



# Combined Project Information Documents / Integrated Safeguards Datasheet (PID/ISDS)

Appraisal Stage | Date Prepared/Updated: 3-May-2017 | Report No: PIDISDSA20864

**BASIC INFORMATION****A. Basic Project Data**

Country Solomon Islands	Project ID P161319	Project Name Tina River Hydropower Development Project	Parent Project ID (if any)
Region EAST ASIA AND PACIFIC	Estimated Appraisal Date 16-Mar-2017	Estimated Board Date 15-June-2017	Practice Area (Lead) Energy & Extractives
Lending Instrument Investment Project Financing	Borrower(s) Ministry of Finance and Treasury	Implementing Agency Ministry of Mines, Energy and Rural Electrification	

## Proposed Development Objective(s)

To increase the share of renewable energy in the generation mix in Solomon Islands.

## Components

- Component 1: Tina River Hydropower Project Facility (HPF)
- Component 2: Access Roads
- Component 3: Transmission lines
- Component 4: Technical Assistance

**Financing (in USD Million)**

Financing Source	Amount
ABU DHABI: Abu Dhabi Fund for Arab Economic Development	15.00
Asian Development Bank	30.00
KOREA, Rep of: Economic Development Cooperation Fund	31.60
AUSTRALIA, Government of	11.70
Green Climate Fund	86.00
International Development Association (IDA)	24.70
IDA Grant	8.90
Foreign Private Commercial Sources (identified)	10.40
Sub-borrower(s)	22.18
<b>Total Project Cost</b>	<b>240.48</b>

## Environmental Assessment Category



A - Full Assessment

Have the Safeguards oversight and clearance functions been transferred to the Practice Manager? (Will not be disclosed)

No

Decision

Other Decision (as needed)

**B. Introduction and Context**

Country Context

**Solomon Islands is a remote archipelago with one of the lowest population densities (20 persons/km<sup>2</sup>) and urbanization rates (17 percent) in the world.** The country consists of 997 islands encompassing a total land area of 29,900 km<sup>2</sup> spread over 1.34 million km<sup>2</sup> of ocean. The population of approximately 616,000 is dispersed across an estimated 90 islands.<sup>1</sup> The island geography, coupled with weak infrastructure links, presents formidable challenges to service delivery and economic integration. Major obstacles to development are the high cost environment resulting from the country's remoteness as well as its small market, lack of competition, high transportation and energy costs, and customary land issues. It is also vulnerable to natural disasters such as cyclones, tsunamis, flooding, drought and earthquakes.

**Solomon Islands has one of the lowest levels of gross domestic product (GDP) per capita among the Pacific Island states, at US\$2,013/capita.** The country is still recovering from many years of intermittent political turmoil and civil strife. Locally referred to as the "tension", the conflict during 1998-2003 disrupted the functioning of state and social institutions which resulted in a 40 percent decline of GDP. To support the stabilization of the Solomon Islands, neighboring countries led by Australia deployed the Regional Assistance Mission to the Solomon Islands to restore law and order and other basic state functions. Ever since, peace has generally been maintained, barring major riots in 2006 (which did not trigger further conflict), and political protests in 2011 following a change in prime minister.

**The economy has since rebounded, but remains vulnerable to external shocks.** Solomon Islands Government (SIG) managed its economy pursuant to the agreed principles of the Honiara Club Agreement (HCA) set up to support the recovery of the Solomon Islands, and the economy grew mainly on export of commodities such as logging and substantial amounts of Official Development Assistance. However, the global financial crisis of 2009 hit the Solomon Islands hard, resulting in GDP contracting by

<sup>1</sup> Population data based on *Solomon Islands 2012/13 Household Income and Expenditure Survey – National Analytical Report [Volume 1]*, October 2015.



4.7 percent, a budget crunch and a depletion of foreign currency reserves. Furthermore, oil price spike of 2008, and subsequently during 2011 to 2013, demonstrated Solomon Islands' vulnerability to global oil price volatility as the country's balance of payments came under severe pressure since fossil fuels account for about a quarter of all imports.

**Going forward, real GDP is projected to grow on average by 3.1 percent over the medium-term (in the next 5 years).** This projection is based on the assumption of resumed gold-mining activity, the exploitation of large nickel deposits, and increased investments in key transport infrastructure, energy, and telecommunications projects. There are considerable down-side risks to this outlook, notably the expected decline in log production over the medium-term.

### Sectoral and Institutional Context

**Low access to electricity services.** About 9 percent of the population in Solomon Islands has access to grid-connected electricity supplied by the national power utility, Solomon Islands Electricity Authority (SIEA), and about 2 percent are supplied by diesel generators owned by households or communities.<sup>2</sup> Access to grid electricity is uneven across the country. About 50 percent of the urban households are supplied by SIEA of which the majority are being supplied through the Honiara Electricity System (HES) in the capital city, with a population of nearly 70,000, on the main island of Guadalcanal. Only about 3 percent of the rural households is supplied by SIEA or through diesel generators owned by households or communities. Nationally, one-third of the households have installed small solar home systems, with photovoltaic (PV) panels typically of 20 watts, which are only sufficient for a few light bulbs and to charge cell phones. At an average annual consumption of 125 kilowatt-hours (kWh) per capita, the country has the lowest consumption rate in the Pacific.

**Demand and supply.** Currently the demand growth on the HES is constrained by the interruptions in supply caused by frequent maintenance of diesel generators, limited distribution network coverage, small number of overall customers and high retail tariffs (see section below). The total installed capacity of the HES is 33.6 megawatts (MW), out of which 32.6 MW are diesel generators and 1 MW is a solar farm. Peak demand of the HES has increased from 9.3 MW in 2003 to 15.5 MW in 2016 representing a compound annual growth rate (CAGR) 4.0 percent. Over the same period, annual electricity generation in HES grew at 4.9 percent CAGR from 45.1 gigawatt-hours (GWh) to 83.9 GWh, with a notable 6.7 percent growth in 2016 alone mainly due to the increased generation capacity realized through the commissioning of four 2.5 MW diesel generators. Total electricity generated in the provincial grids was 6.7 GWh in 2016.

**Heavy reliance on imported diesel, high cost of generation and high retail tariff.** SIEA's system was almost 100 percent reliant on diesel generation. The cost of generation reduced over the recent years, from US\$ 35.6 cents/kWh in 2014 to US\$ 23.8 cents/kWh in 2016, along with the drop of oil prices. Retail tariffs for grid-supplied electricity, adjusted down from US\$ 93 cents/kWh in 2014 to US\$ cent 65/kWh as of January 2017. The 2017 reduction was partly due to low oil prices, and partly due to enforcement of a new tariff calculation methodology. The Tariff Regulation mechanism adopted since 2005 linked retail tariffs to fuel cost. However, while the retail tariff increased along with rising oil prices up to mid-2014, the drop in fuel cost which began in late-2014 was largely not translated into lower retail tariffs. As a result of this distortion in this tariff methodology and efficiency improvements since 2010, SIEA has enjoyed a high profit margin on its electricity

<sup>2</sup> Electrification rate based on *Solomon Islands 2012/13 Household Income and Expenditure Survey – National Analytical Report [Volume 1]*, October 2015.



sales in recent years. To rectify the retail tariff distortion, the new tariff methodology, *Tariff Regulation of 2016*, was introduced in January 2017 to appropriately reflect the fuel price in the tariff. Through the new tariff methodology, tariff levels are set by determining the Maximum Allowable Revenue for SIEA based on Non Fuel Revenue Requirements and a pass-through of Fuel Charges of all fuel costs, including power purchased under power purchase agreements, adjusted for heat rate and losses. However, the retail tariff is still significantly higher than the Pacific regional average of residential retail tariffs, which is approximately US\$ 40 cents/kWh. Although no affordability survey has been conducted, it is understood that the expensive tariff is one of the major factors for the extremely low annual consumption per capita.

To expand access and to improve reliability, affordability and sustainability of electricity services, SIEA plans to implement its least-cost expansion plan (see section below), expand its network coverage, improve system efficiency and significantly expand the use of less expensive, indigenous renewable energy sources. With commissioning of the 15 MW Tina River Hydropower Development Project (TRHDP; the Project) by 2022 according to the least-cost plan, financial projections suggest that the retail tariff could be further lowered to US\$ 33 cents/kWh by 2023 and US\$ 26 cents/kWh by 2052 (one year after the end of the TRHDP Power Purchase Agreement [PPA] period), compared to US\$ 51 cents/kWh by 2023 and US\$ 65 cents/kWh by 2052 without TRHDP. The retail tariff in the “without TRHDP” scenario is much higher since diesel generation still represents a higher share in the energy mix while diesel generation cost is expected to increase in line with World Bank’s oil price forecast. With commission of TRHDP in 2022 and the expected incremental development of solar power, the share of energy from renewable energy sources would increase from 1 percent in 2016 to 85 percent in 2022 (68 percent from TRHDP and 17 percent expected from solar). By 2046, as the demand grows, share of TRHDP will reduce to 43 percent, and the share of solar will increase to 40 percent as they are incrementally developed, making the total renewable share 83 percent. Without TRHDP, 58 percent will be supplied by solar while diesel will be 42 percent in 2046.

**Least economic cost generation expansion plan.** The annual demand is projected to grow to over 140 to 250 GWh by 2040 under different scenarios of CAGR growth rate. Under the Base Case scenario assuming (a) a 2.1 percent CAGR<sup>3</sup> for demand growth; (b) international crude oil price growing from US\$ 64/barrel in 2017 to US\$ 72/Barrel in 2025, and growing up to 87 by 2046 in real terms; (c) solar farm installation price going down from US\$ 2.8 to 1.6 million/MW from 2017 to 2030 and remaining constant afterwards; and (d) an economic discount rate of 3 percent pursuant to the Bank’s *Discounting Costs and Benefits in Economic Analysis of World Bank Projects* (May 2016)<sup>4</sup>, the least-cost expansion plan requires installation of over 54 MW new capacity in a combination of hydropower, solar and storage, and diesel capacity to meet the demand growth at the least economic cost, and commissioning of TRHDP in 2022. Using the above parameters, the optimization study also found that TRHDP constitutes a key component of the least-cost expansion plan.

**Sector Institutions.** The Ministry of Mines, Energy and Rural Electrification (MMERE) is the supervising ministry for the energy sector, and its Energy Division bears responsibility for legal and regulatory development, institutional strengthening and supervision of the state-owned utility, SIEA. Operating under the Electricity Act,

<sup>3</sup> From the Debt Sustainability Analysis of Solomon Islands carried out by World Bank and International Monetary Fund.

<sup>4</sup> This guidance recommends the use of discount rate of twice the projected rate of GDP per capita in real terms. It is anchored in welfare economics and implies that the net benefits of a project at different points in time should be valued according to their marginal impact on welfare at the time they occur. Higher (lower) growth prospects would normally imply a higher (lower) discount rate for a particular country.



SIEA is a vertically-integrated power utility that is responsible for electric power generation, transmission and distribution to all urban and provincial centers. Retail tariff is nationally uniform and is regulated by MMERE, and there is a cross-subsidy between the HES customers with relatively lower cost of supply and the customers of the outer islands with higher generation costs mainly due to the high cost of transporting fuel. Since an independent regulatory authority does not exist in the Solomon Islands, SIEA also advises SIG on regulatory instruments, and is given the authority to issue licenses to entities who wish to generate and distribute electricity in areas not supplied by SIEA. There are also small privately owned generators, which are for self-consumption and some of which sell excess power to SIEA under loosely negotiated PPAs. In 2016, SIEA purchased 1.1 GWh from the Solomon Tropical Products company.

**SIEA financial performance.** SIEA was in financial crisis and close to insolvency with severe cash-flow problems until 2010 due to the “tension”, large outstanding receivables, non-revenue losses, rising oil prices, large debt levels, and a depreciating Solomon Islands Dollar (SBD). Together with support provided through the World Bank-financed *Solomon Islands Sustainable Energy Project (SISEP)*, SIEA’s financial performance improved dramatically from making losses until 2010 to a net profit of SBD68 million in 2012, and SBD107 million in 2015. Electricity sales revenues increased from SBD351.5 million in 2011 to SBD433.5 million in 2016, while the cost of generation kept going down, largely due to lower oil prices, from US\$ 35.6 cents/kWh in 2014 to US\$ 23.8 cents/kWh in 2016. If the least-cost expansion plan is implemented, and according to price estimates from the ongoing PPA negotiations between SIEA and the private sector developers, commissioning of the TRHDP will result in a PPA tariff equivalent to around US\$ 18.9 cents/kWh, and will lower further the cost of generation, making room for retail tariffs to be adjusted downward. System loss has been high at around 19-21 percent during 2011-2016, and SIEA targets aggressively to reduce it to 11 percent by 2021. SIEA’s average earnings before interest, tax depreciation and amortization (EBITDA) margin is forecasted to grow from 24 percent to 53 percent, and Net Margin from 14 percent to 43 percent, over the projection period of 2017-2052. Accounts receivable have also improved from 70 days of sales in 2011 to 40 days in 2015.

**Indigenous energy resources and government strategy.** Beyond the aims of lower cost of electricity, the *Solomon Islands National Energy Policy (SINEP)* aims to enhance energy security at a national level, by increasing the share of renewable energy to 50 percent of total installed capacity by 2020. SINEP estimates the country’s *hydropower* potential to be 300 MW, but past attempts to develop hydropower in Guadalcanal to supply Honiara were abandoned due to customary land issues and challenging geological conditions. SINEP estimates the *solar* irradiation to be in the range of 5.5 to 6.5 kWh/m<sup>2</sup>/day, and with the timing of its peak output coinciding with the daily peak load at mid-day, solar energy is regarded as a promising source of energy. In addition to SIEA’s 1 MW grid-connected solar farm commissioned in 2016, SIEA plans to incrementally develop similar size installations. However, a significant constraint to developing solar farms in the Solomon Islands is the difficulty of acquiring land in a country where approximately 90 percent of the land is customary. Other alternatives such as *geothermal, wind and biomass* have been examined, but do not currently offer cost-effective alternatives to hydropower and solar energy.<sup>5</sup> While SIEA is preparing to develop the 500 kilowatt

<sup>5</sup> A geothermal power project on Savo Island off the coast of Honiara had been considered, but was dropped due to uncertainty over resource availability and the high cost of the submarine cable needed to transmit power to Honiara. Measured wind speed data is not available in Honiara, but global wind models suggest fairly low wind speeds in the general area.



(kW) Fiu River Hydropower Project in Malaita with assistance from the Asian Development Bank (ADB),<sup>6</sup> TRHDP will be the first large hydropower project in the country according to the SIEA's least-cost expansion plan.

**Support of development partners.** In addition to the previously mentioned SISEP, the World Bank is also supporting SIEA to implement an *Electricity Access Expansion Project*, which aims to increase access to electricity by providing a targeted subsidy to low-income households to pay for new service connections and in-house wiring which are unaffordable for households with limited income. In addition to the previously mentioned Fiu River Hydropower project, the ADB is also implementing the *Solar Power Development Project*, which aims to hybridize existing diesel-based outstations with solar and battery units. The Energy Programme of the Secretariat of the Pacific Community's Economic Development Division provides technical assistance to MMERE, including on development of the SINEP in 2014. The Japan International Cooperation Agency (JICA) grant-funded a 50 kW parking lot rooftop solar facility for SIEA, and the governments of New Zealand and United Arab Emirates co-financed the 1 MW solar farm mentioned earlier. The Government of Australia (GOA) has provided ongoing support to TRHDP project preparation and is committed to co-finance the Project.

### C. Proposed Development Objective(s)

Development Objective(s) (From PAD)

To increase the share of renewable energy in the generation mix in Solomon Islands.

Key Results

Progress will be measured against the following PDO level results indicators, as applicable:

- a. Share of renewable energy in the generation mix (%);
- b. Generation capacity of hydropower constructed under the Project (MW); and
- c. Electricity generated by the Project (GWh).

### D. Project Description

The TRHDP will consist of four components: (i) hydropower facility (HPF); (ii) access road; (iii) transmission line; and (iv) technical assistance.

**Component 1: Tina River Hydropower Facility (TRHPF)** (Estimated cost: US\$185.66 million). Under a 34-year PPA (including 4-year construction period), the PC will develop, finance, construct and operate the HPF with an installed capacity of 15 MW located on the Tina River, 20 km southeast of Honiara, and will comprise:

---

<sup>6</sup> The cost of Fiu River Hydropower Project including a 3.5 km access road and a 10 km transmission line is estimated at SBD66.14 million. This is equivalent to about US\$17.0 million/MW for the initial 500 kW installation, and US\$11.3 million/MW if considering 750 kW capacity once the additional unit is added when demand increases.



- A roller-compacted-concrete (RCC) dam 72 m high (from foundation) located in a narrow gorge on the Tina River;
- A waterway including a 3.3 km headrace tunnel in 3.3 m diameter, surge shaft and a surface-type steel penstock in 3.0 m diameter to convey water from the dam to the power station;
- A powerhouse 5.7 km downstream of the dam site that will house three 5 MW Francis turbines and an extra bay for future installation of a fourth 5 MW turbine.

**Component 2: Access Road** (Estimated cost: US\$25 million). The access road to facilitate HPF construction and operations includes two lots: Lot 1 involving the upgrade of the existing 13.2 km road from Black Post Junction to Managikiki Village; and Lot 2 involving a 5.5 km “greenfield” road through steep heavily forested terrain from Managikiki Village to the dam and power station sites. Upon commissioning of the HPF, Lot 1 will become the responsibility of SIG and Lot 2 will remain the responsibility of the PC for the duration of the PPA, after which it will hand over to SIG together with the HPF.

**Component 3: Transmission Lines** (Estimated cost: US\$22.82 million). Generated power from the HPF will be evacuated to HES through two parallel single-circuit 66 kilovolt (kV) transmission lines of 23 km to the existing Lungga Diesel Power Station. The cost of this component includes the upgrading of Lungga Power Station since the highest system voltage at present is 33 kV. Since the transmission lines are only required by the time of testing and commissioning of the HPF in 2022, the exact route has not been decided by the implementing agency, SIEA. Financing from IDA will be on-lent by SIG to SIEA. Cost in excess of these allocations will be borne by SIEA.

**Component 4: Technical Assistance** (Estimated cost: US\$7.0 million). This technical assistance (TA) supports the operation of the TRHDP Project Office (PO) MMERE to finance consultants to monitor overall project implementation, provide awareness building and training for various stakeholders, monitor and support social and environmental safeguard arrangements and the Gender Action Plan (GAP), maintain a Dam Safety Advisory Panel (DSAP) and an independent social and environmental monitoring agent, liaise with various government counterparts and other stakeholders, support implementation arrangements agreed under the land acquisition process, support communities in utilizing their share of project benefits for community development, and to report to the Bank and other financiers on project performance and achievement of objectives. A non-governmental organization (NGO) will also be engaged to work with landowning tribes in the upper catchment to support the first stages of establishing a protected area, up to the point of preparing a Protected Area Management Plan and Budget, if community members are interested and committed to doing so.

## **E. Implementation**

### Institutional and Implementation Arrangements

**General.** The PO under MMERE will be the main implementing agency of the Project, as it has been during project preparation. The PO will provide overall project oversight, coordinate between the project components, project monitoring and reporting. As a majority of the project financing will be provided through SIG, the Ministry of Finance and Treasury (MOFT) will play an instrumental role in coordinating the provision of financing from various sources. A donor coordination mechanism, led by the Bank, is expected to be established for reporting and information sharing between SIG and donors, and among donors.



**Component 1** will be implemented by the PC. K-Water and HEC will enter into a shareholders agreement with ICSI to establish the PC. Under the PPA, the PC will contract an EPC contractor (expected to be HEC) for the construction of the HPF and the access road (Component 2), and an operation and maintenance (O&M) contractor (expected to be K-Water) for the operation of the HPF and Lot 2 of the access road. The EPC contract, in particular, will be a fixed-price contract whereby the EPC contractor will assume all construction-related geological risks. The PC will contract an Owner's Engineer to supervise the EPC contract.

- **Component 2** will be implemented as a part of the overall the EPC contract under Component 1. Supervision would be conducted by the PC's Owner's Engineer to review project design and ensure quality and timely construction of the access road.
- **Component 3** will be implemented by SIEA who will procure a supply and install contractor, and supervise the installation using its own resources and consultants it retains through a framework agreement.
- **Component 4** will be implemented by MMERE, through the PO, who will recruit (i) key PO staff and DSAP members; (ii) environmental and social experts, including a gender focal point; (iii) an Independent Environmental and Social Monitoring Agent, and (iv) external auditors.
- **Financing Arrangements.** The Bank will sign a financing agreement for IDA with SIG, including financing for SIG's equity shares in the PC as well as financing of project debt (Component 1), construction of the transmission lines (Component 3) and TA (Component 4). The International Bank for Reconstruction and Development (IBRD) and IDA, acting jointly as the administrator for APIP TF will also sign a grant agreement with SIG to extend the APIP TF financing of the access road (Component 2) and TA (Component 4); and financing agreement for GCF. The Bank will sign project agreements, respectively, with the PC for Components 1 and 2 and SIEA for Component 3.

#### F. Project location and Salient physical characteristics relevant to the safeguard analysis (if known)

The hydropower site is located on the Tina tributary of the Ngalimbiu River on the north of Guadalcanal and thirty kilometers east of Honiara. The site was selected based on relatively favorable geological conditions and consideration to avoid physical relocation of affected people. The dam site is located in the Tina Gorge, a narrow valley comprised of steep slopes that constrain the river in a narrow channel, and narrow ridge crests. Where the Tina and the Toni River converge, they form the Ngalimbiu River that flows through the coastal plane to the sea, with a small delta at its mouth. The vegetation cover in the upper catchment is dominated by montane forest, much of it undisturbed although increasingly threatened by logging. The catchment in the middle river is covered by lowland forest, some of it undisturbed, but showing increasing disturbance with distance downstream. In the vicinity of the villages downstream of the dam, the forest is largely disturbed, by settlements, garden plots, and logging. Terrestrial biodiversity is high, with a large number of animal species endemic to Solomon Islands, and, with the exception of the avifauna that evidences a preference for undisturbed areas, did not vary significantly between disturbed and undisturbed habitat. The Tina is a valuable aquatic habitat, with 57 fish species identified during the ESIA baseline



surveys, all migratory. The project area consists of over 30 villages and hamlets, within the Malango Ward, of mainly indigenous people originating from the central Guadalcanal mountain lands, and several official —settler villages made up of people originating from South Guadalcanal/Weather Coast. The Bahomea tribal villages, which are largely home to the tribes identified as landowning tribes in the core project area, and their component hamlets are mainly stretched out alongside the Ngalimbiu River and lower-mid sections of the Tina River, and are often only a few hundreds of meters apart. The Ghaobata tribal villages are generally located on the lower stretches of the Ngalimbiu River between the sea and the Bahomea villages. The mountainous interior of Malango Ward is essentially unpopulated apart from periodic expeditions by the traditional owners for hunting and camping, and to reconnect with customary homelands. The indigenous people of the Tina area are therefore aware of the locations of their key originating villages and important cultural sites. Since membership of particular clans is claimed through kinship connection with people from successive historic settlements and originating places, knowledge of such places is important for establishing identity and land and resource rights.

**G. Environmental and Social Safeguards Specialists on the Team**

Thomas E. Walton, Ross James Butler, Nicholas John Valentine, Frederick Brusberg

**SAFEGUARD POLICIES THAT MIGHT APPLY**

Safeguard Policies	Triggered?	Explanation (Optional)
Environmental Assessment OP/BP 4.01	Yes	<p>Environmental impacts would occur during the construction, operations and maintenance phases of the project and would occur in locations including the reservoir and possibly the river further upstream, the dam site, tunnel corridor and power plant location, a section of the Tina River between the dam and powerhouse that will experience significantly reduced flows, the downstream waters, and the corridors of the transmission line and access roads. Impacted areas would also include the construction areas, quarry areas, spoil disposal areas and construction equipment service areas.</p> <p>The project will have the potential to create a number of negative social impacts. These include direct physical impacts on nearby communities (e.g., intrusive noise, vibration, explosion shockwaves, dust, air and ground discharges, and visual intrusion) some of which could have potential health consequences and negative impacts on way of life and local amenities; loss of access to abundant clean</p>



fresh water; damage to and/or loss of access to livelihoods assets, including fishing areas, food garden areas, hunting areas, plant and related materials, planted and wild fruit and nut trees, and timber woodlots and plantations, with potential negative impacts on household and community wellbeing.

For Components 1 and 2, the developer will be responsible for addressing seven of the eight World Bank Performance Standards (PS). (the only PS not relevant to Components 1 and 2 is PS 5 – Land Acquisition and Involuntary Resettlement as land acquisition is a Government activity and controlled by OP 4.12). The Government has completed and disclosed a ESIA as part of the Feasibility Study and tendering process to attract a private developer. The Bank has reviewed the Government’s ESIA and the developer’s ESMS and has prepared an Environmental and Social Review Summary (ESRS) prior to appraisal. Early in implementation, the selected developer will submit an updated ESIA and its Environmental and Social Management Plan (ESMP) to SIG in order to receive Development Consent from the Director of Environment in the Ministry of Environment, Climate Change, Disaster Management and Meteorology (MECDM).

The members of the Environmental and Social Panel have been contracted by the Project Office since July 2013. They provide ongoing advice, in particular on the preparation of safeguards documentation, including the design and costing of mitigation measures. Terms of Reference for consultants advising the government on environment and social safeguard risks will continue to be approved by the Bank to ensure the requirements of the World Bank PS and safeguards policies are effectively integrated into the TA work under Component 4.

For Component 3, OP 4.01 is triggered as the transmission line construction by SIEA is likely to result in environmental and social impacts. The potential impacts and their mitigation are covered in the ESIA, since the transmission line is a part of the



overall project design.

The ESIA, prepared by government, was disclosed on the Bank's external website on August 15, 2016. It was re-disclosed in January, 2017 in a substantially revised version.

In preparation of the ESIA, fauna, flora and fish surveys have been carried out and project affected communities have been extensively consulted through social surveys and mitigation workshops. The main anticipated impact during operations based on information available would be on aquatic ecology, related to the presence of the dam, an impassable obstacle to all fish due to its height. As on other tropical islands of the Indo-pacific, all native species encountered in inland fresh water are migratory species with a life cycle between ocean and river. The ESIA concludes that while the upper catchment plays an important role in fish life cycle it is not considered to be a critical one since the fish do not show homing behavior (meaning that juveniles will colonize any rivers and not only their native one), and the Tina River mouth is more important to life cycle than upstream areas, being the only entry point for all fishes. Nevertheless, to address aquatic habitat impacts, the ESMP proposes mitigation measures including environmental flow (riparian flow), a "trap and haul" system to allow migratory fish to pass the dam, protective devices to prevent fish mortality in turbines, and fish monitoring, to allow major impacts to be mitigated to moderate significance.

The undisturbed montane forests in the upper catchment meet the definition of critical natural habitat. Based on assessment undertaken and information available, the project is not expected to have direct impacts on those forests. The project site is located over 10km downstream from these forests and will not improve access to them. In relation to logging, although a new road will be built beyond the point where vehicular access is already available, this road will be access restricted (with fencing/gates and other security measures) to create a secure space during construction and to allow protection of the powerhouse and dam during operation. Overall,

Natural Habitats OP/BP 4.04

Yes



road access to the dam site and the upper catchment for the purposes of logging will not be improved as a result of the new roads. Logging roads have already been constructed on the opposite side of the river and logging is ongoing in the area, however this is outside of the project area and unrelated to the project. The project will not increase the accessibility of the forest. None of the upper catchment is in protected status. The Bank will support any action by SIG to protect it.

The approximately 400 ha acquired for the dam, powerhouse, access road and transmission line contains a great deal of modified habitat but some natural habitat as well. Of the 115 ha of land that will be cleared, 60 ha has forest cover, but only 9.5 ha can be considered primary forest and natural habitat. The remainder consists of disturbed secondary forest and remnant forest, i.e., secondary forest formed by natural revegetation of cleared areas. The 60 ha represents 0.9% of the total area of non-montane forest and 0.3% of all forest in the catchment. In the context of the assemblage of terrestrial vegetation communities and the wildlife habitats they provide, this permanent loss within the Tina River catchment is not considered to be significant. Cliff habitat and riparian habitat (partially disturbed) that are considered natural habitat, approximately 15 ha of each, will be affected by reservoir preparation.

Performance Standard 6 that applies to Components 1 and 2 requires that when natural habitat is degraded or converted, as approximately 39.5 ha will be, the project must include actions to ensure there is no net loss of biodiversity. To this end, the developer will prepare a Biodiversity Management Plan (BMP) with the objective of achieving no net loss of biodiversity as a result of natural habitat conversion. The BMP will accomplish this by means of an offset that will include measures to protect the remaining natural habitat in the Core Area and a program to rehabilitate an area of modified habitat of at least 40 ha.

The Bank will ensure that the requirements of the



Performance Standards are effectively integrated into the TA work under Component 4 by requiring that Terms of Reference for consultants advising government on topics related to this PS be approved by the Bank.

For Component 3, potential impacts on biodiversity and natural habitats are addressed in the ESIA since the transmission line is part of the overall project design.

Many areas on the left bank of Tina River have been logged, and some of the project area, in particular the banks of the reservoir, is too steep to be accessible for logging. Nonetheless, erosion due to logging is an important concern for the local population, as the slope is steep, erosion quickly affects water quality of the river. Being located upstream from the dam site, logging activity represents a potential threat to water quality and could increase siltation processes in the reservoir and create landslides. The draft ESIA estimates that 9.54 ha of undisturbed forest (mainly for quarry sites), 29.65 ha of disturbed forest, and 21.87 ha of remnant forest would be affected by project construction. Due to the poor reputation of this industry in the Solomon Islands and Guadalcanal, the draft ESIA and ESMP requires that the company responsible for logging of project sites be subject to strict contractual measures and best environmental and social management practices, and that all its activity be monitored by an independent environmental expert. Good practices such as keeping the canopy “sealed” by minimizing large tree clearing to maintain canopy connectivity and reduce the edge effect are also recommended and will be costed as part of the ESMP.

For Component 1, the developer will be responsible for addressing Performance Standard 6, Biodiversity Conservation and Sustainable Management of Living Natural Resources.

The activities under Components 3 (transmission line) are through highly modified environments, however OP 4.36 is triggered as there will be impacts on forests. The potential impacts and their

Forests OP/BP 4.36

Yes



mitigation are covered in the ESIA.

Pest Management OP 4.09

No

None of the project components will involve, or promote, pesticide use.

Physical Cultural Resources OP/BP 4.11

Yes

There are numerous traditional tambu sites in the project area, many of which have been identified during the Social Impact Assessment part of the draft ESIA. These are sites that have local spiritual, historical, or other cultural importance and are considered sacred or restricted as to use or access. The draft ESIA requires that prior to any construction commencing, the government or project developer carries out a survey in consultation with community representatives to identify cultural heritage, tambu sites in the construction areas. A suitably qualified heritage expert, working closely with knowledgeable elders and the Solomon Islands National Museum, will undertake this survey. The details of the sites are to remain confidential. This work has already commenced as part of the land acquisition process, in identifying all assets of the tribes occupying the core land area. Prior to construction, it is also recommended that the developer, in conjunction with culturally knowledgeable locals and a botanist, should also survey the project and road construction sites to identify culturally important medicinal and magical plants that may need to be protected or relocated.

For Components 1 and 2, the developer will be responsible for addressing Performance Standard 8: Cultural Heritage. For Component 3, SIEA will address the requirements of OP 4.11 by applying the same procedures presented in the ESIA and ESMP.

Indigenous Peoples OP/BP 4.10

Yes

Several groups or communities are situated in the project's area of influence and could be affected by the project, including: the indigenous Malango people of the Bahomea area who own and occupy the project's 'core land area: the indigenous Malango people of Malango area, some of whom are customary 'shareholders' in the core area; the 'settler' Guale people in the Bahomea area; the indigenous coastal Ghaobata people of the Guadalcanal Plains, and; 'squatter' peoples of various origins, who are living on 'unoccupied' government/alienated land in the northern part of



the project area without the formal approval of the local indigenous customary tribes. For the purposes of the social impact assessment and social safeguards compliance, the vast majority of groups resident in the project area can be considered indigenous Solomon Islanders, and all groups, whether identified as core area landowners, host communities of Bahomea and Malango tribes, or downstream, Ghaobata communities affected by environmental impacts, have expressed their broad community support for the project based on the SIA and several years of free, prior and informed consultation. They have expressed this support based on information shared by government as to the risks, mitigation measures and benefits offered. In relation to Indigenous Peoples, for Components 1 and 2, the government will be responsible for meeting the requirements of OP4.10 as it relates to land acquisition and the developer will be responsible for addressing Performance Standard 7: Indigenous Peoples. Under Component 3, SIEA will have the corresponding responsibility under OP 4.10. OP 4.10 also applies to Components 1 and 2, specifically to the land acquisition and resulting impacts on livelihoods.

A separate Indigenous Peoples Plan (IPP) has not been prepared as the overwhelming majority of direct project beneficiaries in the project area are indigenous peoples. Accordingly, IPP requirements have been integrated into the overall project design as well as the LALRP and ESIA. A Community Development Plan (CDP) has also been prepared to describe the benefits that will be received by the project area communities as a result of the Tina River Hydropower Development Project (TRHDP), in particular, members of the Bahomea and Malango tribes which are the indigenous, customary landowning groups in the project area.

The benefits described in the CDP are documented in detail in other project documents. The purpose of the CDP is to consolidate the description of benefits for project area communities into one comprehensive document which can be monitored



by the beneficiaries and other stakeholders over time to ensure that project communities receive the benefits agreed within the context of the project. The CDP will play an important role in ensuring the project continues to deliver benefits to the broader host communities.

The CDP documents how affected communities in the broader Bahomea and Malango tribal areas, will receive benefits from a benefit sharing scheme which Government will develop with the affected indigenous peoples' communities. The "benefits" in the envisaged scheme are based on a portion of the project's revenue stream. The scheme will not be fully implemented until payments for electricity commence under the Power Purchase Agreement. In the meantime, the Bank is preparing a project to be financed by the Japan Social Development Fund to: (i) establish implementation arrangements; (ii) build the capacity of the communities to identify, implement and operate community projects; and (iii) to implement early investment projects (i.e. community water and electricity supply, and training) in advance of the launch of the scheme upon the first electricity payment.

The Bank Performance Standards do not apply to the Project's land acquisition (as it is undertaken by the Solomon Islands Government as the borrower). The process of free, prior and informed consultation to fully identify their views and to ascertain their broad community support for the project, including through a negotiated agreement for the acquisition of the Core Land is set out in the ESIA, LALRP and CDP.

Throughout project preparation, the Project Office has been engaged in extensive consultations with affected indigenous communities, guided by the use of a Stakeholder Engagement Plan. Numerous (over 200) community consultations and meetings with a range of stakeholder groups on a range of topics have been carried out during project preparation and these have been carefully documented by the Project Office through reports, surveys, photos and videos. Summaries are appended to the ESIA. As part



of the land acquisition process, the Project Office has also worked with indigenous groups to identify the tribes that are landowners of the core land area which has already been acquired by government via the statutory process. The land identification process which has involved chiefs and storytellers who are cognizant of the history of the land was initiated in November 2012. A number of meetings - which were open to community members - were convened to reach consensus on ownership and boundaries. This indigenous initiative has been of critical importance, not only because an agreement has been reached on boundaries required for the subsequent land acquisition, but perhaps more importantly because of the participatory process through which consensus was achieved. The land identification process has also led to the emergence of legitimate community leaders that can speak on behalf of the affected tribes which will be critical during the land acquisition and benefit sharing processes.

Involuntary Resettlement OP/BP 4.12

Yes

The project will not cause any physical displacement of people. Based on the technical design in the final feasibility study, the minimum area required for the hydroelectric plant and auxiliary facilities, the transmission towers and lines, and during construction, for the access roads, quarries, construction camps, and disposal sites has been identified and referred to as the "core land area." The core land area covers 428 ha. This land is uninhabited, and it is utilized by customary landowners primarily for hunting, non-timber forest products and, potentially, small-scale harvesting of timber. The tribal registries for the five tribes identified as landowners identify 781 people as affected by acquisition of the core land.

The Land and Titles Act provides two different ways by which the Government through the Commissioner of Lands may acquire land. Part V (Division 1) provides a process through the use of a Land Acquisition Officer who is appointed by the Commissioner. However, past experience of the indigenous land owners has been that this process



does not lead the parties, whom they consider the “rightful” owners, as being correctly identified and dealt with in a culturally appropriate manner. In an effort to address this shortcoming, the government approached the land acquisition process through the use of another statutory process, which exercises the provisions of Part V (Division 2), compulsory acquisition for public purpose.

Following an extensive consultation process with local stakeholders, the government has, as discussed above, facilitated land identification by indigenous groups in the core land area. Through the signing of a Process Agreement with the four identified tribes (Kochiabolo, Roha, Buhu Garo and Vuralingi) in August 2014 they confirmed their agreement for the Government to acquire the land for the purposes of the project. Subsequent to signing the Process Agreement, Government acquired the core land, which is now vested in the Commissioner of Lands.

Government has completed the statutory procedures under Division 2 of the Land and Titles Act, including the appeals period. The Commissioner has made offers to all five land-owning tribes (a fifth tribe was identified during the claims period) and, none of the tribes responded to the offer, thereby, making the offer final. As of March 2017, three tribes have received compensation. Under the terms of the Process Agreement, the members of each of the landowning tribes will be supported by SIG to register as members of a tribal cooperative association and receive compensation through an account in the name of the association. The process of setting up these accounts has been time consuming, as have ongoing discussions with the two tribes which have not yet received compensation as there are tribal members who wish to negotiate for a higher amount. SIG has placed the required amount of funds for compensation in an escrow account and will transfer the funds to each tribe as soon they proceed to establish cooperative associations. In addition to the compensation of land acquired, member of the core land tribes will receive a 1.5% royalty from the hydropower operation, 50% ownership of a land management company with



government, as well as income from the land lease, much of which would be used to administer the land management company. It is important to emphasize that the signing of the Process Agreement and the consensus on the statutory process would not have been possible without the successful indigenous land identification process which in turn was based on many years of in- depth stakeholder engagement.

A small number (12) of core land owners residents have agricultural assets on the core land and would be compensated for replacement. In addition to core landowners, individuals and households living in the infrastructure corridor (about 30 persons) will likely incur damage to their gardens. Both groups would receive a small grant for garden replacement. The Government contracted a consultant to prepare a Land Acquisition and Livelihood Restoration Plan (LALRP) to ensure that affected individuals will have their livelihoods restored, as necessary. The draft LALRP was disclosed on the Bank’s external website on August 15, 2016.

For Components 1 and 2, OP 4.12 will be triggered for as land has been acquired by a SIG entity (Performance Standard 5: Land Acquisition and Involuntary Resettlement is not triggered because the developer will not have any responsibilities that fall beyond government’s responsibility via its acquisition of land.). OP 4.12 is also triggered for Component 3 as the final transmission line route has not been fixed and could entail the acquisition of additional land. A Resettlement Policy Framework (RPF) to address land acquisition issues associated with the transmission line is included in the LALRP.

Terms of Reference for consultants advising on topics related to OP 4.12 will be approved by the Bank to ensure the requirements of the World Bank are effectively integrated into the TA work under Component 4.

For Component 1, the developer will be responsible for addressing dam safety under Performance Standard 4: Community Health, Safety and Security. Terms of Reference for consultants advising on topics related to this PS will be approved by the

Safety of Dams OP/BP 4.37

Yes



Bank to ensure the requirements of the Performance Standards are effectively integrated into the TA work under Component 4. The Construction Supervision and Quality Assurance Plan, Instrumentation Plan and Operations, Maintenance Plan and Framework of Emergency Preparedness Plan have been submitted to the Bank prior to appraisal. The plans include the key elements required for appraisal and the developer is finalizing with Bank feedback.

As part of project preparation the Project Office contracted four international experts, approved by the Bank, as members of the Dam Safety Advisory Panel, basing the Panel’s terms of reference on World Bank OP/BP 4.37. The members of the Panel provide ongoing advice on technical aspects of the project. They have been particularly active in advising on the completion of the Feasibility Study which is being used to negotiate Component 1 design with the developer. The Panel members also played an instrumental role in the selection of the final preferred location for the dam and other facilities, recommending a site which was further upstream than the site which the Feasibility Study consultants had previously identified, but which turned out to have superior geological conditions as well as more favorable financial and economic returns.

As part of Component 4, the Panel will continue to advise the Project Office, and government more broadly, through contracting, construction and initial operations.

Components 2 and 3 do not trigger OP/BP 4.37

Projects on International Waterways OP/BP 7.50	No
Projects in Disputed Areas OP/BP 7.60	No



## KEY SAFEGUARD POLICY ISSUES AND THEIR MANAGEMENT

### A. Summary of Key Safeguard Issues

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

The most significant environmental risks during project construction and operation will be alterations in the quantity and quality of water in the Tina River for drinking and washing and maintenance of aquatic habitat, and obstruction of fish migration up and downstream. Impacts on water quality will be limited to the construction period, but impacts on quantity and fish migration will persist as long as the project is operating and thus are considered long-term. Conversion of natural habitat is also a significant impact, and dam safety is an important issue. These are discussed in more detail below.

- *Alterations in downstream hydrology and water quality.* The 5.7 km reach of the river that will be bypassed by the tunnel between dam and powerhouse would be dry (except for minor inflow from small tributaries) other than during flood events large enough to cause releases via the dam spillway. Daily transitions from generation to non-generation would cause fluctuations in water flow downstream of the tailrace. Impacts could include loss of habitat for fish and other aquatic organisms, changes in fish spawning and migration behavior, abrupt changes in river level, and reduced availability of water for drinking and other human uses. The operator will be required to maintain an environmental flow of 1 m<sup>3</sup>/s below the dam, which the ESIA predicts is the minimum to mitigate loss of aquatic habitat and to allow fish movement in the dam-to-powerhouse reach. The operator will also maintain a minimum flow through the powerhouse at all times of day, and throughout the year of 2.43 m<sup>3</sup>/s (equivalent to the minimum generating discharge through one turbine) to maintain habitat in the wider channel downstream and reduce the range of flow fluctuations between periods of peak generation and reservoir refilling. Mitigation measures will be supplemented or modified on the basis of monitoring of water quality, fish populations, and aquatic invertebrates. Dam safety is being incorporated in the design and the operating plans in accordance with PS 4, under the guidance of a DSAP for which the terms of reference are based on OP 4.37 Safety of Dams.
- *Obstruction of fish migration.* Most of the fish species found during ESIA baseline surveys in the river near the dam and reservoir sites and in the upper reach of the river are migratory. The main mitigation measure in the ESMP, a “trap and haul” system, was selected as a practical, relatively low-cost option that has proven effective in New Zealand for climbing and crawling species similar to those found in the Tina River. Species that are true swimmers can be collected and hauled to upstream locations if they tend to migrate in congregations, but for those that do not, populations upstream of the dam will decline. Fortunately, none of the species identified in Tina River exhibits homing behavior – i.e., they do not have to return to the stream in which they originate and thus could spawn or mature in the adjacent Toni River, where available information indicates similar species composition and population density, or in other streams on Guadalcanal. Fish monitoring at the dam and upstream will be used to assess the effectiveness of the mitigation measures.
- *Conversion or degradation of natural habitat.* Installation of the dam will change about 2.6 km of the 36-km Tina/Ngalimbiu River system from flowing-water to lacustrine habitat. Operation of the project will affect aquatic natural habitat downstream by changing flow amounts and patterns and at least temporarily affecting water quality. Construction of the dam, powerhouse, access road, and transmission line will cause permanent conversion of 115 ha of land, 60 ha of which has forest cover, but only 9.5 ha of which can be considered primary forest and natural habitat. Additional natural habitat in the forms of 21.62 ha of riparian and 16.12 ha of cliff habitat will be affected. Changes in fish species composition and population density upstream of the



dam could cause other changes in aquatic ecology of the upper reaches of Tina River, where the stream drains primary montane forest habitat and is of near-pristine quality. The environmental flow and fish trap and haul system are mitigation measures for the potential loss of aquatic biodiversity, and, along with the plant and animal communities that will develop in the reservoir, should achieve no net loss in biodiversity in the middle and downstream reaches of the river. Changes in biodiversity in the upper reaches are difficult to predict: the project will not have direct or indirect impacts on the primary forest, some of which may prove to be critical habitat, but loggers are moving into the area and may cause degradation of the forest and, as a result, of the river. The Project's monitoring program will be important for tracking changes and formulating remedial measures. There have been proposals to accord protected status to the upper catchment, and the Bank would support any movements in that direction.

- The ESIA includes an assessment of cumulative impacts that considered the proposed hydropower development along with, among other things, potential expansion of gold mining and oil palm cultivation, logging in the catchment, changes in land tenure, and induced land development. Many of the potential impacts identified have low probability because, for example, expansion of gold mining into the Tina catchment is unlikely at least in the near term. The ESMP provides for a second phase of cumulative impact assessment culminating in a management strategy, to be undertaken by SIG.

Notwithstanding the potential benefits of lower cost and more stable power supply to all consumers and potential beneficiaries of the project, the main social impacts to be considered in the implementation of the project are those related to land acquisition and the construction and operation of the dam and associated infrastructure such as the access road and transmission line. A detailed Social Impact Assessment (SIA) was conducted as a part of the overall Environmental and Social Impact Assessment (ESIA) conducted during project preparation. This ESIA includes an Environmental and Social Management Plan (ESMP) which provides a comprehensive identification of the Project's social and environmental impacts and recommended mitigation measures for them.

**Policies triggered.** The ESIA and ESMP have been prepared to meet the requirements of the relevant World Bank safeguard policies and Performance Standards (PSs). Because Component 1 will be delivered by a private sector entity, the provisions of **OP/BP 4.03 – Performance Standards for Private Sector Activities** applies to this component. As a result, **for Component 1, the developer will be responsible for addressing seven of the eight World Bank Performance Standards.** Performance Standard 5: Land Acquisition and Involuntary Resettlement is not triggered for Component 1 because the developer will not have any responsibilities that fall beyond government's responsibility via its acquisition of land. **OP 4.12 – Involuntary Resettlement will be triggered** for Component 1 as the land process agreement is the responsibility of the SIG. OP 4.12 is also triggered for Components 3 as the transmission line route has not been fixed and could entail the acquisition of additional land. Terms of Reference for consultants advising on topics related to OP 4.12 will be approved by the Bank to ensure the requirements of the World Bank are effectively integrated into the TA work under Component 4.

For Component 1, the developer will be responsible for addressing **Performance Standard 8: Cultural Heritage**. For Components 2 and 3, MMERE and SIEA will address the requirements of **OP 4.11, Physical Cultural Heritage**, by applying the same procedures presented in the ESIA and ESMP.

In relation to Indigenous Peoples, for Component 1, the Government will be responsible for addressing land acquisition related elements of OP4.10 and the developer will be responsible for addressing **Performance Standard 7: Indigenous Peoples**. Under Components 2 and 3, SIG and SIEA will have the corresponding responsibility under **OP 4.10**. OP 4.10 also applies to Component 1, specifically to the land acquisition and resulting impacts on livelihoods. A separate Indigenous Peoples Plan (IPP) has not been prepared as the overwhelming majority of direct project



beneficiaries in the project area are indigenous peoples. Accordingly, IPP requirements have been integrated into the overall project design.

The Bank's Performance Standard 5 does not apply to the Project's land acquisition as it undertaken by the Solomon Islands Government as the borrower.. The process of free, prior and informed consultation to fully identify their views and to ascertain their broad community support for the project, including through a negotiated agreement for the acquisition of the Core Land is set out in the ESIA, LALRP and CDP.

**Disclosure.** The Government prepared a **Land Acquisition and Livelihood Restoration Plan (LALRP)** to ensure that affected individuals will have their livelihoods restored, as necessary. The draft LALRP was disclosed on the Bank's external website on August 15, 2016 and in-country at the PO on the same date, and then subsequently re-disclosed on the Bank's external website and in-country on January 27, 2017, in a substantially revised version.

Additionally, throughout project preparation, the PO has been engaged in an intensive process of **citizen engagement**, including more than 200 meetings with a range of stakeholder groups, including affected indigenous communities, on a range of topics and these have been carefully documented by the PO through reports, surveys, photos and videos. The project will also include a GRM to facilitate the submission of any questions or concerns relating to the project by members of the communities and other project stakeholders. Such comments or concerns would be addressed through a stepped process that begins with community dispute resolution mechanisms and can rise to the level of the World Bank.

A **Gender Action Plan (GAP)** has been completed as part of project preparation to guide the mainstreaming of gender into the TRHDP to help promote equal opportunities for women and men to participate in project benefits, with a particular focus on addressing impacts on communities directly affected by the TRHDP construction. The Plan includes, actions and monitoring and reporting arrangement.

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

The impacts are described in number 1 above. Only limited indirect impacts would be likely. The improved livelihoods and improvements in local infrastructure may attract people to the area. Similarly, the increased incomes (especially cash incomes) may create or exacerbate social issues such as gender based violence. This could increase pressure on land and other resources. To the extent that in-migrants are "outsiders", their presence could lead to social conflict.

The ESIA includes an assessment of potential cumulative impacts. The overall objective of the CIA is to identify environmental and social impacts associated with the TRHDP, that when combined with potential impacts of existing, planned and reasonably foreseeable developments or activities, may generate cumulative impacts that could jeopardize the sustainability of the TRHDP. This study looked at valued environmental components in the project area and assessed the impact of existing and possible future developments in the area including oil palm production, potential expansion of mining on the Gold Ridge tenement, artisanal and commercial harvesting of timber; and gravel extraction on the Ngalimbiu River.

A more in depth Cumulative Impact Assessment (CIA) will be undertaken during implementation.

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

Alternative energy sources were compared on the basis of energy production; economics; reliability and limitations; and environmental and social benefits and constraints: demand-side management, wave and tidal energy, diesel-



fueled generation (which, as a continuation of present practice, is also the “no-action alternative”), standard and pumped-storage hydro, solar, wind, geothermal, and gas-fired thermal. Ten different siting and configuration options were examined on Tina River, which had already been selected as the most favorable stream on Guadalcanal for hydroelectric development. Different dam heights were considered. Evaluation of several types of fish passes by a fishery expert led to the selection of “trap and haul” to mitigate impacts on fish migration.

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.

The ESMP in the ESIA prepared by the Government will guide the Project Company in preparing its own ESMP and related management plans for Components 1 and 2. Key provisions in the ESMP that address the potential significant impacts include the following.

- The operator will be required to maintain an environmental flow of 1 m<sup>3</sup>/s below the dam at all times, including during reservoir filling. The ESIA predicts this is the minimum to mitigate loss of aquatic habitat and to allow fish movement in the dam-to-powerhouse reach. The operator will also maintain a flow through the powerhouse equivalent to the minimum generating discharge through one turbine (2.43 m<sup>3</sup>/s) to maintain habitat in the wider channel downstream and reduce the range of flow fluctuations between periods of peak generation and reservoir refilling. Flows large enough to cause spillway release are projected to occur approximately 10 times per year, which should be sufficient to trigger normal fish spawning and migration in the river, and mitigation is therefore not required. The developer/operator will be obligated to provide new, permanent water supplies for communities along the dam-to-powerhouse reach and at least temporary replacement supplies for other downstream users that would be affected by water quality changes during dam construction.
- The main mitigation measure for impacts on fish migration in the ESMP, a “trap and haul” system, was selected as a practical, relatively low-cost option that has proven effective in New Zealand, at least for climbing and crawling species similar to those found in the Tina River. Species that are true swimmers can be collected and hauled to upstream locations if they tend to migrate in congregations, but for those that do not, populations upstream of the dam will decline. Mitigation measures will be supplemented or modified on the basis of monitoring of water quality, fish populations, and aquatic invertebrates. Provisions to minimize mortality of adult eels moving downstream will include screens at the water intake and changes in generating schedules to allow spillway releases during peak times of downstream migration. Fish monitoring at the dam and upstream will be used to assess the effectiveness of the mitigation measures.
- With respect to the conversion of terrestrial natural habitat in the project’s 400-ha core area, rehabilitation and protection of modified habitat in area equal to the amount of natural habitat converted will serve as an offset to achieve no net loss of biodiversity.
- Dam safety is being incorporated in the design and the operating plans in accordance with PS 4, under the guidance of a Dam Safety Advisory Panel engaged by MMERE, for which the terms of reference are based on OP 4.37 Safety of Dams.
- A key concern is the influx of workers, some of which will be foreign, and their interaction with local communities, in particular, women and children. To mitigate this risk, the ESIA clearly stipulates that overnight workers camp cannot be established within the project area. MMERE PO will also monitor this issue carefully through its regular community consultations. The ESIA and ESMP assess and set management criteria, including a requirement for the EPC contractor to prepare and implement a Labor Influx Management Plan, associated with construction workers, with a particular aim of protecting the health and well-being of women and children. The project developer and construction contractors will also be expected, in advance of any



construction work commencing on the project, to prepare and promulgate a code of conduct for its workers (and related visitors), including locals, other Solomon Islanders, and immigrants/expats. Importantly, the site is located close to Honiara (approximately 30 minutes from the airport and an hour from the center of the city). Furthermore, given the level of skills in the local area as a result of a previously operating gold mine in an adjacent valley, the project developer will be required to source workers as much as possible from the local area. This existing skill level is proposed to be supplemented by skills and vocational training under the community benefit sharing program. This will greatly reduce the social threats arising from inappropriate behavior of outside construction workers, and local people employed on the Project

- The ESIA details the budget and responsibilities for additional plans and studies to be prepared during project implementation. Among these are the need for additional cumulative impact assessment (CIA) studies as well as the preparation of a biodiversity management plan (BMP)

The Government, through the project office, has undertaken extensive consultation (over 200 documented meetings), prepared a comprehensive set of safeguard instruments (ESIA, ESMP, LALRP and CDP), completed a number of options assessments and design/option modifications and completed a wide range of specialist studies to address the environmental and social issues. The studies and technical work will be provided to the private sector developer to inform the detailed design and development of construction and operations methods to mitigate identified risks to be prepared by the developer for submission to the Government for development consent.

The Project Company will be required to have in place adequate, qualified staff to fulfill its ESMP commitments. The MMERE Project Office staff will need to be augmented so that it can provide proper oversight of the environmental, social, health, and safety aspects of the project. The Dam Safety Advisory Panel contracted by MMERE will remain in place during an initial period of operation, as will the, and MMERE will also engage an Independent Environmental and Social Monitoring Agent to monitor implementation of management and monitoring actions called for in the ESMP. The project will provide support to the Ministry of Environment, Climate Change, Disaster Management and Meteorology (MECDM) for its monitoring activities.

Component 4 of the project comprises a technical assistance (TA) which will support the operation of the TRHDP Project Office (PO) under MMERE to finance consultants to monitor overall project implementation, provide awareness building and training for various stakeholders, monitor and support environmental and social safeguard arrangements and the Gender Action Plan (GAP), maintain a Dam Safety Advisory Panel (DSAP) and an independent environmental and social monitoring agent, conduct cumulative impact assessment, liaise with various government counterparts and other stakeholders, support implementation arrangements agreed under the land acquisition process, support communities in utilizing their share of project benefits for community development, and to report to the Bank and other financiers on project performance and achievement of objectives.

A non-governmental organization (NGO) will also be engaged to work with landowning tribes in the upper catchment to support the first stages of establishing a protected area, up to the point of preparing a Protected Area Management Plan and Budget, if community members are interested and committed to doing so. The planning and implementation of the benefit sharing mechanism and the proposed protected area management shall adopt an inclusive community-based planning approach with due consideration to the gender dimensions of the activities

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



Electric power users on Guadalcanal are the broadest group of stakeholders. Stakeholders potentially affected by the project can be divided into several groups, some of which partly overlap: landowning tribes and families whose land is being acquired by the Government for the project; riverside dwellers and river users between dam and powerhouse; riverside dwellers and users downstream of the powerhouse but still in the upstream area; other residents in the upstream catchment; and river users downstream of the confluence of the Tina and Toni Rivers.

MMERE conducted an extensive program of community consultations prior to and during ESIA preparation. More than 45 village communities attended survey meetings. Attendees included tribal chiefs, village chiefs, men, women adolescents, and children -- 511 people in all. Mitigation workshops were held in February 2014 to meet with communities and present information on potential impacts of the Project, along with a first draft of possible mitigation measures. The aim of the workshops was to exchange ideas on these measures and to obtain input on people’s issues and concerns, including any grievances, regarding the potential project impacts. Communities affected by dam construction and operation, landowners who have customary rights in the project-affected area, and downstream affected communities were present at the mitigation workshops. NGOs and government agencies participated in separate workshops. A total of 442 people attended the workshops. Following these workshops, stakeholder issues and concerns were addressed in the impact assessment and mitigation sections of the ESIA. Mitigation measures were adapted to local population needs and aspirations. Subsequent to the disclosure of the draft ESIA in August 2016, in October/November 2016, MMERE presented the draft for discussion at two community meetings – one upstream at Tina Village and one downstream – and one meeting with NGOs. A revised ESIA was subsequently disclosed on January 25, 2017. Based on further feedback on the drafts, another revision will be disclosed in early May.

Moving forward, the Project Office and Project Company will have dedicated communications people who will work alongside community liaison staff to ensure all stakeholders are fully engaged throughout the project cycle. This will include an ongoing community information process and timely disclosure of any updates to the ESIA, ESMP, LALRAP or detailed sub plans which will be required for adaptive management throughout implementation.

**B. Disclosure Requirements (N.B. The sections below appear only if corresponding safeguard policy is triggered)**

**Environmental Assessment/Audit/Management Plan/Other**

Date of receipt by the Bank	Date of submission to InfoShop	For category A projects, date of distributing the Executive Summary of the EA to the Executive Directors
15-Aug-2016	15-Aug-2016	

**"In country" Disclosure**

Solomon Islands  
15-Aug-2016

Comments

Made available at the Tina River Hydropower Project Office in Honiara.



**Resettlement Action Plan/Framework/Policy Process**

Date of receipt by the Bank

15-Aug-2016

Date of submission to InfoShop

15-Aug-2016

**"In country" Disclosure**

Solomon Islands

15-Aug-2016

Comments

Made available at the Tina River Hydropower Project Office in Honiara.

**Indigenous Peoples Development Plan/Framework**

Date of receipt by the Bank

15-Aug-2016

Date of submission to InfoShop

15-Aug-2016

**"In country" Disclosure**

Solomon Islands

15-Aug-2016

Comments

A separate Indigenous Peoples Plan is not being prepared in keeping with the provision of OP 4.10 that IPP requirements can be integrated into the overall project design when the overwhelming majority of direct project beneficiaries are indigenous people. The analysis leading to this assessment is contained in the Social Impact Assessment section of the ESIA.

**C. Compliance Monitoring Indicators at the Corporate Level (to be filled in when the ISDS is finalized by the project decision meeting) (N.B. The sections below appear only if corresponding safeguard policy is triggered)**

**OP/BP/GP 4.01 - Environment Assessment**

Does the project require a stand-alone EA (including EMP) report?

Yes

If yes, then did the Regional Environment Unit or Practice Manager (PM) review and approve the EA report?

Yes

Are the cost and the accountabilities for the EMP incorporated in the credit/loan?

Yes

**OP/BP 4.04 - Natural Habitats**



Would the project result in any significant conversion or degradation of critical natural habitats?

No

If the project would result in significant conversion or degradation of other (non-critical) natural habitats, does the project include mitigation measures acceptable to the Bank?

Yes

**OP/BP 4.11 - Physical Cultural Resources**

Does the EA include adequate measures related to cultural property?

Yes

Does the credit/loan incorporate mechanisms to mitigate the potential adverse impacts on cultural property?

Yes

**OP/BP 4.10 - Indigenous Peoples**

Has a separate Indigenous Peoples Plan/Planning Framework (as appropriate) been prepared in consultation with affected Indigenous Peoples?

NA

**OP/BP 4.12 - Involuntary Resettlement**

Has a resettlement plan/abbreviated plan/policy framework/process framework (as appropriate) been prepared?

Yes

If yes, then did the Regional unit responsible for safeguards or Practice Manager review the plan?

Yes

Is physical displacement/relocation expected?

No

Is economic displacement expected? (loss of assets or access to assets that leads to loss of income sources or other means of livelihoods)

Yes

Provide estimated number of people to be affected 781

**OP/BP 4.36 - Forests**

Has the sector-wide analysis of policy and institutional issues and constraints been carried out?

Yes

Does the project design include satisfactory measures to overcome these constraints?

Yes

Does the project finance commercial harvesting, and if so, does it include provisions for certification system?

No

**The World Bank Policy on Disclosure of Information**



Have relevant safeguard policies documents been sent to the World Bank's Infoshop?

Yes

Have relevant documents been disclosed in-country in a public place in a form and language that are understandable and accessible to project-affected groups and local NGOs?

Yes

### **All Safeguard Policies**

Have satisfactory calendar, budget and clear institutional responsibilities been prepared for the implementation of measures related to safeguard policies?

Yes

Have costs related to safeguard policy measures been included in the project cost?

Yes

Does the Monitoring and Evaluation system of the project include the monitoring of safeguard impacts and measures related to safeguard policies?

Yes

Have satisfactory implementation arrangements been agreed with the borrower and the same been adequately reflected in the project legal documents?

## **CONTACT POINT**

### **World Bank**

Takafumi Kadono  
Senior Energy Specialist

Erik Caldwell Johnson  
Senior Social Development Specialist

### **Borrower/Client/Recipient**

Ministry of Finance and Treasury

### **Implementing Agencies**



Ministry of Mines, Energy and Rural Electrification  
Jeffrey Sade Deve  
Permanent Secretary  
jdeve@mmere.gov.sb

**FOR MORE INFORMATION CONTACT**

The World Bank  
1818 H Street, NW  
Washington, D.C. 20433  
Telephone: (202) 473-1000  
Web: <http://www.worldbank.org/projects>

**APPROVAL**

Task Team Leader(s):	Takafumi Kadono Erik Caldwell Johnson
----------------------	--

**Approved By**

Safeguards Advisor:	Peter Leonard	May 8, 2017
Practice Manager/Manager:	Jie Tang	May 8, 2017
Country Director:	Michel Kerf	May 8, 2017