG Power are interested to develop lower cost hydropower generation as soon as possible. Moreover, hydropower is a clean and renewable energy resource. PNG Power has hired international consultants to undertake the feasibility study of the Naoro Brown Hydropower Project to supply the Port Moresby grid with about 80 MW. The feasibility study was largely completed in late 2011, although some further work, including drilling to test grouting solutions to address seepage identified in phase 2 of

the feasibility study, is still required. The concept proposed for development of the Naoro Brown Hydropower Project is a private sector-led approach. This is in line with the Electricity Industry Policy approved in December 2011, and reflects the fact that PNG Power does not have the resources to develop this as a public sector project. A properly structured IPP (Independent Power producer)/PPP would additionally enable shifting of commercial risks to the private sector and benefit from construction and operational expertise of the private sector.

Given the imperative to move forward with development of new hydropower to supply Port Moresby as soon as possible, the proposed approach is as follows:

- PNG Power, the key state entity currently with skilled manpower and power sector-related expertise, would manage the process for developing the IPP/PPP.

- The Electricity Management Committee (EMC), chaired by the Secretary for Petroleum and Energy, will be the key supervising and decision-making body. The other permanent members of the EMC include the Secretaries for Treasury and Planning and the Managing Director for the Independent Public Business Corporation (IPBC) and a representative from the PNG Chamber of Commerce and Industry. Other members (for example, from the Department of Environment and Conservation or the ICCC) may be co-opted to the Committee as required. The EMC will be supported by a secretariat housed in the Energy Division (Department of Petroleum and Energy). A working-level committee has also been established that will report to the EMC and so it is likely that recommendations on the Naoro Brown Hydropower Project will first be reviewed by this working group before being submitted to the EMC for a final decision. As and when the PPP Center in Treasury is established, designated staff may be invited to join the EMC itself or its working group. PNG Power would report to the EMC or its working group on a regular basis so that the Committee is well-informed regarding the progress and issues as decision points are reached.

- Consultants hired by PNG Power largely completed the feasibility study in late 2011, although some further work to assess options to address seepage is required.

- PNG Power would implement a Naoro Brown Communication and Consultation Plan for potential Project-affected People (PAPs) and other stakeholders. With advice from the WB and input from the Electricity Management Committee and stakeholder consultation, PNG Power would prepare TOR for the safeguards-related aspects of the project, to be undertaken by the selected Naoro Brown Hydropower Project Developer.

- PNG Power would hire financial, technical and legal advisors ("Transaction Advisors").

- PNG Power would hire Panels of Experts (dam safety and social / environmental). Once the Naoro Brown Hydropower Project Developer is in place, maintaining these Expert panels will become the Developer's responsibility (and will be included in the bidding and legal agreements).

- With the assistance of the advisors and under the oversight of the Electricity Management Committee, PNG Power would undertake a transparent process to select a private sector Naoro Brown Hydropower Project Developer.

- The Developer would be responsible for the social and environmental impact studies, as per the prepared TOR, in coordination with the detailed design work.

- Day-to-day supervision of the Developer regarding the technical, social and environmental aspects would be the responsibility of PNG Power (with specialist support). The Electricity

Management Committee would provide overall guidance as appropriate. With regard to the environmental aspects, Department of Environment and Conservation would exercise their responsibility for reviewing and approving the EIA and EMP. As per the EIP, the technical regulator (under the EIP this role is intended to be transferred from PNG Power to DPE) would enforce environmental and safety regulation in the electricity industry as an added component to its technical regulatory functions. This function would be carried out in close consultation with DEC. As economic regulator, ICCC would be provided with current information to help ensure that ICCC remains abreast of the preparation and is able to draw attention early on to any issues which may need to be addressed with respect to the regulatory process.

- Once the required GoPNG approvals are in place, the Developer would mobilize financing for the Naoro Brown Hydropower Project. It is expected that the financing would be limited recourse on the basis of a long-term power purchase agreement (PPA) which would commit PNG Power to buy the electricity generated and/or capacity made available by the projec t. Based on the advice from PNG Power's transaction advisors and the decision of the GoPNG, through the Electricity Management Committee, the financing for the project could include some public equity. It could also include some concessional borrowing and / or guarantees to supplement commercial lending and improve the terms and extend the tenor of the commercial financing to achieve a sustainable tariff. ICCC, responsible for economic regulation, would have a role in approving the pass-through of PNG Power's costs under the PPA to consumers.

- Following financial close the Naoro Brown Hydropower Project would be constructed and operated by the Developer and begin commercial operation supplying electricity to the Port Moresby grid.

- One option to be considered is a "Build Own Operate Transfer" (BOOT) approach, in which ownership of the project would be transferred to GoPNG at the end of a specified concession period, *e.g.*, 25 years. The lifetime of the asset would be significantly longer than that if properly maintained, thus providing the government with an operating asset with considerable residual lifetime. PNG Power, as power purchaser, would also have a key role in reviewing the Operation Strategy and would dispatch the power and energy from the Project. In a BOOT arrangement PNG Power would also carefully review maintenance arrangements since the project would eventually pass to GoPNG.

Activities to be financed under the proposed Project related to the preparation of the Naoro Brown project to supply Port Moresby would include:

o Naoro Brown Transaction Advisors (legal, technical and financial). As part of the advisory work, financial advisors would assist PNG Power in determining the tariff implications of the Power Purchase Agreement;

o Additional feasibility study work (i.e. Preparation of Geological Baseline Survey including additional drilling to assess options for limiting seepage from the reservoir and, subject to further review, possibly some drilling along the tunnel route, and information dissemination with affected communities);

o Preliminary social assessment, including information sharing and consultation strategy, land owner identification, land use mapping and consultations;

o Resettlement Policy Framework;

o Project Economic Analysis;

o Dam Safety Expert panel. (Once the Developer is in place, this would become the responsibility of the Developer);

o Social and Environmental Expert Panel. (Once the Developer is in place, this would become the responsibility of the Developer);

o Social and Environmental specialists;

o Communications consultant;

o Environmental baseline survey work;

o Other preparation activities and specialist support identified during implementation, for example additional preparation work following the completion of the feasibility study and as might be recommended once the transaction advisors are in place;

o Project Management support.

Improved Planning Related to Hydropower Supply for Port Moresby

Proposed activities related to the improved planning and identification of subsequent hydropower projects for supply to Port Moresby would include:

o Three-basin inventory study of the Brown, Vanapa and Angabanga basins;

o Training, institutional strengthening and capacity building in areas critical for implementation of improved performance and implementation of the next hydropower project. This could include planning capacity, project evaluation and preparation and negotiation of power purchase agreements.

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

Component 1 of the proposed PNG Energy Sector Development Project will address national policies which will be applied throughout Papua New Guinea. Component 2 of the proposed PNG Energy Sector Development Project focuses specifically on preparation of the Naoro Brown Hydropower Project and subsequent planning to supply the Port Moresby grid. This component would focus on the preparation of the Naoro Brown Hydropower Project, and help identify optimal sequencing of future hydropower options for Port Moresby through a three-basin inventory study of the Brown, Vanapa and Angabanga basins.

The Naoro Brown project is located in the upper reaches of the Naoro Brown catchment area comprising approximately 274 square km. within the Kairuku-Hiri District of the Central Province. Within this District, the Naoro Brown project area comprises five Wards of the Koiari Rural Local-Level Government. The Naoro Brown project area is characterized by a very low population density of around 5 persons per sq. km. and dispersed small settlements. There are 14 villages of which 13 are inhabited by Mountain Koiari, while a cluster of settlements at Edebu at the lower end of the project area also include some Mountain Koiari, who have settled from locations outside the Naoro Brown catchment area. According to the 2000 Census, the resident population in the project area is

1,415, and another 8,737 persons have migrated from the area to Port Moresby and other locations. Livelihoods in the Naoro Brown catchment area are based on subsistence shifting cultivation supplemented by use of natural resources (e.g., fishing in the rivers). The outmigration from the area is due to lack of income opportunities together with lack of education and health services. The migrants retain links to their villages of origin including land rights.

The Naoro Brown Hydropower Project is expected to include the physical components described below. The exact dimensions of these components would be determined by the engineering design by the selected Naoro Brown Project Developer.

1. A gravity concrete dam with a height of about 19 meters, which will create a reservoir of around 14 million cubic meters inundating an estimated 150 hectares upstream of the Madilogo village.
2. A tunnel with an estimated length of 10 km between the dam site on the Naoro river and the power station on the Brown river.
3. A 2 km power tunnel at the power station site.
4. A surface power station on the left bank of the Brown River. No settlements appear to be located at or near the proposed power station site.
5. An access road of an estimated 50 km from Edebu to the sites of the dam and power station (the alignment is still to be decided, but will likely mostly follow old logging roads) and possibly to intermediate points on the tunnel route.
6. Electricity transmission lines to the Port Moresby grid.
7. Construction related impacts comprising the construction camp(s), material excavation sites, and sites for dumping of spoils.

5. Environmental and Social Safeguards Specialists on the Team

Mark C. Woodward (EASER)

James Orehmie Monday (EASTS)

6. Safeguard Policies	Triggered?	Explanation (Optional)
Environmental Assessment OP/BP 4.01	**Yes**	The proposed WB-financed PNG Energy Sector Development Project requires an Environmental and Social Management Framework. This has been completed and disclosed. Development of the Naoro Brown hydropower project (for which preparation support is included in the proposed PNG Energy Sector Development Project), requires a full Environment and Social Impact Assessment. The ESIA for the Naoro Brown Hydropower Development Project will be carried out during implementation of the proposed PNG Energy Sector Development Project. The Strategic Environmental and Social Assessment which will inform the Renewable Electrification Policy and the Rural Electrification Policy will provide recommendations on consultations with

		local communities to establish their broad support for management of potential environmental impacts related to energy investments.
Natural Habitats OP/BP 4.04	**No**	However, this policy could potentially be triggered by the development of the Naoro Brown Hydropower Project.
Forests OP/BP 4.36	**No**	However, this policy could potentially be triggered by the development of the Naoro Brown Hydropower Project.
Pest Management OP 4.09	**No**	
Physical Cultural Resources OP/BP 4.11	**No**	
Indigenous Peoples OP/BP 4.10	**No**	The proposed WB-financed PNG Energy Sector Development Project does not require an Indigenous Peoples Plan. Development of the Naoro Brown Hydropower Project (for which preparation support is included in the proposed Project), would require an Indigenous Peoples Plan. The Indigenous Peoples' Plan for the Naoro Brown Hydropower Project will be carried out during implementation of the proposed PNG Energy Sector Development Project. The Strategic Environmental and Social Assessment which will inform the Renewable Electrification Policy and Rural Electrification Policy will provide recommendations on consultations with local communities to establish their broad support for management of impacts, and compensation and benefit sharing related to energy investments.
Involuntary Resettlement OP/BP 4.12	**No**	The proposed WB-financed PNG Energy Sector Development Project does not require a RPF / RAP. Development of the Naoro Brown hydropower project (for which preparation support is included in the proposed Project), would require both a RPF and RAP. These will be developed during implementation of the proposed PNG Energy Sector Development Project. The Strategic Environmental and Social Assessment which will inform the Renewable Electrification Policy and the Rural Electrification Policy will provide recommendations on consultations with

		local communities to establish their broad support for management of impacts related to access to land for energy investments.
Safety of Dams OP/BP 4.37	**No**	The proposed WB-financed PNG Energy Sector Development Project does not require a Dam Safety Plan. Development of the Naoro Brown Hydropower Project (for which preparation support is included in the proposed Project), would require a Dam Safety Plan. The Naoro Brown Dam Safety Plan will be developed during implementation of the proposed PNG Energy Sector Development Project.
Projects on International Waterways OP/BP 7.50	**No**	
Projects in Disputed Areas OP/BP 7.60	**No**	

II. Key Safeguard Policy Issues and Their Management

A. Summary of Key Safeguard Issues

1. Describe any safeguard issues and impacts associated with the Restructured project. Identify and describe any potential large scale, significant and/or irreversible impacts:

1. Summary of Key Safeguard Issues

The proposed Project would finance technical assistance, not investments. However, part of the technical assistance related to additional feasibility study activities would involve drilling a series of holes on the right abutment of the proposed dam site for grouting trials, to determine the feasibility of a grouting solution to the seepage identified during phase 2 of the feasibility study. Consultations would be undertaken before mobilizing the drilling services, and appropriate measures put in place in accordance with the process set out in the Environmental and Social Management Framework (ESMF). Consideration will be given to transporting the drilling equipment to the site by helicopter. If this is not technically or financially feasible, PPL would upgrade the existing road to the site. Procedures to be followed in this instance – including consultations – are set out in the ESMF.

Activities supported under Component 2 of the Project are aimed at catalyzing the development of the Naoro Brown Hydropower Project. Development of the Naoro Brown Hydropower Project would have social and environmental impacts. The technical assistance includes providing technical advice and guidance to GoPNG, PNG Power and the selected Naoro Brown Hydropower Project Developer on assessing, addressing and mitigating potential social and environmental impacts. Safeguards documents and studies financed under the proposed PNG Energy Sector Development Project would be prepared in compliance with WB standards and safeguards policies, as well as meeting PNG requirements. Any civil works related to the Naoro Brown Hydropower Project undertaken while this proposed PNG Energy Sector Development Project is under implementation would be undertaken in compliance with WB policies, even if WB is not financing the civil works. During the period of implementation of the proposed PNG Energy Sector Development Project, WB would provide review of all safeguard documents related to the Naoro Brown Hydropower Project. The selected Naoro Brown Hydropower Project Developer would be legally obligated to develop the hydropower project in accordance with the approach set out during preparation.

Also, the proposed PNG Energy Sector Development Project would finance other TA activities that will inter alia support preparation of a Renewable Energy Policy, Rural Electrification Policy, Rural Electrification Strategy, and a three-basin inventory study of hydropower potential.

1.1 Key safeguards issues for consideration in preparation of the Naoro Brown Hydropower Project:

The Environment and Social Management Framework is the safeguards instrument for the proposed Project. The ESMF sets out the approach to addressing safeguards aspects for the overall PNG Energy Sector Development Project. It covers both Component 1, which focuses on policy and strategy development, and Component 2 which provides technical assistance for the preparation of the Naoro Brown Hydropower Project and improved project management and planning related to hydropower to supply Port Moresby. The ESMF sets out the approach to identifying and addressing potential social and environmental aspects, including -inter alia- the public consultation and communication strategy, and the institutional arrangements.

The environmental safeguard policy that is triggered by the proposed PNG Energy Sector Development Project is OP 4.01: Environmental Assessment and has been assigned an EA Category B. The Environment and Social Management Framework (ESMF) is the safeguards instrument for the proposed Project.

The environmental safeguard policies that would be triggered by development of the Naoro Brown Hydropower Project, if the WB were to be involved in financing the development, are OP 4.01: Environmental Assessment; OP 4.04: Natural Habitats; Safety of Dams OP4.37; and potentially OP 4.36: Forests (whether or not this policy would be triggered would be determined during further preparation of the Naoro Brown Hydropower Project). Environmental Safeguards Documents required to be developed once the Naoro Brown Hydropower project Developer is in place are the Environment and Social Impact Assessment (ESIA), Environmental Management Plan (EMP); and Dam Safety Plan. Terms of Reference for these activities, developed to be in compliance with WB safeguard guidelines, will be included in the bidding documents for the selection of the Naoro Brown Hydropower Project Developer, and in the legal agreement with the selected Developer.

The Environmental and Social Management Framework (ESMF) sets out the list and broad scope of studies and safeguards instruments to be prepared during implementation of the proposed Project; institutional arrangements defining the roles and responsibilities for safeguards compliance, and the approach to public consultation.

The social safeguard policies that would be triggered by development of the Naoro Brown Hydropower project - if the WB were to be involved in financing the development of the Naoro Brown Hydropower Project - are OP4.10: Indigenous Peoples; and OP4.12 Involuntary Resettlement; and potentially OP 4.11 Physical Cultural Resources. The social safeguards documents required to be developed once the Naoro Brown Hydropower project Developer is in place are: the Environment and Social Impact Assessment (ESIA) including an Information and Consultation Strategy; Resettlement Policy Framework (RPF); and Resettlement Action Plan (RAP). Terms of Reference for these activities, developed to be in compliance with WB safeguard guidelines, will be included in the bidding documents for the selection of the Naoro Brown Hydropower Project Developer and in the legal agreement with the selected Developer.

Key environmental issues: With respect to the future development of the Naoro Brown Hydropower Project, environmental impacts would occur in the construction, operations and maintenance phases of the Naoro Brown project and would occur in locations including the upstream catchment area and the reservoir, the dam site, tunnel corridor and power plant location, a section of the Naoro River immediately downstream of the dam that will experience significantly reduced flows, and the corridors of the transmission line and access roads. Impacted areas would also include the construction areas where workers would be camped, quarry areas, spoil disposal areas and construction equipment service areas. In-migration could increase the prevalence of HIV and workers could destroy vegetation for firewood and eat the local wildlife. Given the mountainous nature of the terrain, erosion and sedimentation issues would need to be evaluated and managed in all areas during project construction, operation and maintenance, including ensuring slope areas are well protected and drained. Managing water quality in the reservoir and ensuring adequate environmental/riparian flows are also issues to be evaluated and managed carefully.

Initial, preliminary baseline surveys were conducted as part of the Naoro Brown feasibility study. The terrestrial flora survey indicated mostly secondary forest in the project area, although the tunnel route, penstocks and power station areas have primary forest. There is a high plant diversity, all relatively common in PNG. There is a rich biodiversity in terrestrial fauna including a number of International Union for Conservation of Narure (IUCN)-listed species (endangered, threatened, vulnerable) that were either sighted or for which anecdotal reports were provided. In terms of aquatic environment, Upper Brown and Naoro Rivers typically have poorly developed aquatic flora. Five species of fish were identified, of which one was identified as important as it is the only mullet species that lives in rapid-flowing streams and rivers in hilly terrain. No species 'alerts' from the IUCN status list were indicated.

It was reported from the local inhabitants interviewed during the Naoro Brown field survey that the Naoro Brown project sites do not possess any particularly important species or communities that are stringently site-restricted.

Physical cultural resource issues: There is currently no information available on archaeological or other physical cultural resource sites within the proposed Naoro Brown project area. A survey of the existing literature found that "archaeological research within the [Kokoda Track] project area has been sporadic and restricted almost entirely to surveys of rock art sites and occasional test excavations of rock shelters, with little result". The known sites are all located on the Sogeri Plateau and in the Laloki valley outside the Naoro Brown project area. However, the presence of these sites close to the Naoro Brown project area together with the very sporadic archaeological exploration suggests that similar sites may exist within the Naoro Brown catchment area. In addition, the contemporary culture of the population in the project area - the Mountain Koiari – will include structures and/or places of spiritual and religious importance. Impacts, if any, on archaeological or contemporary sites of cultural importance are still to be determined (this will be covered as part of the ESIA, and if necessary, the EMP). In any case, procedures will be specified in case chance finds of any artifacts/sites of archeological significance occur during construction.

Key social issues: Direct physical impact by development of the Naoro Brown Hydropower Project on the population and landscape is expected to be fairly modest if properly managed. The Naoro Brown project would have land acquisition impacts deriving from the civil works comprising the dam, reservoir, access roads, and the transmission line. In addition, there would be construction related impacts from the construction labor camp(s), material excavation sites, and sites for dumping of spoils, which all will require land either temporarily or permanently. Displacement and resettlement is not anticipated, but a final determination can only be made when the technical design of the Naoro Brown

Hydropower installations including construction labor camp(s), road(s), and transmission line is more advanced. The Madilogo village (2000 Census: population 54) is located near the proposed Naoro Brown dam site, and the villages of Ebologo (pop. 89) and Naoro (pop. 40) are located near the reservoir area. Since the land, water, and other natural resources in the Naoro Brown project area are all held under customary tenure arrangements by the local communities, both the land required for specific civil works components and the access to use the area and its water resources for the Naoro Brown project will require agreements on entitlements to customary land owners and settlers with permissive rights granted in the past.

The population in the project area - the Mountain Koiari – shares the four characteristics that identify indigenous peoples. The basis for reaching agreement on entitlements for land acquisition and for long-term use of the area for hydropower will be the establishment of arrangements which enable a process of free, prior, and informed consultation that starts early in the preparation phase and that results in broad community support for the project. The parties to this consultation process will on the one hand be PNG Power and later the selected Naoro Brown Project Developer, and on the other hand the population in the project area comprising communities in the upper Naoro Brown catchment area that own or have interests in the land, water, and other natural resources.

Since little is documented about socio-economic and cultural conditions in the Naoro Brown project area, a social impact assessment is required to furnish the information that will inform (a) the design of an information and consultation strategy applicable to the preparation, implementation, and operation of the project, (b) the determination of the full range of social impacts and the people impacted by the project, (c) the development of a Naoro Brown Land Acquisition and Resettlement Policy Framework that lays out the principles for management of land acquisition impacts and access to use land and water in the project area, and (d) the development of a Naoro Brown Resettlement Action Plan (or Abbreviated Resettlement Plan) to manage the actual land acquisition and any resettlement that might be required. This will be included as part of the ESIA to be prepared by the developer.

1.2 Key safeguards issues for the three-basin inventory

The three-basin inventory study will take into account technical, environmental and social issues in scoping potential hydropower projects.

1.3 Key safeguards issues for the Renewable Energy and Rural Electrification policies:

Implementation of both the Renewable Energy Policy and the Rural Electrification Policy has potential environmental and social implications. A Strategic Environmental and Social Assessment (SESA) will be conducted to assess these implications and make recommendations regarding (i) the establishment of the requisite institutional, regulatory and decentralization framework, (ii) integration of the management of any environmental and social issues into subsequent planning decisions for the location and scale of energy investments, alternatives, mitigation measures and monitoring activities.

2. Describe any potential indirect and/or long term impacts due to anticipated future activities in the project area:

Potential indirect and / or long term impacts would be associated with future development of the Naoro Brown Hydropower Project.

If the Naoro Brown Hydropower Project is developed, no negative significant long-term social impacts are anticipated presently from future activities in the Naoro Brown project area. Instead, it is expected that the information and consultation strategy would lead to agreements between the local

population and the Naoro Brown Project developer which would include leases and benefit sharing arrangements that would have a positive impact on development and living standards in the Naoro Brown project area.

However, long term environmental impacts from development of the Naoro Brown hydropower project are possible and may include effects from the morphology of the channel of the Naoro River immediately downstream of the dam site, and from impacts associated with erosion and sedimentation in the catchment area and along the corridors of the access roads if these are left unmitigated. While the access road to the Naoro Brown project site will likely follow the alignment of an old and abandoned logging road, longer term induced impacts associated with the Naoro Brown Project could involve the access roads potentially opening up access to forest areas in the Naoro and Brown river watersheds that were previously difficult to access.

3. Describe any project alternatives (if relevant) considered to help avoid or minimize adverse impacts.

With respect to the technical assistance under the proposed PNG Energy Sector Development Project, Component 2 to support the preparation of the Naoro Brown Hydropower Project, in terms of alternative sources of energy, the only alternative in the time-frame of the proposed Naoro Brown project is diesel-fired generation. This is significantly more expensive than the anticipated cost of new hydropower. Other potential hydropower projects have been considered in past studies. For reasons including the matching of new supply to demand, and because the Naoro Brown project is located closer to Port Moresby, these earlier studies concluded that development of hydropower on the Brown River would be the best choice for commencing hydropower development. This conclusion is still considered valid. In addition, because the feasibility study of the Naoro Brown project is advanced it would be expected to provide supply to the Port Moresby grid well ahead of any other hydro project.

One possible option for the configuration of the Naoro Brown Hydropower Project would involve a relatively large storage area. This option was discarded early on because of the flooding of the Kokoda Trail (a trail of historic and cultural significance largely due to the part it played in WWII) that would result. It has been agreed that development of the Naoro Brown project would not flood any part of the Kokoda Trail and this constraint is built into the feasibility study.

Three possible arrangements for the Naoro Brown Hydropower Project, regarding the location of the dam, tunnel and power plant were considered in the preliminary feasibility report:

- Upstream Option: Dam site upstream of an identified water loss area (i.e., just upstream of Madilogo Village);
- Downstream Option: Dam site downstream of Madilogo village;
- Vabuiagi Option: Dam site downstream of the confluence of the Naoro River with the Vabuiagi (also called Fagume) River .

Based on considerations of dam height and storage, gross head, energy output, tunnel length and access the recommended arrangement is the Upstream Option. Compared to the Upstream Option, the Downstream option has similar tunnel and access road lengths, but poor storage and about 12% less energy output than the Upstream Option. The Vabuiagi option would require a much higher dam (64m compared to 19m), would flood a larger area, would require an extra 20km of access road and would produce about 30% less energy.

The preferred arrangement is essentially run-of-river, providing only weekly storage which would result in advantages (compared to no storage) including an increase in the electricity output from the

available head and flow and improvements to the overall system operation of the Port Moresby grid.

Further detail in provided in Annex 6 of the PNG Energy Sector Development Project Appraisal Document.

4. Describe measures taken by the borrower to address safeguard policy issues. Provide an assessment of borrower capacity to plan and implement the measures described.

There will be two implementing agencies, namely the Energy Division of the Department of Petroleum and Energy (DPE) and PNG Power. The Department of Environment and Conservation (DEC) will also be involved as the line agency responsible for approving the EA process and for issuing the environment license for new generation projects. DPE and PNG Power have no recent experience in implementing World Bank-supported projects and have little or no internal environmental or social management capacity. The proposed PNG Energy Sector Development Project would provide support to address capacity issues at two levels: (i) at the sector level, the environmental and social constraints and risks will be identified through the Strategic Environmental and Social Assessment, and (ii) at the project level, tailor-made specific measures will be identified and financed under the PNG Energy Sector Development Project to support PNG Power and DPE (and DEC through DPE) consistent with their roles in the PNG Energy Sector Development Project and, specifically, in the preparation of the environmental and social aspects of the Naoro Brown Hydropower Project.

In the proposed PNG Energy Sector Development Project, assistance will be provided to ensure that policies and strategies comply with World Bank safeguard requirements and that preparation of the Naoro Brown Hydropower project incorporates these requirements (e.g., ToRs for ESIA, EMP, Information and Consultation Strategy, RPF, and RAP; reflection of these requirements in the bidding documents for the Naoro Brown Project Developer; and World Bank review of the ESIA, EMP, and RAP undertaken by the Developer).

The role of the World Bank in supervision of the social and environmental aspects of the Naoro Brown Hydropower Project under the PNG Energy Sector Development Project would end when the PNG Energy Sector Development Project closes soon after financial close for the Naoro Brown Hydropower Project is reached. Unless the World Bank were to become involved in the financing of the Development of the Naoro Brown Hydropower Project (i.e. under a subsequent project), ensuring compliance with World Bank standards and policies for documents financed by the developer and / or for those undertaken after the closing of the WB-financed PNG Energy Sector Development Project would be the responsibility of GoPNG.

This may pose a risk that agreed social and environmental measures may not be implemented fully, which could lead to negative social and / or environmental impacts. However, GoPNG and PNG Power have specifically sought WB technical assistance support in order to benefit from WB experience on hydropower development. Both GoPNG and WB view this as a first step in a longer term engagement in the energy sector so it is unlikely that GoPNG would reverse the agreed safeguards approach. Ensuring that the Naoro Brown Developer has clear responsibilities and TOR for the agreed work, and supporting a strong information-sharing and consultation process throughout the project, will also mitigate this risk.

Any civil works related to the Naoro Brown project undertaken while the proposed WB-financed PNG Energy Sector Development Project is under implementation would be undertaken in compliance with World Bank policies, even if World Bank is not financing the civil works.

Under the proposed PNG Energy Sector Development Project, the following support has been or will be provided to address safeguards issues for the Naoro-Brown project:

- The feasibility study for the Naoro-Brown project was largely completed in 2011. In early December 2010, the feasibility consultants presented the initial findings to PNG Power providing an indication of the likely size and location of the Naoro Brown project, which in turn provides an indication of the location and types of environmental and social impacts which might be expected. In January 2011, PNG Power held consultations at Madilogo Village. People from other villages that may potentially be affected by the civil works and / or reservoir (including Naoro and Ebologa) also participated. PNG Power provided an update to the villagers on the potential physical developments proposed and the scope of potential environmental and social impacts as per the initial feasibility study report. The meeting provided the villagers an early opportunity to understand the proposed Naoro Bro wn Hydropower project and have an opportunity to voice their questions and concerns. The feasibility study consultants and PNG Power undertook further consultation and information dissemination during continued preparation of the feasibility study in 2011. Most recently, in April 2012, PNG Power conducted another consultation at Madilogo Village.
- In continuation of this early information sharing and consultation, a consultant will be engaged (based on ToRs approved by the Bank) by PNG Power soon after the proposed PNG Energy Sector Development Project is approved to (i) deepen information sharing and consultation in the project area, (ii) develop a strategy for information sharing and consultation, (iii) collect data to analyze and describe the relevant socio-economic and cultural features including landowner identification in potential core impact villages, (iv) undertake a preliminary determination of the impacts of civil works on villages in the area, and (v) develop a Land Acquisition and Resettlement Policy Framework that lays out the principles for management of land acquisition impacts and access to use land and water in the project area. The outputs of this consultancy will be made available to the developer.
- A Social and Environmental Panel of Experts and a separate Dam Safety Panel would be engaged to provide oversight and advice on the ESIA, EMP and Dam Safety Issues. Until the Naoro Brown Developer is in place, these panels would be financed under the proposed PNG Energy Sector Development Project. Once the Naoro Brown Developer is in place, the Expert Panels would become the responsibility of the Naoro Brown Developer. A communications consultant financed under the proposed PNG Energy Sector Development project would support the information and consultation activities over the same period.
- The Naoro Brown Project Developer will be responsible for follow-up on the activities started by the consultant for PNG Power. Activities from selection of the Naoro Brown Developer through to financial close for the Naoro Brown Project are planned to:
  - Complete the genealogical census mapping of rights and interests in land.
  - Complete the identification based on the detailed engineering design of all people in the project area affected by project activities related to civil works.
  - Reach agreement with men and women in the project area on entitlements regarding compensation for losses, and entitlements involving leases and/or ongoing benefit sharing, and on arrangements that ensure the timely, transparent, and equitable provision of agreed entitlements.
  - Establish the institutional arrangements required to ensure implementation and monitoring of (i) agreements regarding compensation for losses, and entitlements concerning lease or benefit sharing for use of the project area, and (ii) complaints and grievance resolution arrangements.
  - Continue information dissemination on the project along with consultation through the project implementation phase.
  - Develop a Naoro Brown Resettlement Action Plan informed by the socio-economic and cultural analysis, the genealogical census mapping, the determination of project impacts, the consultation regarding entitlements, and the principles outlined in the Naoro Brown Land Acquisition

and Resettlement Policy Framework.

o Finalize the Naoro Brown Environmental and Social Impact Assessment (ESIA), the corresponding Naoro Brown Environmental Management Plans (EMP's) and Naoro Brown Dam Safety Plans, all based on the terms of reference approved by the World Bank.

ToRs approved by the World Bank for the preparation of these safeguards documents have been completed and are to be included in the bidding documents to select the Naoro Brown Developer in order to ensure that the selected Naoro Brown Developer is fully informed of the environmental and social requirements they will be held accountable for managing.

Finally, these measures are all described in the GoPNG's Naoro Brown Environmental and Social Management Framework (ESMF), which constitutes the safeguards instrument for the PNG Energy Sector Development Project and has been prepared, approved by DEC, cleared by the World Bank and disclosed locally in PNG and in the Infoshop.

5. Identify the key stakeholders and describe the mechanisms for consultation and disclosure on safeguard policies, with an emphasis on potentially affected people.

With respect to the support under the proposed PNG Energy Sector Development aimed at preparation for the Naoro Brown project:

Key stakeholders include people (women and men) with customary or permissive land rights in the project area (the Naoro Brown catchment area), the PNG Government (PNG Power, DEC, DPE), PNG civil society organizations engaged environmental and/or social development issues, and the Naoro Brown Project Developer and financiers when selected.

Consultations with civil society organizations on the proposed PNG Energy Sector Development Project started in December 2010 and continue on an ongoing basis. Consultations on the draft Environment and Social Management Framework (ESMF) with civil society representatives took place in Port Moresby in February 2011 and on the updated draft in April 2012. The ESMF was officially endorsed by the Department of Environment and Conservation in April 2012

Consultations with communities in the Naoro Brown project area were also held in January 2011, April 2012 and will be continued and strengthened when the Information Sharing and Consultation Strategy is developed. This strategy, which will be developed as part of the preliminary social assessment and subsequently revised as part of the ESIA, is an important element of the proposed WB-supported PNG Energy Sector Development Project design, to help ensure that the people in the Naoro Brown project area receive culturally appropriate economic and social benefits, and that adverse impacts are minimized, mitigated, and compensated. The strategy will include the following elements:

o An approach to information dissemination and consultation on the project across the affected area that ensures (i) that both men and women receive timely and adequate information to make informed decisions, (ii) that the consultations are undertaken at locations and with groups of people that are meaningful in terms of the rights and interests in the project area, (iii) that the approach itself is accepted by the involved social groups and their representatives, and (iv) that it results in decisions that respond to the interests and concerns of both women and men in the project area, and advance the objectives of the project.

o Institutional arrangements and staffing (including identifying and addressing capacity building needs) to enable ongoing consultation during project preparation, implementation, and operation;

o Institutional arrangements that ensure that agreements are honored by both (i) the project (e.g.,

timely, transparent, and equitable provision of agreed entitlements involving compensation for losses, and lease or benefit sharing entitlements), and (ii) the involved communities (e.g., access to land for civil works or restrictions on logging to ensure catchment area sustainability).
o Institutional arrangements for handling of complaints and grievances that are accepted by the involved communities and that provide for timely resolution.
o Arrangements that ensure documentation comprising: (i) records on consultations, (ii) monitoring of the implementation of agreements on entitlements and benefits, and (iii) records on the management and resolution of complaints.

Information sharing: Draft Terms of Reference for the Naoro Brown Environmental Impact Assessment (ESIA), Naoro Brown Resettlement Policy Framework (RPF), Naoro Brown Environmental Management Plans (EMP) and Naoro Brown Resettlement Action Plan (RAP) were completed in 2012, and summaries will be translated into Tok Pisin and disclosed in Port Moresby and at a local information center(s) in the project area. When completed, the Naoro Brown Resettlement Policy Framework, Naoro Brown Environmental Management Plans (EMP) and Naoro Brown Resettlement Action Plan (RAP) would also be disclosed in Port Moresby and at a local information center in the project area, including summaries translated into Tok Pisin. A local information center and meeting venue will be established in the Naoro Brown project area, and information materials will be developed, to convey understanding of the project to people who may be illiterate and/or may not understand maps and engineering drawings.

B. Disclosure Requirements

Environmental Assessment/Audit/Management Plan/Other	
Date of receipt by the Bank	23-Feb-2011
Date of submission to InfoShop	23-Feb-2011
For category A projects, date of distributing the Executive Summary of the EA to the Executive Directors	
"In country" Disclosure	
Papua New Guinea	25-Feb-2011
Comments:	
If the project triggers the Pest Management and/or Physical Cultural Resources policies, the respective issues are to be addressed and disclosed as part of the Environmental Assessment/Audit/or EMP.	
If in-country disclosure of any of the above documents is not expected, please explain why:	

C. Compliance Monitoring Indicators at the Corporate Level

OP/BP/GP 4.01 - Environment Assessment			
Does the project require a stand-alone EA (including EMP) report?	Yes [ ]	No [X]	NA [ ]
The World Bank Policy on Disclosure of Information			
Have relevant safeguard policies documents been sent to the World Bank's Infoshop?	Yes [X]	No [ ]	NA [ ]
Have relevant documents been disclosed in-country in a public	Yes [X]	No [ ]	NA [ ]

place in a form and language that are understandable and accessible to project-affected groups and local NGOs?	
All Safeguard Policies	
Have satisfactory calendar, budget and clear institutional responsibilities been prepared for the implementation of measures related to safeguard policies?	Yes [X] No [ ] NA [ ]
Have costs related to safeguard policy measures been included in the project cost?	Yes [X] No [ ] NA [ ]
Does the Monitoring and Evaluation system of the project include the monitoring of safeguard impacts and measures related to safeguard policies?	Yes [X] No [ ] NA [ ]
Have satisfactory implementation arrangements been agreed with the borrower and the same been adequately reflected in the project legal documents?	Yes [X] No [ ] NA [ ]

III. APPROVALS

Task Team Leader:	Name: Wendy E. Hughes	28/01/13
Approved By:		
Regional Safeguards Coordinator:	Name: Peter Leonard	Date: 28/01/13
Sector Manager:	Name: Michel Kerf	Date: 28/01/13

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