Chapter 6 Environmental and Social Considerations

6-1. Environmental and social considerations

For this preparatory study, the analysis of environmental and social concerns pertaining to the project has been carried out based fundamentally on JICA's "Guidelines for Environmental and Social Considerations (April 2010)." For the environmental impact assessment of the project, where possible the results have been compiled in accordance with JICA's "Report Guidelines for Environmental and Social Considerations for Category B Projects (June 2011)."

6-1-1. Overview of the elements of the project with environmental or social impact

The planned project is a run-of-the-river method hydropower-generating project based in the municipality of Sibagat in the Philippine province of Agusan del Sur. It involves the construction of three intake weirs and two power plants on the Wawa River (Wawa River No. 1 and Wawa River No. 2). The three weirs will have peak intake levels of 10.0 m^3/s (for Wawa River No. 1) and 3.4 m^3/s (for Wawa River No. 2) on the main body of the Wawa River, and 4.20 m^3/s (for Wawa River No. 2) on the Manangon River, a tributary of the Wawa. The maximum power-generating capacity of each power plant will be 2.58 MW for Wawa River No. 1 and 10.2 MW for Wawa River No. 2, for a total of 12.78 MW.

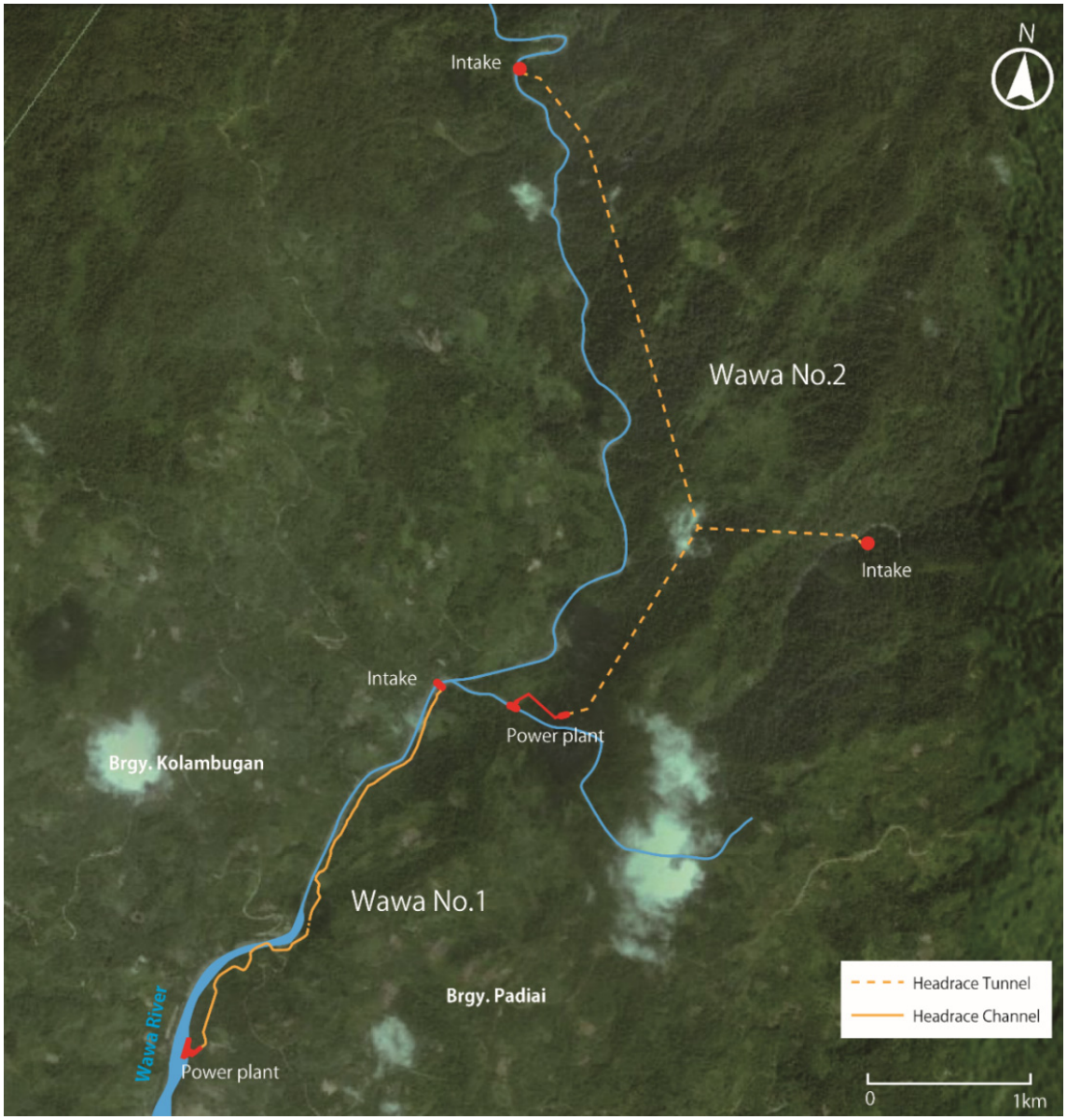


Fig. 6-1: The planned project site

Source: Created by the study team

6-1-2. Current environmental and social situation

(1) Land use

The area around the planned project site is, generally speaking, part of the mountainous forest region of the island of Mindanao, but in terms of land use, the sites of the various components of the project differ greatly. The land around Wawa River No. 1 power plant features residential areas and farmland, but the site for Wawa River No. 2 is far from any settlements and is predominantly surrounded by forestland. There are no sites of cultural or historical importance in the area, or any sites to which the indigenous population may have a collective attachment.

(2) Natural environmental situation

The planned project sites lie within or adjacent to the Mt. Hilong-hilong Area, identified as a Key Biodiversity Area (KBA) for the protection of a wide range of animal and plant species, within the

Eastern Mindanao Biodiversity Corridor.

In the surrounding areas lie two watershed forest reserves (WFRs), designated as protected areas by Philippine law: the Andanan Watershed Forest Reserve in the province of Agusan del Sur, and the Taguibo Watershed Forest Reserve in the province of Agusan del Norte. However, neither encompasses the area of the Wawa River planned for this project; the WFRs lie roughly 10 km and 3 km away respectively from the project area (see Fig. 6-2). In terms of the implementation of this project, however, neither these WFRs nor KBAs are officially specified as protected areas under the National Integrated Protected Area System (NIPAS) Law, meaning that while they may have protected status, there is no legal restriction on development in the planned area.

However, in the hearings conducted in Sibagat in December, it emerged that the municipality of Sibagat has applied to the Environmental Management Bureau (EMB), a subsidiary body of the Department of Environment and Natural Resources (DENR), to have the Wawa River area, including the planned project area, designated as the “Wawa River Basin Protected Landscape.” Approval for this proposal is expected to be received during 2016.

An additional issue is that the planned project site lies adjacent to an area of forestland designated as protected by the municipality of Sibagat. Indeed, part of the water conduit for the Wawa No. 2 power plant is projected to run through this area. However, the conduit is planned to be encompassed by an underground tunnel, meaning that only the tunnel mouth will appear at the surface level, and no felling of trees will be necessary (see Fig. 6-3).

As can be appreciated, the planned project site lies within an area of rich biodiversity, meaning that all due consideration must be given to the ecological systems of the area. The current situation and planned responses to environmental concerns pertaining to the project are summarized in the table below.

Table 6-1: Project status with respect to environmental concerns

Environmental concern	Project status
Appropriateness of implementing the project within a KBA; possible alternative solutions	・ The province of Agusan del Sur contains no power plants, exacerbating the power shortage issue it faces. ・ The planned project site lies in the optimal area in Agusan del Sur for a hydro plant in terms of flood discharge rates and topography.
Possibility of significant impact on the ecological systems of the area	・ The water conduit for Wawa No. 1 will follow the Wawa River, avoiding deep penetration into forest areas. The water conduit for Wawa No. 2 is planned to be constructed in a forestland area, but will take the form of a subterranean tunnel. ・ Any land alterations caused by the project will be kept to an absolute minimum, and will not cause any significant changes or damage to the natural living environment. We believe there will be no significant effect on the ecosystems of the area, and that the function of the biodiversity corridor will not be adversely affected.
Possibility of a reduction in the numbers of protected species	・ The water conduit for Wawa No. 1 will follow the Wawa River, avoiding deep penetration into forest areas. The water conduit for Wawa No. 2 is planned to be constructed in a forestland area, but will take the form of a subterranean tunnel. ・ Any land alterations caused by the project will be kept to an absolute minimum. Further, as the project area is not designated as a living or breeding area for any threatened species, it is believed that the project would not lead to a reduction in the numbers of any such species.
Implementation of environmental monitoring	・ Although the impact of the operation of the plant on the terrestrial biota of the area will be restricted and is believed to be insignificant in degree, environmental changes for the aquatic biota in the areas from which water will be drawn will be autonomously monitored for a year after implementation.

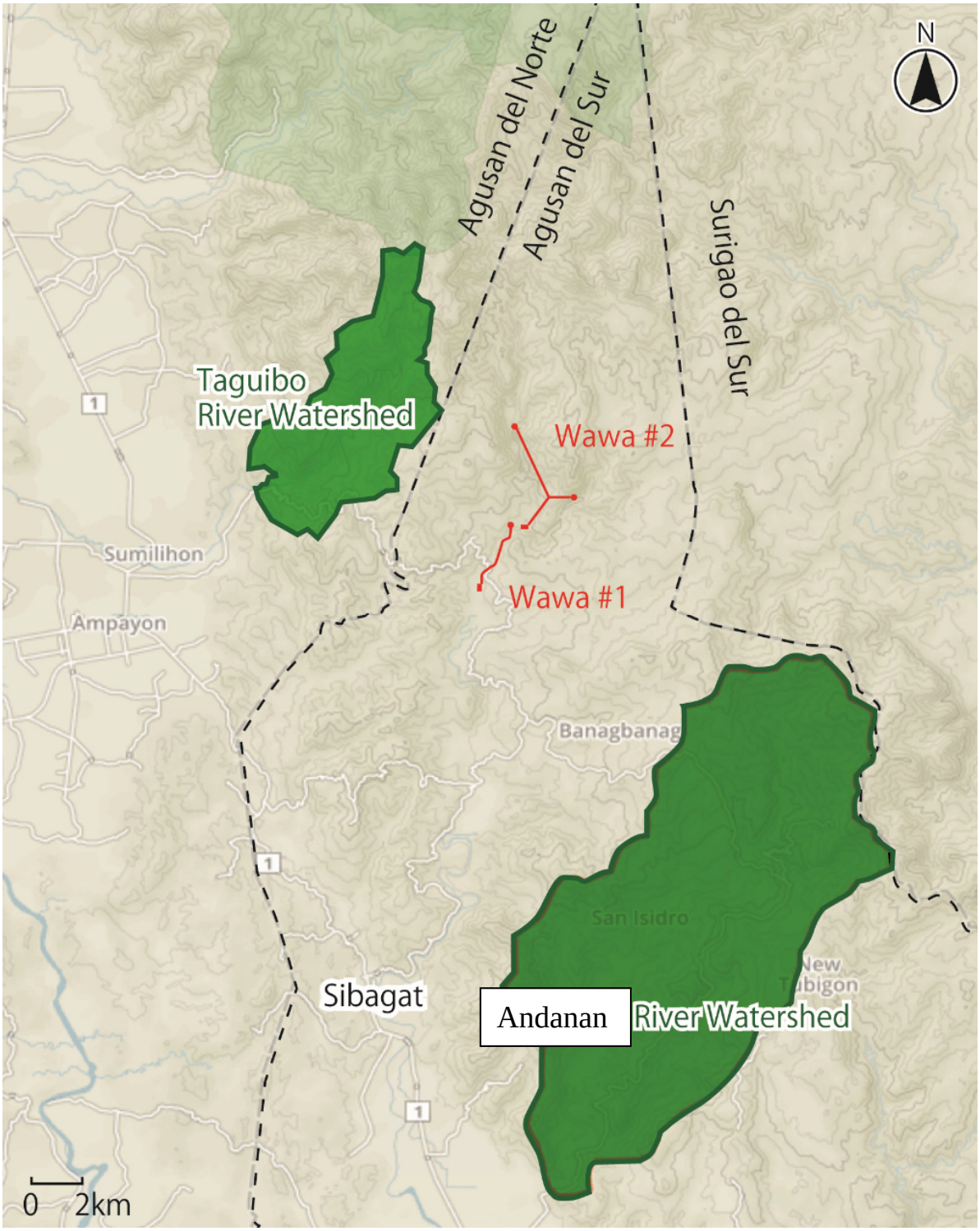


Fig. 6-2: Location of planned project site in relation to nearby protected areas

Source: Created by the study team

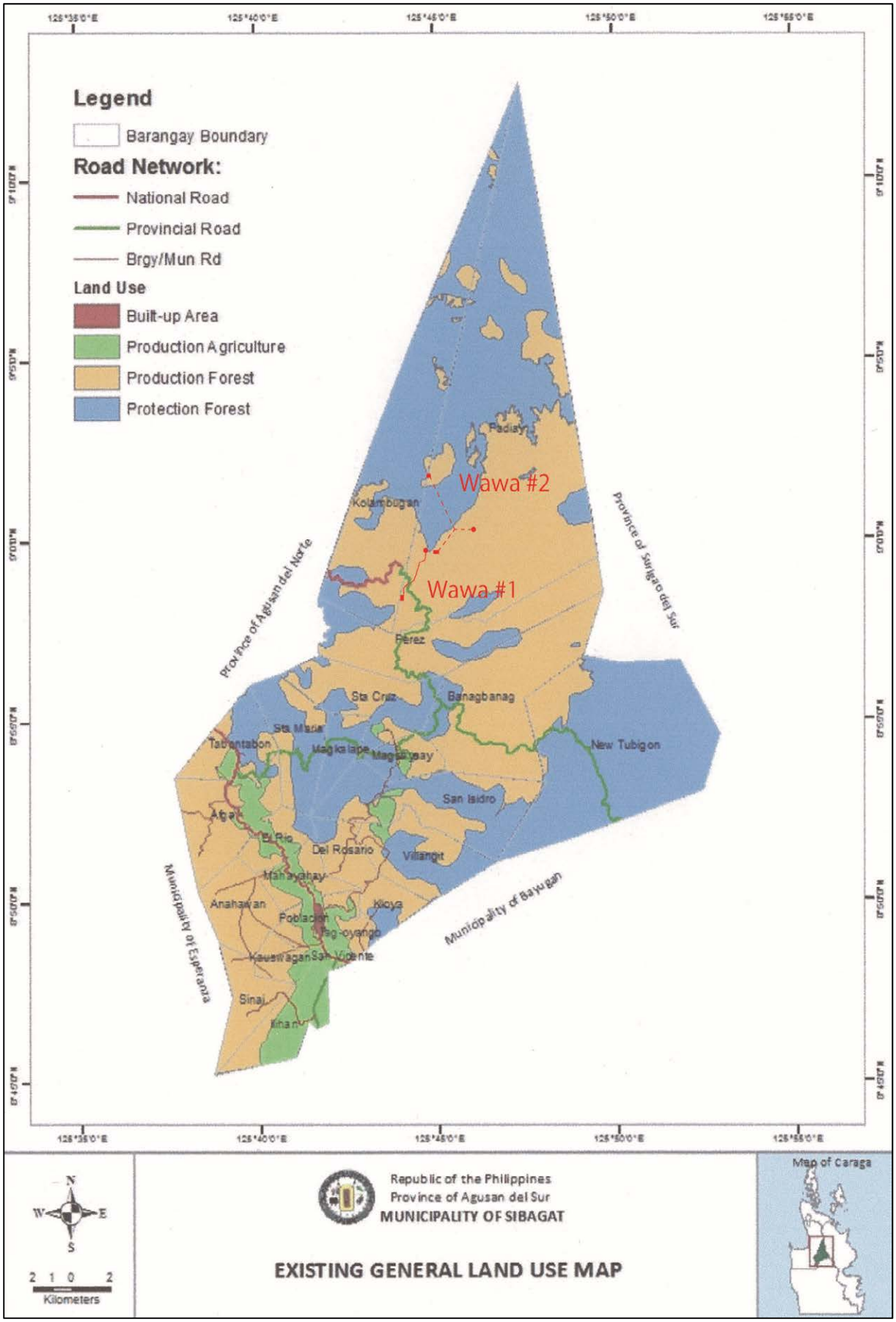


Fig. 6-3: Location of planned project site in relation to protected forestland

Source: Municipality of Sibagat

(3) Social situation of the planned project area

The planned project area straddles the barangays of Padiay and Kolambugan, in the municipality of Sibagat. Sibagat, in turn, lies within the province of Agusan del Sur, which forms part of Region XIII, or the Caraga Administrative Region, of the Philippines.

An overview of the particulars of the barangays of Padiay and Kolambugan is shown in Table 6-2 below.

Table 6-2: Overview of the barangays of Padiay and Kolambugan

Category		Padiay	Kolambugan
No. of districts (Puroks)		8	7
Total area (ha)		14,300	8,862
1	Residential	4.4	4.0
2	Farmland	344.4	361.4
3	Forestland	9,237.4	2,532.0
4	Shrub and grassland	4,711.8	5,962.5
5	Other (incl. cemeteries)	2.0	2.0
6	Mining and industrial	0.01	0.0
Population (pop. density)		1,175 (0.08)	2,207 (0.25)
Indigenous population (ratio)		920 (78%)	936 (42%)
Working population		716 (60.9%) (of which 430 are employed (36.6%))	1,492 (67.6%) (of which 829 are employed (37.6%))
Economic activity (main industries)		Agriculture	Agriculture and forestry
Households		251	276
Ethnic groups		Visayan (54.2%) Manobo (45.8%)	Visayan (57.61%) Manobo (42.39%)
Water sources (household, drinking water)		Spring water	Spring water, well water
Electrification		All households use kerosene lamps	7 households use generators for electricity. 269 households use kerosene lamps.
Sanitation		Households with toilets: 120	Households with toilets: 172

Source: “Barangay Development Plan Padiay (Municipality of Sibagat, Province of Agusan del Sur, CY 2003-2007)” and “Barangay Development Plan Kolambugan (Municipality of Sibagat, Province of Agusan del Sur, CY 2003-2007)”

The planned project site is on land that has been issued with a Certificate Of Ancestral Domain Title (CADT) by the provincial office of the National Commission on Indigenous Peoples (NCIP), meaning that the indigenous peoples of the area have right of priority to the collection, extraction, development and use of all natural resources within their ancestral domain. As a result, the SPC created to run this project is required to obtain consent from the indigenous peoples before carrying out any activity (particularly construction), in the form of a “Free, Prior and Informed Consent” (FPIC) document, as stipulated in the Indigenous Peoples’ Rights Act (IPRA). Details of this are given in section 6-2 of this report.

An indigenous people known as the Manobo tribe live in the barangays of Padiay and Kolambugan, but due to the fact that they are willing to intermarry with those from tribes other than their own and

that migration to other places is practiced in much the same way as in other areas, they do not fit the strict definition of an “indigenous people” as established as the fundamental international standard by the World Bank. Nevertheless, they fit the definition of an indigenous people under Philippine law, as a “group of people who share a sense of identification with certain linguistic and cultural characteristics, and who live in a certain area.” It can be seen, therefore, that while the residents of the area surrounding the planned project site may be defined as “indigenous peoples” under Philippine law (RA 8371), their lifestyles have changed with the flow of history, allowing them to have the same educational opportunities as city-dwellers, for example, and to have a full understanding of the monetary economy. Now, they no longer exist as an ethnic group which protects its own social, economic and political systems, but instead live their lives in accordance with the administrative systems established by the government of the day.

Table 6-3: Current situation of the Manobo tribe living in the area near the planned project site

JICA guidelines; definition of indigenous peoples	Current situation of the indigenous peoples living near the planned project site
・Self-identification as members of a distinct cultural group and recognition of this identity by others	・Lifestyles have changed with the flow of history, allowing them to have the same educational opportunities as those in other areas, for example, and to have a full understanding of the monetary economy. ・A willingness to intermarry with individuals from other ethnicities, such as the Visayans, means that the barangay population is now roughly half Manobo and half Visayan. The Manobo are also not completely cut off from the culture and customs of other ethnicities and urban areas.
・Collective attachment to geographically distinct habitats or ancestral territories and to the natural resources in these habitats and territories	・While their habitat is an ancestral territory, migration to other areas is practiced. ・Further, there is no collective or religious attachment to the territory.
・Customary cultural, economic, social or political institutions that are separate from those of the dominant society and culture	・Both barangays are under the administrative control of the municipality of Sibagat. No customary economic, social or political institutions exist. ・Further, a willingness to intermarry with individuals from other ethnicities means that they are not completely cut off from the culture and customs of other ethnicities and urban areas.
・Usage of a language that differs from the official language of the country	・The residents of the area use the Visayan language. ・While this differs from the predominant language of the Manila region, Tagalog, Visayan is not only used in the area around the planned project area on the island of Mindanao, but is the primary mother tongue throughout the southern islands of the Philippines.

One final issue is that the planned project site lies within a Community-Based Forest Management (CBFM) area under the management of the local community pursuant to DENR Administrative Order 92-30, which means that permission is required for any development. In practice, however, the land has been issued with a CADT, making it the property of the indigenous peoples. As this is not public land, involvement of the DENR with this forestland will only be at the same level as for any privately-owned piece of land.

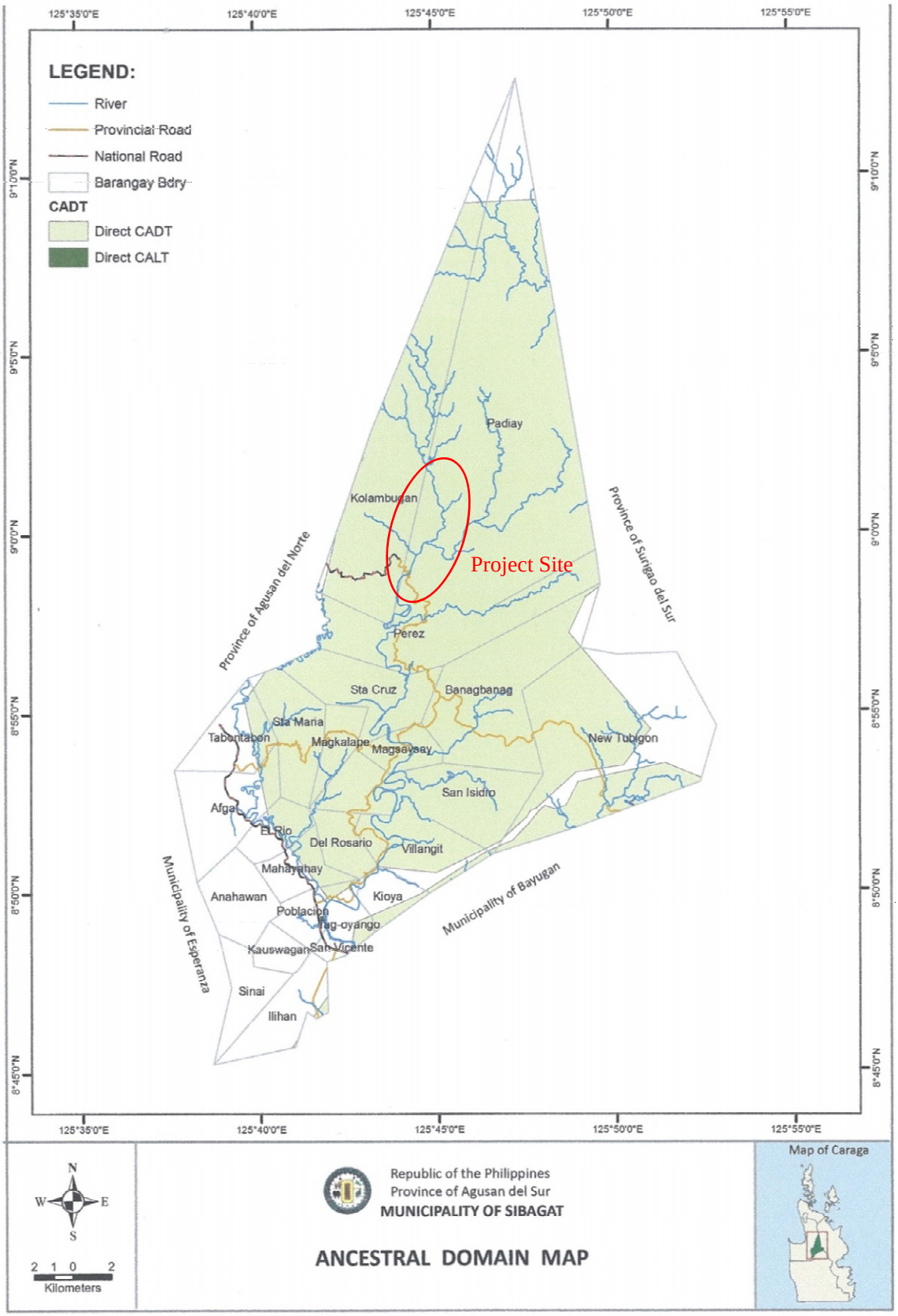


Fig. 6-4: Location of planned project site in relation to ancestral domains

Source: Municipality of Sibagat

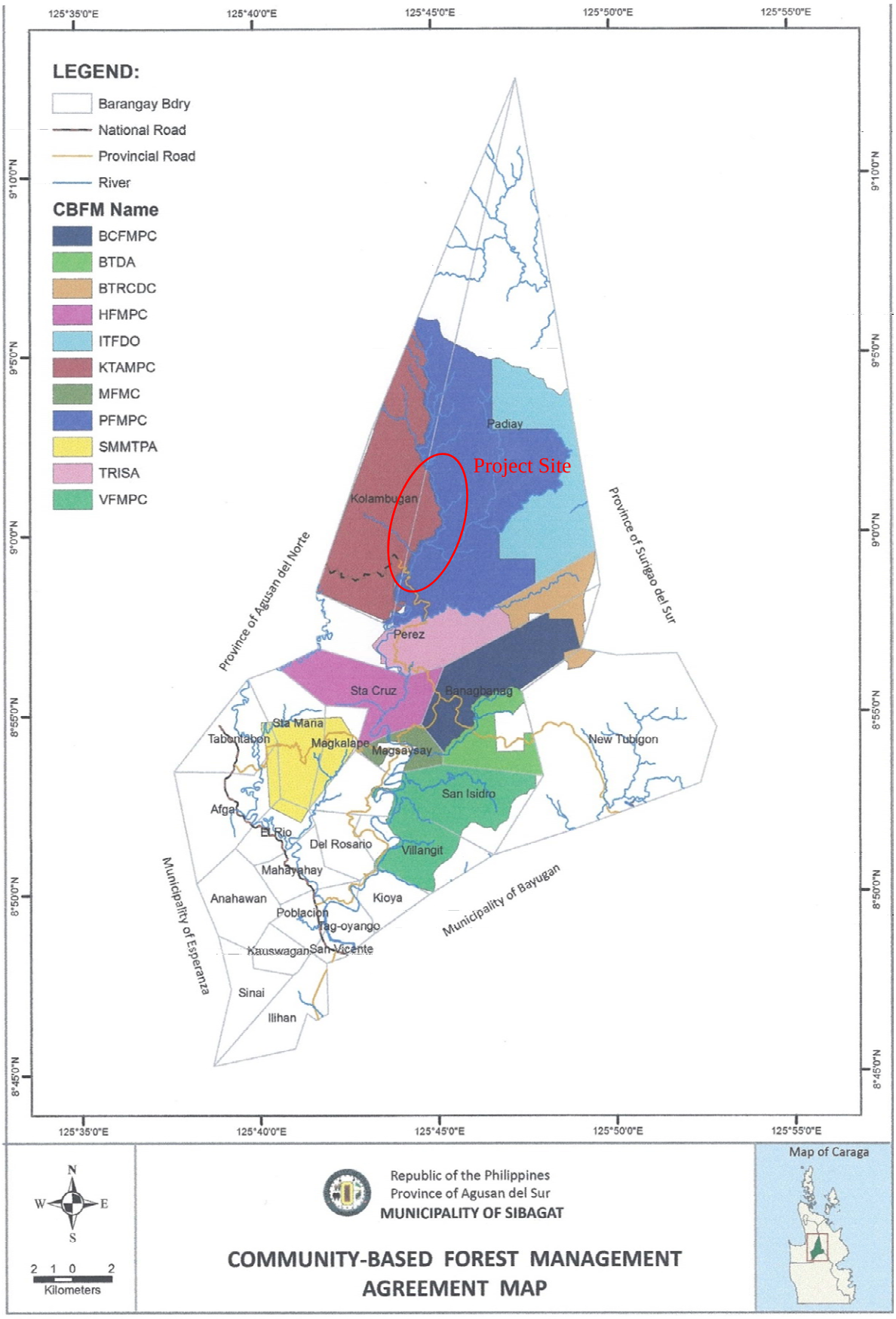


Fig. 6-5: Location of planned project site in relation to CBFM areas

Source: Municipality of Sibagat

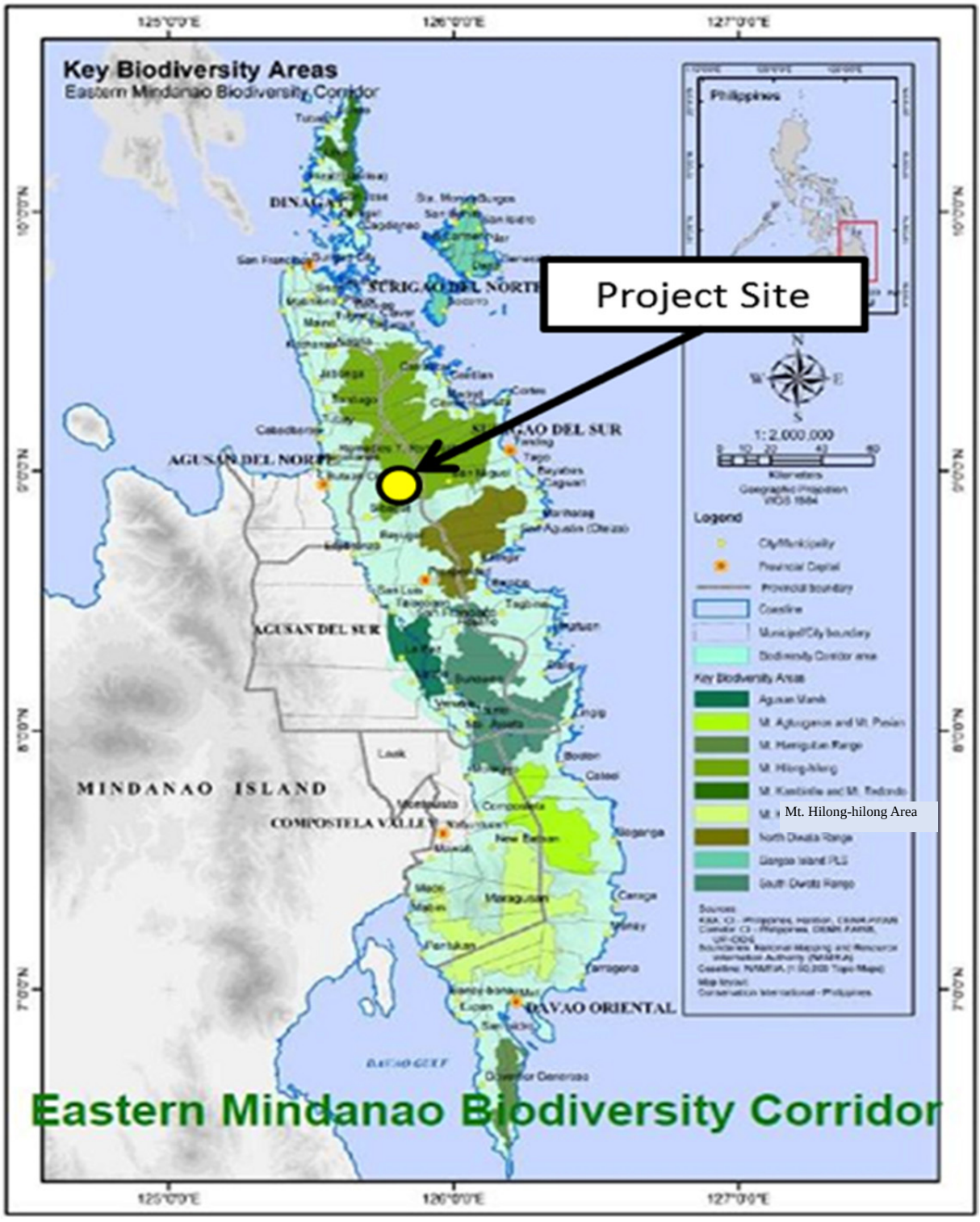


Fig. 6-6: Key Biodiversity Areas in eastern Mindanao

Source: Created by the study group based on the “Agusan River Basin Integrated Water Resources Management Project Draft Final Report 2010”

6-1-3. Systems and organizations overseeing environmental and social concerns in the Philippines

(1) Environmental management organizations

The Department of Environment and Natural Resources (DENR) was established in 1987 as the governmental authority for environmental administration in the Philippines. The DENR has put in

place policies to strike a balance between development and environmental management, and allow for the sustained use of the country's natural resources. As can be seen in Fig. 6-7 below, the DENR oversees six distinct bureaus, each of which handles the practical tasks of the area under their purview: the Forest Management Bureau, the Mines and Geosciences Bureau, the Environmental Management Bureau, the Ecosystem Research and Development Bureau, the Protected Areas and Wildlife Management Bureau and the Land Management Bureau. Of these, it is the Environmental Management Bureau (EMB) which has jurisdiction over environmental management, pollution prevention and environmental assessment. Aside from overseeing air and water quality and conducting environmental assessments, the EMB also coordinates with other governmental agencies. As shown in Fig. 6-8 below, the EMB is made up of four standard divisions (Legal Division, Research and Development Division, Environmental Quality Division and Environmental Education Division), and a further two divisions under the direct supervision of the director (Administrative and Finance Division and General Affairs Division).

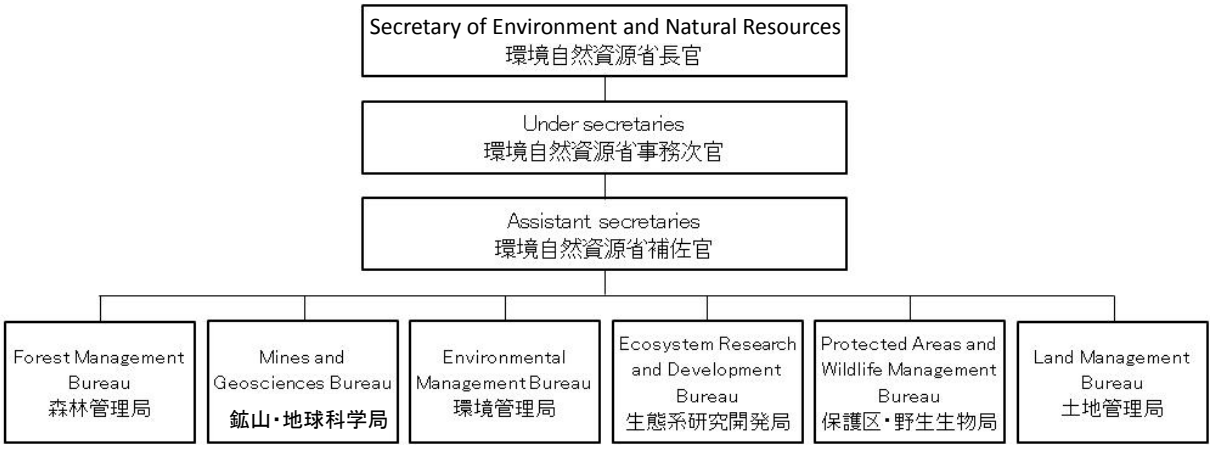


Fig. 6-7: DENR organization chart

Source: Created by the study team

Fig. 6-8: EMB organization chart

Source: Created by the study team

The DENR also has 16 regional offices, each of which is responsible for multiple provinces. In most cases, each province has a Provincial Environment and Natural Resource Office (PENRO), beneath which are several Community Environment and Natural Resource Offices (CENRO), each of which

oversees one or more municipalities or barangays. The province of Agusan del Sur falls under the jurisdiction of the Caraga Regional Office (Region 13).

(2) Environmental laws and regulations

In terms of laws pertaining to environmental issues in general in the Philippines, the Philippine Environmental Policy (Presidential Decree No. 1151) and Philippine Environmental Code (Presidential Decree No. 1152) were enacted in 1977, and are equivalent to Japan's Basic Environment Law. Presidential Decree No. 1151 defines the state's environmental policies and goals, asserts the right of every citizen to a healthy environment, and outlines the guidelines for requesting an Environmental Impact Statement (EIS) and the agencies which will carry it out. Presidential Decree No. 1152, which follows the same guiding principles as Presidential Decree No. 1151, defines the standards for the control of air quality, water quality, land use, natural resources and waste.

Table 6-4: Environmental laws and regulations in the Philippines

Field	Law	Year of enactment	Registered number
Basic environmental laws	Philippine Environmental Policy	1977	Presidential Decree No. 1151
	Philippine Environmental Code	1977	Presidential Decree No. 1152
Natural environment	Natural Environmental Protection Law	1977	Presidential Decree No. 1198
Wildlife	Act Creating the Commission of Parks and Wildlife	1952	Republic Act No. 826
	Wildlife Resources Conservation and Protection Act	2001	Republic Act No. 9147
Forest resources	Prescribing the Procedures for the Processing of Applications for the Development of Forest Resources	1987	Executive Order No. 278
Air quality	Air Quality Standard	1993	DENR Administrative Order No. 14
	Philippine Clean Air Act of 1999	1999	Republic Act No. 8749
	Implementing Rules and Regulations for RA 8749	2000	DENR Administrative Order No. 81
Water quality	Water Usage and Classification / Water Quality Criteria	1990	DENR Administrative Order No. 34
	Effluent Regulations	1990	DENR Administrative Order No. 35
	Clean Water Act	2004	Republic Act No. 9275
	Implementing Rules and Regulations of the Philippine Clean Water Act of 2004	2005	DENR Administrative Order No. 10
Noise pollution	Noise Control Regulations	1980	NPCC Memorandum Circular No. 002, Series of 1980
Waste management	Sanitation Code	1975	Presidential Decree No. 856
	Toxic Substances and Hazardous and Nuclear Wastes Control Act	1990	Republic Act No. 6969
	Ecological Solid Waste Management Act	2000	Republic Act No. 9003
Environmental impact	Philippine Environmental Impact Statement System (PEISS)	1978	Presidential Decree No. 1586

Field	Law	Year of enactment	Registered number
assessment	Implementing Rules and Regulations (IRR) for the Philippine Environmental Impact Statement (EIS) System	2003	DENR Administrative Order No. 30
	Revised Guidelines for Coverage Screening and Standardized Requirements under the Philippine Environmental Impact Statement System (PEISS)	2014	EMB Memorandum Circular No. 005

Source: Created by the study team

(3) Environmental impact assessment procedures

The Philippine Environmental Impact Statement System (PEISS) was established in 1978 by Presidential Decree No. 1586 to serve as the standard for environmental impact assessments in the Philippines. This system outlines the process for environmental impact assessment; before a project can be undertaken, an environmental impact assessment study must be conducted, an examination must be carried out by the relevant authorities, and an Environmental Compliance Certificate (ECC) must be issued. This process is carried out in accordance with the "Revised Procedural Manual for DAO 2003-30," issued by the DENR in August of 2007. This procedure falls under the jurisdiction of the EMB, and depending on the scale of the enterprise, it will either be overseen by the main body of the organization or its regional offices; larger-scale enterprises will fall under the purview of the main office, while the regional offices handle all smaller projects.

PEISS procedures differ depending on the scale and expected environmental impact of the project under review. According to the EIS examination standard guidelines (EMC No. 005), projects are to be divided into the following four categories.

- Category A: Projects which may pose a threat of significant damage to the environment (Environmentally Critical Projects, or ECPs)
- Category B: Projects in areas determined to be of environmental importance (areas prone to environmental influence, known as Environmentally Critical Areas, or ECAs)
- Category C: Projects designed to improve the environmental situation or respond to environmental issues
- Category D: Projects which do not fit into any of the above categories

Projects considered ECPs are required to submit an Environmental Impact Statement (EIS) to the local EMB regional office, while other projects are required to submit either an EIS or an Initial Environmental Examination (IEE) checklist or similar document, in order to obtain an Environmental Compliance Certificate (ECC). The designated period for an ECC to be issued is 60 working days for projects submitting an EIS, and 30 working days for projects submitting an IEE checklist.

For hydropower generation projects in the Philippines, categories may be further subdivided depending on the scale of the project and the presence or otherwise of a tunnel.

This project involves the construction of three intake weirs and two power plants on the Wawa and Manangon Rivers. The maximum generating capacity of the two plants is planned to be 2.58 MW for

Wawa No. 1 and 10.2 MW for Wawa No. 2. The construction periods and applications for each power plant will be separate, so the environmental impact assessment procedures will also be carried out independently of each other.

With generating capacity of 2.58 MW and 10.2 MW respectively, neither Wawa No. 1 nor Wawa No. 2 can be considered ECPs, and as the planned project site is not in a legally protected area, they do not fall into the ECA category either. According to the "Revised Guidelines for Coverage Screening and Standardized Requirements (EMB MC 2004-05)," the two components of the Wawa River hydropower project are assessed as fitting into category B. However, as both No. 1 and No. 2 use tunnels for part of their water conduits, it will be necessary to submit an EIS report in order to receive an Environmental Compliance Certificate. Furthermore, should the Wawa River area, including the planned project site, be officially designated as a protected area, the project will be considered an ECA project. However, as the scale of the project is insufficient to warrant ECP status, it will still fall into category B, requiring the submission of an EIS report in order to obtain an Environmental Compliance Certificate. Even in this case, no additional procedures will need to be followed from an environmental impact perspective.

Table 6-5: Category divisions in the Philippine Environmental Impact Statement System

Project	ECC required			ECC not required
	Category A: ECP	Category B: Non-ECP		Category D
	EIS	EIS	IEE Checklist	PD
Hydropower generating facility	≧50 MW	≧10 MW but <50 MW or featuring a tunnel (regardless of capacity)	>1 MW but <10 MW; no tunnels	≦1 MW; no tunnels

Source：Revised Guidelines for Coverage Screening and Standardized Requirements (EMB MC No. 005)

Fig. 6-9 is an overview of the EIA process in the Philippines.

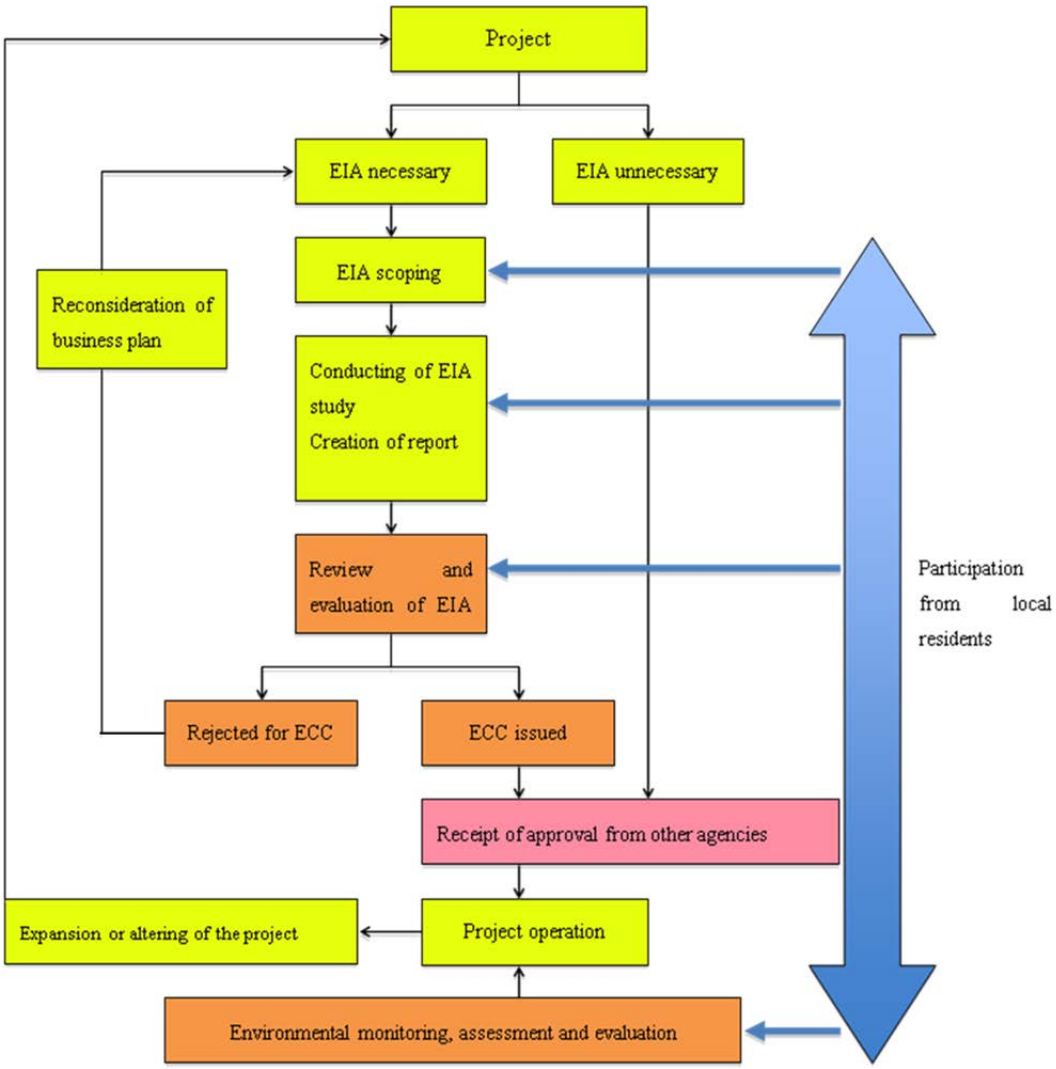


Fig. 6-9: Philippine EIA process overview

Source: DENR Administrative Order 2003-30

6-1-4. Considerations of alternative solutions

A comparative analysis was carried out of alternative solutions to the overall project plan in consideration of all of the pertinent factors, including the option of canceling the project entirely (zero option). The optimal solution was selected after assessing the plans from technical, economic, environmental and social perspectives. Below is a summary of the analysis of alternative solutions to address environmental issues, including the zero option.

(1) Cancelation of the project (zero option)

Should this project be canceled, and a thermal power plant using fossil fuels be constructed and operated as an alternative solution to the area's energy shortage, it is believed that the impact on the surrounding environment and the release of greenhouse gases would increase. While the proposed project is small in scale, it will have a definite positive effect on the quality of life of the residents of the area. Although a temporary negative impact will be caused by the construction phase of the project, this is far outweighed by the positive effects of the enterprise once it is operational.

Below is a calculation of the expected state of greenhouse gas emissions (carbon dioxide emissions) should the project not go ahead. As this project involves the construction of a hydro plant, it will produce no CO2 emissions as part of the electricity-generating process, meaning that significant CO2 reductions can be expected when compared to a thermal power plant using fossil fuels. In order to quantify the effect of this environmental amelioration, a calculation was undertaken to ascertain the CO2 output of a diesel generator producing the same amount of electricity as will be supplied by this hydropower project.

The planned capacity and estimated yearly electricity production of the hydro plants are outlined in Table 6-6 below.

Table 6-6: Electricity generated by this project

Component	Planned output capacity (MW)	Capacity factor	Yearly energy production (MWh)
Wawa No. 1	2.58	30.0%	6,764
Wawa No. 2	10.2	34.4%	30,824
Total	-	-	37,588

The above results indicate a total yearly energy production of 37,588 MWh from the planned small hydropower project. Below are the calculations of the amount of CO2 that would be emitted by a diesel-powered plant achieving the same production.

Yearly CO_2 emissions = Volume of fuel used※ x 38.2 GJ/metric ton (calorific value per fuel unit) x 0.0187 ton-C/GJ (carbon released per unit of calorific value) x 44 (molecular weight of CO_2) ÷ 12 (atomic weight of carbon)

[Reference: Order for Enforcement of the Act on Promotion of Global Warming Countermeasures, Article 6 Clause 1 Item 1, Ministry Ordinance for the Calculation of Greenhouse Gas Emissions, Article 2 and Appendix 1]

※Fuel used was calculated with crude petroleum as the fuel, following the below premises:

Yearly petroleum used (metric tons) = Yearly electricity production (MWh) x calorific value conversion factor (9.0 GJ/MWh) x inverse of petroleum calorific value (0.02193 metric tons/GJ)

= (6,764 + 30,824) MWh x 0.19737 metric ton/MWh

= 7418.74 metric tons

Yearly CO_2 emissions = 7418.74 metric tons x 38.2 GJ/t x 0.0187 ton-C/GJ x 44 ÷ 12

= 19,432 ton-CO_2

From the above calculations, it can be seen that the planned project would be estimated to cut carbon dioxide emissions by a rate of 19,432 ton-CO_2 per year.

This suggests that the “zero option” of canceling the project would be inappropriate.

(2) Social and environmental aspects

As the planned project site lies within a Key Biodiversity Area (KBA), there are concerns that the implementation of the project could have an impact on the ecosystems of the region. In order to prevent this occurrence, large-scale development is to be avoided if at all possible. However, the results of basic studies carried out by our local business partner EPCC reveal that where it flows through the province of Agusan del Sur, the Wawa River has the ideal flow rate and topography for the implementation of a hydropower generation project. Out of consideration for the potential impact on ecosystems, it would be preferable if the project could be implemented outside the KBA. However, this would mean moving the project site to the downstream area of the river basin, where the stream gradient is so gentle that in order to create a head large enough for power generation, the water conduit would have to be extended significantly, resulting in an increase in socio-environmental impact through the acquisition and modification of a much larger area of land. An extended water conduit would also prove to be a financial burden. For these reasons, the upper section of the river, where the head is much larger, was selected as the optimal site for the project, despite the fact that it lies within a KBA.

- Wawa River No. 1: As the projected site for Wawa River No. 1 lies in an area surrounded by small settlements, and as the water conduit is planned to follow the contours of the river, the effect of the project in terms of resettlement of residents or acquisition of land will change depending on the exact location of the water conduit. The area near the right bank of the river features a distinct village made up of more than a dozen households and farmland, while the left bank features only two or three sporadically located households and farmland. Aside from these areas, both banks are covered in forestland of equivalent type.
  Based on this, we believe that constructing the water conduit on the left bank will be the preferred option.

- Wawa River No. 2: As the water conduit for Wawa River No. 2, connecting the eastern intake weir and the powerhouse, runs through protected forestland, land modification is to be avoided where possible. Construction of an open water conduit, even if every effort was made to keep environmental impact to a minimum, would necessarily involve some felling of trees and modification of the land. A tunnel-style conduit, on the other hand, would not necessitate the felling of trees, and would leave the protected forestland unharmed.
  Based on this, we believe that the water conduit for Wawa River No. 2 should be constructed as a tunnel-style conduit.

6-1-5. Scoping plan and environmental and social considerations study TOR

The results of the study into the social and environmental issues which must be considered for this project are laid out as a scoping plan in Table 6-7 below.

Table 6-7: Scoping plan

Category	Area of impact	Assessment		Reason for assessment
		Before or during construction	During operation	
Pollution mitigation measures	Air pollution	B^-	D	・During construction, the operation of construction machinery and vehicles is projected to temporarily damage air quality through exhaust fumes and dust particles. The scope of the pollution will be restricted to the construction zone. ・Once operational, the traffic volume will decrease from its levels during construction. Furthermore, the operation of a hydro plant will not produce any dust.
	Water pollution	B^-	D	・During construction, excavation is projected to temporarily create some water impurities. ・Once operational, no water will be expelled from the power plant as a by-product of electricity generation.
	Waste	B^-	D	・During construction, surplus soil and material scraps are projected to be produced. ・Once operational, no waste that will have any significant impact on the surrounding environment is projected to be produced.
	Soil contamination	D	D	・No materials that could cause soil contamination are projected to be used.
	Noise/ vibration	B^-	D	・During construction, the operation of construction machinery and vehicles is projected to create a certain amount of noise and vibration, but as the nearest settlement is over 300 meters away, effect on the surrounding area will be minimal. ・Once operational, no sound or vibration effects are projected.
	Land subsidence	D	D	・No activities are planned that could cause land subsidence.
	Effluvium	D	D	・No activities are planned that could create effluvium.
	Substrata	D	D	・No activities are planned that could affect the land's substrata.
Natural environment	Protected areas	D	D	・While the planned project site lies near the Andanan Watershed Forest Reserve and the Taguibo Watershed Forest Reserve, these reserves are separate from the Wawa River area, and lie 10 km and 3 km away respectively. As a result, these areas are not projected to be affected by the project.
	Ecosystems	C	C	・No survey results are available outlining the existing ecosystems around the planned project area. However, as the project area lies within a biodiversity corridor, and shares a similar environment to the rest of that corridor, it is fair to surmise that similar biota exists in the area. A study of the flora and fauna of the area will therefore be conducted to determine whether or not the project will have any effect on the area's ecosystems. ・Once operational, the existence of a weir is projected to adversely affect migratory fish that swim upstream.
	Hydrology	D	D	・No activities are planned during construction that could bring about changes in the river flow or the riverbed.
	Topography and geology	D	D	・No significant topological or geological features exist in the vicinity of the planned project site.
Social environment	Resettlement	B^-	D	・In order to accommodate the land needed for the establishment of the hydro plant, one or two households are projected to need to be moved prior to construction.
	Poverty	C	B^+	・While the details have yet to be confirmed, it is possible that the residents who need to be resettled prior to construction could have a quality of life that is below the poverty line. ・During construction and operation, the plants will create employment opportunities for local residents, meaning that any impact should be positive.

Category	Area of impact	Assessment		Reason for assessment
	Ethnic minorities and indigenous peoples	B^-	D	・The Manobo tribe does not fit the World Bank's definition of an indigenous people, and it is believed that they would not be considered as such from an international perspective. ・However, the Manobo are defined as an indigenous people by Philippine law. As part of this law, consent is required from the indigenous peoples for any such project. Therefore, the operator of the project will follow this legal requirement and obtain consent from the Manobo.
	Regional economy (employment and livelihood)	B^+	B^+	・During construction, the project will offer prioritized employment opportunities for local residents, allowing for cash influx to the local economy. Business opportunities for local residents will also be created in terms of the potential for the establishment of stalls and grocery shops. ・Once operational, employment opportunities will be created for local residents in the operation of the plants.
	Land use and utilization of local resources	C	C	・In terms of privately-owned land, the majority of land affected by construction is mountainous forestland. As this land is not used for farmland, any impact on the livelihood of local residents should be minimal. However, this will be reevaluated once the final locations of the water conduits have been confirmed.
	Water sources	D	D	・As the local residents use spring water or well water, no significant impact is expected.
	Existing social infrastructure and services	B^-	D	・Traffic rates are expected to increase during the construction period, leading to an increased risk of traffic accidents.
	Social organizations involved in social capital and decision making	D	D	・No significant impact is expected on social organizations involved in social capital and decision making. Local institutions are also not expected to be impacted significantly.
	Uneven distribution of damage and benefits	D	D	・As this project involves the construction of power plants, it is not expected to create any significantly uneven distribution of damage and benefits in the surrounding area.
	Conflicts of interest within the area	D	D	・As this project involves the construction of power plants, it is not expected to create any significant conflicts of interest within the local area.
	Cultural heritage	D	D	・No cultural heritage sites or similar sites exist in the surrounding area.
	Landscape	D	D	・The power-generating facilities are planned for construction in a location that cannot be seen from any major lookout points, meaning that they should not cause any adverse impact on the visual landscape. The water conduits, however, do pose a potential threat to the visual landscape. Once the final details of the design are confirmed, including the location of the water conduits, an assessment of their impact will be carried out.
	Gender	D	D	・No significant negative impact on any specific gender is expected for this project.
	Children's rights	C	C	・No significant negative impact on the rights of children is expected for this project, but hearings will be conducted with local authorities during the field study to evaluate any possible effects.
	Infectious diseases such as HIV/AIDS	B^-	D	・The influx of laborers during the construction period could potentially contribute to the spread of infectious diseases in the area.
	Working environment (including	B^-	D	・During construction, it will be necessary to give due consideration to the labor conditions of construction workers. ・No activities are planned once the plants are operational that

Category	Area of impact	Assessment		Reason for assessment
	worker safety)			would create any negative impact on workers.
Other	Accidents	B-	D	・During construction, it will be necessary to give due consideration to the possibility of construction accidents. ・Once operational, traffic flow will drop, leading to a decreased risk of traffic accidents.
	Transboundary issues and climate change	D	D	・As this project involves the construction of power plants, it is not expected to have any significant impact on transboundary issues or climate change.

Assessment categories:
A+/-: Significant impact anticipated
B+/-: Moderate impact anticipated
C+/-: Unclear (further study required / will become clear as study proceeds)
D: Little to no impact anticipated

Source: Created by the study team

Fundamental policies pertaining to estimate and assessment methods for each potential area of impact from an environmental and social perspective have been collated below, based on the collection of data from up until the second dispatch, and on theoretical research.

Table 6-8: Fundamental policies pertaining to estimate and assessment methods

Category	Area of impact	Assessment		Study topics	Study method
		Before or during construction	During operation		
Pollution mitigation measures	Air pollution	B-	D	1. Air quality 2. Environmental standards 3. Impact of construction	・Analysis of existing materials ・Estimation of total pollutant emissions based on future traffic rates
	Water pollution	B-	D	1. Surface water quality 2. Water quality standards 3. Surface water usage status	・Analysis of existing materials ・Surface water quality measurements ・Interviews with relevant parties ・Confirmation of details and methods of construction
	Waste	B-	D	1. Waste disposal methods in the area around the construction site	・Interviews with relevant parties ・Analysis of similar cases
	Noise/ vibration	B-	D	1. Noise/vibration levels 2. Environmental standards 3. Location of hospitals and schools 4. Impact of construction	・Analysis of existing materials ・Roadside noise/vibration level measurements ・Estimation of noise levels based on estimated future traffic rates
Natural environment	Ecosystems	C	C	1. Distinctive ecosystems of the area 2. Forestland distribution 3. Fauna distribution	・Field study ・Analysis of existing materials ・Interviews with relevant parties ・Analysis of similar cases
Social environment	Resettlement	B-	D	1. Land acquisition and confirmation of the	・Research into relevant laws and institutions

Category	Area of impact	Assessment		Study topics	Study method
				scale of resettlement 2. Resettlement plans (newly created)	・Census and socioeconomic survey ・Replacement costs study ・Stakeholder meetings ・Analysis of similar cases
	Poverty	C	B^+	1. Living conditions of affected residents	・Socioeconomic survey ・Analysis of existing materials ・Analysis of similar cases
	Ethnic minorities and indigenous peoples	B^-	D	1. Current living conditions of indigenous peoples	・Field study ・Analysis of existing materials ・Interviews with relevant parties
	Regional economy (employment and livelihood)	B^+	B^+	1. Living conditions of affected residents 2. Current status of economic activity in the area	・Socioeconomic survey ・Analysis of existing materials ・Field study ・Analysis of similar cases
	Land use and utilization of local resources	C	C	1. Land use status of the area surrounding the construction sites of the planned facilities 2. Current status of economic activity in the area	・Field study ・Analysis of existing materials ・Interviews with relevant parties ・Analysis of similar cases
	Existing social infrastructure and services	B^-	D	1. Existence of residential households, schools and medical facilities in the area	・Field study ・Analysis of existing materials ・Interviews with relevant parties
	Infectious diseases such as HIV/AIDS	B^-	D	1. Workers' health	・Interviews with relevant parties ・Analysis of similar cases
	Working environment (including worker safety)	B^-	D	1. Labor conditions	・Interviews with relevant parties ・Analysis of similar cases
Other	Accidents	B^-	D	1. Industrial accidents 2. Traffic accident statistics	・Interviews with relevant parties ・Analysis of similar cases
	Stakeholder meetings	-	-	1. Scoping plan phase 2. Draft report phase	-

Source: Created by the study team

6-1-6. Final results of investigations into environmental and social considerations

(1) Results of studies pertaining to environmental and social considerations

Studies pertaining to environmental and social considerations of the project were carried out based on the scoping plan. Information gathering methods included research of existing documents, field studies, and interviews with area residents, local government bodies and related government departments. This information was then analyzed in accordance with the scoping plan.

The results of these studies pertaining to environmental and social considerations are collated in Table 6-9 below.

Table 6-9: Results of studies pertaining to environmental and social considerations

<table>
<tr><th>Area of impact</th><th>Study results</th></tr>
<tr><td>Air pollution</td><td>
・ Air pollution levels in the barangay of Kolambugan, which will be passed through on the access road to the project site, were measured and were found to be comfortably below the standards established by the DENR.

Measured pollution levels and Philippine national standards

Unit: μm/Ncm
<table>
<tr><th>Item</th><th>Measured level in Kolambugan</th><th>DENR standard level</th></tr>
<tr><td>PM10</td><td>15</td><td>200</td></tr>
<tr><td>NO_2</td><td>2</td><td>260</td></tr>
<tr><td>SO_2</td><td>69</td><td>340</td></tr>
</table>
</td></tr>
<tr><td>Water pollution</td><td>
・ The water quality of the Wawa River is classified as Class A (Public Water Supply Class: a quality level that requires complete treatment (coagulation, sedimentation, filtration and disinfection) in order to meet the National Standards for Drinking Water).
・ The Wawa River is shallow, with a depth of approximately 0.6 meters. The average flow rates for each month, in m^3/s, are 2.43 for April, 2.02 for June, 2.14 for July, 1.92 for August and 2.32 for September.
・ According to hearings conducted with the residents of settlements around the Wawa River area, their main sources of water for everyday use are spring water and well water. The Wawa River is used primarily for swimming, fishing and, in one area, washing clothes.

Measured pollution levels and Philippine national standards
<table>
<tr><th>Item</th><th>Measured level in the Wawa River</th><th>DENR standard level (Class A)</th></tr>
<tr><td>BOD mg/L</td><td>1.0 mg/L</td><td>5 (maximum)</td></tr>
<tr><td>TSS mg/L</td><td><0.1 mg/L</td><td>50</td></tr>
<tr><td>Total coliform</td><td>24,000 MPN/100ml</td><td>1,000</td></tr>
<tr><td>pH</td><td>8.9</td><td>6.5-8.5</td></tr>
</table>
</td></tr>
<tr><td>Waste</td><td>
・ Construction waste, including oil from machinery and soil, is expected to be produced during the construction process of the power plants.
・ Work offices will also be constructed at the construction site. A certain amount of domestic waste is expected to be produced from these offices.
・ Once operational, a certain amount of domestic waste is expected to be produced by the plants' operation and maintenance offices.
・ All waste will be disposed of appropriately, in accordance with Philippine laws PD 856 and RA 6969.
</td></tr>
<tr><td>Noise/vibration</td><td>
・ A part of the access road will pass through the barangay of Kolambugan. This road is currently used by the residents as a major thoroughfare.
・ Noise pollution levels in the barangay of Kolambugan, which will be passed through on the access road to the project site, were measured, and recorded a maximum of 64 dB, a minimum of 48 dB and a daytime average of 58 dB. This falls into the light industrial area class (C class) under the DENR standards.

Philippine national standards for noise pollution
<table>
<tr><th rowspan="2">Class</th><th rowspan="2">Area</th><th colspan="3">Maximum allowable level (dB)</th></tr>
<tr><th>Daytime</th><th>Morning/ evening</th><th>Nighttime</th></tr>
<tr><td>AA</td><td>Schools, hospitals</td><td>50</td><td>45</td><td>40</td></tr>
<tr><td>A</td><td>Residential</td><td>55</td><td>50</td><td>45</td></tr>
<tr><td>B</td><td>Commercial</td><td>65</td><td>60</td><td>55</td></tr>
<tr><td>C</td><td>Light industrial</td><td>70</td><td>65</td><td>60</td></tr>
<tr><td>D</td><td>Industrial</td><td>75</td><td>70</td><td>65</td></tr>
</table>
</td></tr>
</table>

Area of impact	Study results
Ecosystems	・ While the planned project site lies near the Andanan Watershed Forest Reserve and the Taguibo Watershed Forest Reserve, protected by Philippine law, these reserves are separate from the Wawa River area, and lie 10 km and 3 km away respectively. ・ During the hearings conducted in Sibagat on December 1, 2015, it emerged that the municipality of Sibagat has applied to the Environmental Management Bureau (EMB), a subsidiary body of the Department of Environment and Natural Resources (DENR), to have the Wawa River area, including the planned project area, designated as the "Wawa River Basin Protected Landscape." Approval for this proposal is expected to be received during 2016. ・ No study of the biota of the planned project area has ever been conducted, and no documents exist detailing such biota. As a result, interviews with residents and visual inspections of the flora and fauna in the area have been carried out. ○Visual inspection results (IUCN-evaluated species are underlined) [Birds] Brahminy kite (*Haliastur indus*), Pacific swallow (*Hirundo tahitica*), grey wagtail (*Motacilla cinerea*), brown-eared bulbul (*Hypsipetes amaurotis*) [Reptiles] Philippine sailfin lizard (*Hydrosaurus pustulatus*) [Fish] Tilapia, catfish ○Interview results (details provided below) [Mammals] 7 species of mammal identified. All 7 are designated as protected species under Philippine law. [Birds] 14 species of bird identified. All 14 are designated as protected species under Philippine law. [Reptiles] 7 species of reptile identified. 6 of the 7 are designated as protected species under Philippine law. [Amphibians] 3 species of amphibian identified. All 3 are designated as protected species under Philippine law. [Fish] 7 species of fish identified. 5 of the 7 are designated as protected species under Philippine law. [Flora] 37 species of tree, 31 species of other low-lying flora (shrubs, grasses and the like) identified. Almost all are common species.
Resettlement	・ New acquisition of land in the barangay of Padiay will be necessary for the construction of the facilities for Wawa No. 1 power plant (water conduit and tank), and residents of three households will need to be relocated. ・ Land will need to be acquired in the barangay of Kolambugan, with its location depending on the position of the access road and power lines. However, the precise positions of the access road and power lines have not been finalized at the time of this study.
Poverty	・ According to the "Official Poverty Statistics" of 2012, Agusan del Sur has the highest ratio of residents living in poverty in the Caraga region. However, as this project will provide employment opportunities, a positive impact can be expected in this area. ・ The barangays of Padiay and Kolambugan have employment rates of just 60% and 55.6% of the potential working population respectively, and are struggling with a lack of opportunities for employment.
Ethnic minorities and indigenous peoples	・ An indigenous people known as the Manobo live in both the barangays of Padiay and Kolambugan. ・ Due to the fact that they are willing to intermarry with those from tribes other than their own and that migration to other places is practiced in much the same way as in other areas, the Manobo do not fit the strict definition of an "indigenous people" as established as the fundamental international standard by the World Bank.

Area of impact	Study results
	・ Nevertheless, they fit the definition of an indigenous people under Philippine law, as a “group of people who share a sense of identification with certain linguistic and cultural characteristics, and who live in a certain area.” ・ The Manobo have the same educational opportunities as city-dwellers, for example, and have a full understanding of the monetary economy. Now, they no longer exist as an ethnic group which protects its own social, economic and political systems, but instead live their lives in accordance with the administrative systems established by the government of the day.
Regional economy (employment and livelihood)	・ The non-employment rates for both barangays lie at above 40% of the potential working population, indicating a chronic shortage of employment opportunities. ・ Employment opportunities will increase both during the construction and the operation of the plants. Furthermore, a proportion of any operating profit will be distributed to the barangays, in accordance with Philippine law and governmental policy, thereby contributing to the vitalization of the regional economy.
Land use and utilization of local resources	・ The projected site for the Wawa No. 2 power plant is surrounded by forestland, but scattered farmland and commercial plantations lie around the planned project site for Wawa No. 1. ・ While the major economic activity of the barangays centers around forestry and farming, roads in the region are insufficiently maintained. The residents are forced to rely on regular truck trips (once or twice a week) for the transportation of harvested goods, and cannot carry goods out of the area freely by themselves.
Existing social infrastructure and services	・ Current traffic rates through the barangay of Kolambugan, through which the project’s access road will run, are extremely low, with large trucks carrying harvested goods traveling back and forth once or twice a week.
Children’s rights	・ The road to be used as an access road for the project is currently used as a school route for children in the area.
Infectious diseases such as HIV/AIDS	・ During construction, an influx into the area of large numbers of workers is expected. As these workers will temporarily live in the area, there is a chance that they may have an impact on the social situation of the area. At the present time, however, no infectious diseases are prevalent in Padiay or Kolambugan.
Working environment (including worker safety)	・ At other construction sites under the management of EPPC, safety education, including the mandatory wearing of helmets and high-visibility vests, is thoroughly conducted and enforced. ・ With security guards placed at the entrance to the site, the safety of all workers will be secured.
Accidents	・ The repair and maintenance of the road currently running through the barangay of Kolambugan is planned, so that it may be used as an access road. This road is used as a major thoroughfare by local residents and as a school route by children.

Source: Created by the study team

During the visual inspections of the area, Pacific swallows, grey wagtails, brown-eared bulbuls, catfish and tilapia were positively identified, among other species. Additionally, while they are not classified as threatened species by the Philippine government, the Brahminy kite (LC: least concern) and the Philippine sailfin lizard (VU: vulnerable) each have IUCN evaluations, and have been identified in the area.

Through interviews with local residents, 37 species of animal and 68 species of plant were identified as possibly living in the planned project area. The vast majority of these have been classified by Philippine law and on the IUCN Red List. Photos of visually identified IUCN-classified species are displayed below, followed by the results of interviews with local residents in Tables 6-10 and 6-11.


Photograph 6-1: Animal species visually identified during the field study: Brahminy kite (left); Philippine sailfin lizard (right)

Source: Photographed by the study team

Table 6-10: Animals identified during interviews with local residents as possibly living within the planned project area

No.	Local Name	Scientific Name	Common Name	Status	
				DAO No.2007-01	IUCN Ver.2015-4
Mammals					
1	Baboy-ihalas	*Sus philippensis*	Philippine Warty Pig	VU	VU
2	Musang Alamid/Milo	*Paradoxorus hermaphroditus*	Asian Plam Givet	LC	-
3	Paniki	*Ptenochirus jagori*	Greater Musky Fruit Bat	LC	LC
4	Kagwang	*Cynocephalus volans*	Philippine flying lemur	LC	LC
5	Unggoy	*Macaca fascicularis*	Longtail Macaque	OTS	LC
6	Ilaga	*Rattus tanezumi*	Oriental house rat	LC	LC
7	Usa	*Rusa marianna*	Philippine Brown Deer	VU	VU
Birds					
1	Alimukon	*Phapitreron leucotis*	White-eared Brown	LC	LC
2	Uwak	*Corvus corax*	Common Raven	LC	LC
3	Kalaw	*Buceros mindanensis*	Southern Rufous hornbill	VU	VU
4	Pirok-pirok	*Pycnonotus goiavier*	Yellow Vented Bulbul	LC	LC
5	Tamsi	*Cinnyris jugularis*	Olive Backed Sunbird	LC	-
6	Tigkarol	*Todiramphus chloris*	Collared Kingfisher	LC	LC
7	Agum-om	*Columbina passerina*	Common Ground Dove	LC	LC
8	Kusi/Kulasisi	*Loriculus philippensis*	Phillippine Hangging Parrot	LC	LC
9	Pikoy	*Psittaciformes*	Common Parrot	VU	-
10	Lawin	*Nisaetus philippensis*	Philippine Hawk-eagle	EN	EN
11	Banog	*Haliastur Indus*	Brahminy Kite	LC	LC
12	Maya	*Passer montanus*	Eurasian Tree Sparrow	LC	LC
13	Pago-pago	*Pycnonotus goiavier*	Yellow Vented Bulbul	LC	LC

No.	Local Name	Scientific Name	Common Name	Status	
14	Damulog	*Anas luzonica*	Wild duck	VU	VU
Reptiles					
1	Baksan	*Python reticulatus*	Reticulated Python	OTS	-
2	Banakon	*Ophiophagus hannah*	King Cobra	VU	VU
3	Ibid	*Hydrosaurus pustulatus*	Philippine Sailfin Lizard	OTS	VU
4	Halo	*Varanus Cumingi*	Yellow-headed Water monitor/ Philippine water Monitor	VU	LC
5	Cobra	*Naja samarensis*	Southern Philippine Cobra	LC	LC
6	Tabili	*Draco mindanensis*	Mindanao flying dragon	VU	VU
7	Tuko	*Gekko gecko*	Tokay gecko	-	-
Amphibians					
1	Baki/Bak-bak	*Limnonectes visayanus*	Giant Visayan frog	VU	VU
2	Cam-Frog	*Bufo marinus*	American Flog/Gian Toad	LC	LC
3	Palaka	*Rana Signata*	Spotted stream frog	LC	LC
Fishs					
1	Tilapia	*Oreochromis niloticus*	Nile Tilapia	-	-
2	Gabot	*Puntius binotatus*	Riverine Fish	LC	LC
3	Karpa	*Cyprinus carpio*	Common carp	VU	VU
4	Molly	*Poecilia sphenops*	Short-Finned Molly	-	-
5	Ulang	*Macrobrachium rosenbergii*	Freshwater Shrimp	LC	LC
6	Haloan/Dalag	*Channa striata*	Snakehead murrel	LC	LC
7	Pantar	*Clarias macrocephalus*	Broadhead catfish	-	NT

Note: “DAO No. 2004-15” EN: Endangered; VU: Vulnerable; LC: Least concern; OTS: Other threatened species
“IUCN Ver. 2015-4” EN：Endangered; VU: Vulnerable; NT: Near threatened; LC: Least concern

Source: Created by the study team

Table 6-11: Plants identified during interviews with local residents as possibly growing within the planned project area

Type	No. of Species	Example
Tree	37	Langanasi (*Acalypha glandulosa*), Anutong (*Cyathea apoensis*), Kubi (*Artocarpus nitidus*), Pili (*Canarium ovatum*), Hagimit (*Ficus minahassae*), Himbabaud/kaburo (*Phoebe sterculoides*), Anonang (*Chordia dichotoma*)
Shrub	14	Bulaklak naburikat(*Sphagneticola trilobata*), Karlang (*Xanthosoma violaceum*), Kupo (*Crotalaria* spp), Agas moro (*Vernonia cinerea*), Ualis haba (*Sida rhombifolia*)
Grass	8	Bugang(*Saccharum spontaneum*), Makahiya (Mimosa pudica), Daat/Arat (*Scleria scrobiculata*), Kawayan(*Bambusa vulgaris*)
Vine	3	Bagtok(*Araceae* spp)
Fern	6	Diliman (*Stenochlaena palustris(Burm.)Bedd.*), Osmunda (*Osmunda banksiifolia*), Pakong kalabaw (*Nephrolepis biserrata*)
Total	68	-

(2) Environmental and social impact assessment

Based on the results of the field study, the environmental and social impact of the project in various areas was assessed. The results are displayed below, together with the assessments from the scoping plan.

Table 6-12: Environmental and social impact assessment projections based on the field study

Category	Area of impact	Scoping assessment		Post-field study assessment		Reason for assessment
		Before or during construction	During operation	Before or during construction	During operation	
Pollution mitigation measures	Air pollution	B-	D	B-	D	・During construction, the operation of construction machinery and vehicles is projected to temporarily damage air quality of the area around the access road through exhaust fumes and dust particles. ・Once operational, the traffic volume will decrease from its levels during construction. Furthermore, the operation of a hydro plant will not produce any dust.
	Water pollution	B-	D	B-	D	・During construction of the water intake gate for Wawa No. 1, excavation is projected to temporarily create some water impurities. ・Once operational, no water will be expelled from the power plant as a by-product of electricity generation.
	Waste	B-	D	B-	D	・During construction, surplus soil and material scraps are projected to be produced. ・Once operational, no waste that will have any significant impact on the surrounding environment is projected to be produced.
	Soil contamination	D	D	D	D	・No materials that could cause soil contamination are projected to be used.
	Noise/ vibration	B-	D	B-	D	・Current levels are already above those allowed by Philippine national standards for residential or commercial areas, and fit within the allowed levels for light industrial areas. ・During construction, the operation of construction machinery and vehicles is projected to create a certain amount of noise and vibration in the area around the access road. ・Once operational, no sound or vibration impacts are projected.

Category	Area of impact	Scoping assessment		Post-field study assessment		Reason for assessment
	Land subsidence	D	D	D	D	・No activities are planned that could cause land subsidence.
	Effluvium	D	D	D	D	・No activities are planned that could create effluvium.
	Substrata	D	D	D	D	・No activities are planned that could impact the land's substrata.
Natural environment	Protected areas	D	D	D	D	・While the planned project site lies near the Andanan Watershed Forest Reserve and the Taguibo Watershed Forest Reserve, these reserves are separate from the Wawa River area, and lie 10 km and 3 km away respectively.
	Ecosystems	C	C	B^-	B^-	・Species identified as protected by Philippine law have been identified in the area surrounding the planned project site, and the felling of trees and transportation of construction equipment and vehicles that will accompany the construction process are projected to have a temporary negative impact on these species. ・Additionally, the construction of the water intake gate and the existence of recession area are projected to have a negative impact on the aquatic ecosystems in the area during the construction process. ・Once operational, the existence of a weir is projected to adversely affect migratory fish who swim upstream.
	Hydrology	D	D	D	D	・No activities are planned during construction that could bring about changes in the river flow or the riverbed.
	Topography and geology	D	D	D	D	・No significant topological or geological features exist in the vicinity of the planned project site.
Social environment	Resettlement	B^-	D	B^-	D	・In order to accommodate the land needed for the hydro plant facilities, one or two households are projected to need to be moved prior to construction.
	Poverty	C	B^+	B^-	B^+	・Should any residents below the poverty line lose their homes or farms as a result of forced relocation, then the project will have a significant negative impact on their livelihoods. ・During construction and operation, the plants will create employment opportunities for local residents, meaning that any impact should be positive.

Category	Area of impact	Scoping assessment		Post-field study assessment		Reason for assessment
	Ethnic minorities and indigenous peoples	B-	D	B-	B+	・The Manobo tribe does not fit the World Bank's definition of an indigenous people, and it is believed that they would not be considered as such from an international perspective. However, the Manobo are defined as an indigenous people by Philippine law. As part of this law, consent is required from the indigenous peoples for any such project. This project will also require their consent. ・During construction and operation, the plants will improve infrastructure and create employment opportunities for local residents, meaning that any impact should be positive.
	Regional economy (employment and livelihood)	B+	B+	B+	B+	・During construction, the project will offer prioritized employment opportunities for local residents, allowing for cash influx to the local economy. Business opportunities for local residents will also be created in terms of the establishment of stalls and grocery shops. ・Once operational, employment opportunities will be created for local residents in the operation of the plants.
	Land use and utilization of local resources	C	C	C	B+	・The majority of the land affected by the construction of Wawa No. 2 is mountainous forestland, but some of the land affected by the construction of Wawa No. 1 is used as farmland. ・The improvements in infrastructure brought about by this project are expected to have the positive effect of allowing for more efficient utilization of local resources.
	Water sources	D	D	D	D	・As the local residents use spring water or well water, no significant impact is expected.
	Existing social infrastructure and services	B-	D	B-	D	・Traffic rates are expected to increase during the construction period due to an influx of construction machinery and vehicles, leading to an increased risk of traffic accidents.
	Social organizations involved in social capital and decision making	D	D	D	D	・No significant impact is expected on social organizations involved in social capital and decision making. Local institutions are also not expected to be impacted significantly.

Category	Area of impact	Scoping assessment		Post-field study assessment		Reason for assessment
	Uneven distribution of damage and benefits	D	D	D	D	・As this project involves the construction of power plants, it is not expected to create any significantly uneven distribution of damage and benefits in the surrounding area.
	Conflicts of interest within the area	D	D	D	D	・As this project involves the construction of power plants, it is not expected to create any significant conflicts of interest within the area.
	Cultural heritage	D	D	D	D	・No cultural heritage sites or similar sites exist in the surrounding area.
	Landscape	D	D	B-	D	・As the water conduit for Wawa No. 1 will be constructed on the slopes above the left bank, trees will need to be felled along the line of the conduit. ・Additionally, as construction equipment will be visible throughout the construction process, this will have a negative impact on the original visual landscape of the area.
	Gender	C	C	D	D	・No significant negative impact on any specific gender is expected for this project.
	Children's rights	C	C	B-	D	・As currently-used roads will be used as access roads for the project site, the passage of vehicles carrying construction materials will be projected to adversely affect air quality during the construction period.
	Infectious diseases such as HIV/AIDS	B-	D	B-	D	・The influx of laborers during the construction period could potentially contribute to the spread of infectious diseases in the area.
	Working environment (including worker safety)	B-	D	B-	D	・During construction, it will be necessary to give due consideration to the labor conditions of construction workers. ・No activities are planned once the plants are operational that would create any negative impact on workers.
Other	Accidents	B-	D	B-	D	・During construction, it will be necessary to give due consideration to the possibility of construction accidents. ・Once operational, traffic flow will drop, leading to a decreased risk of traffic accidents.
	Transboundary issues and climate change	D	D	D	B+	・As this project involves the construction of power plants using renewable energy, it will

Category	Area of impact	Scoping assessment		Post-field study assessment		Reason for assessment
						not produce any greenhouse gases such as carbon dioxide. As a result, it is projected to have a positive impact on climate change in the area.

Assessment categories:
A+/-: Significant impact anticipated
B+/-: Moderate impact anticipated
C+/-: Unclear (further study required / will become clear as study proceeds)
D: Little to no impact anticipated

Source: Created by the study team

1) Impact on the natural environment

While the planned project site does not lie within the boundaries of any national park or forest reserve as determined under Philippine law, even looking only at animal life, two protected species were identified by visual inspection while the existence of as many as 35 such species in the area was suggested in interviews with residents.

In terms of terrestrial biota, it is believed that mobile creatures such as birds and mammals will move out of the affected area during the construction period. Further, the impact of the project on protected and endemic species is predicted to be minimal, for the following reasons.

- The flora affected by construction is located on the periphery of forestland, and is in an area that is already impacted by human activity. As a result, any animals which live in this area are species that have developed a certain level of resistance to human intrusion.
- The habitats of species which could be most significantly affected by the project are not found on the edge of the forestland, but deep within the heart of the forest. It is considered unlikely that they will be affected by construction for this project.
- While no activities that should have any impact on terrestrial animals are planned once construction is complete, it is predicted that any animals in the area will move to avoid the project site's access road. As a result of these changes in the environment of their habitat, it is quite possible that the species of animal prevalent in the area will begin to change over time.
- The area of land for modification as part of this project will be 3.7 ha for Wawa No. 1 and 1.7 ha for Wawa No. 2. The construction of a tunnel for the water conduit for Wawa No. 2, in order to avoid cutting through a forest reserve protected by the local government of the municipality of Sibagat, will be of particular significance in keeping the felling of trees to an absolute minimum. The planned site for Wawa No. 1 lies near inhabited areas and land used for commercial plantations, allowing the construction of an open water conduit, but any felling of trees will be kept to the minimum necessary.

In terms of aquatic biota, as the river levels will be reduced between the intake weir and the powerhouse, the fish in that part of the river are expected to be affected. Five protected species are believed to live in the area of the river falling within the planned project site, but none are unique to the Wawa River, and all can be found in significant numbers in the downstream reaches of the Wawa River and in its tributaries. Therefore, while it is predicted that the larger of the protected species will

move downstream to avoid the lower river levels of the project area, it is difficult to envision a scenario in which the numbers of these species are seriously compromised or the species become in danger of extinction. Nonetheless, when the recession area alone is considered, it is believed that lowered river levels will exert an impact on the habitat and ecosystems of the fish in the area, potentially bringing about changes in both.

Additionally, while some temporary negative impact can be expected before and during the construction process, in such forms as land erosion and water and noise pollution, every effort will be made in terms of construction methods, environmental conservation measures (such as the construction of a fishway) and other alleviating measures to keep any damage to an absolute minimum. Considering the small scale of this project, it is believed that any damage or harm caused should be able to be recovered from in the course of time.

2) Impact on the social environment

The planned project site lies on land inhabited by and recognized as the rightful property of the indigenous people known as the Manobo. However, the area features no heritage sites or sites of historical, cultural or religious importance, and features no trees or areas treated as sacred by the local residents.

The construction of the Wawa No. 1 power plant facilities as part of this project will necessitate the relocation of three local households.

As the residents of the area do not use the Wawa River as their primary water source, while any turbidity in the river water caused by the construction of the water intake gates would have an impact on the residents, it would be minimal and any damage or harm caused should be able to be recovered from in the course of time.

As a result of the implementation of this project, positive impact can be expected in three main areas: (a) improvements in the road transport infrastructure of the surrounding area; (b) increased employment opportunities for local residents during and after construction; and (c) contributions to funds to offer aid to the local barangays for every unit of electricity sold.

6-1-7. Anticipated environmental impact and methods for its alleviation

Based on the results of the environmental studies, the areas of anticipated environmental impact and the plans to alleviate this impact are outlined in Table 6-13 below.

Table 6-13: Anticipated environmental impact and methods for its alleviation

Time	Area of impact	Methods for alleviation of impact	Responsible parties
Pre-construction	Deforestation (ecosystems)	・Plans will be put in place to ensure that any tree felling is kept to an absolute minimum. ・As it is quite conceivable that animal and plant habitats will be affected by any land modification, measures such as striking trees and rustling in undergrowth with sticks will be taken in order to encourage animals to relocate to areas outside the planned modification zone	SPC Contractor

		before any grass or trees are cut. ・Entry into any areas outside the construction zone will be strictly prohibited.	
	Illegal hunting	・In order to ensure that construction workers do not resort to hunting in the area for food, education of workers will be carried out before the fact, and the prohibition of hunting will be strictly enforced.	SPC Contractor
	Land acquisition	・Ownership boundaries within the planned project area will be clarified in order to prevent any trouble from occurring in advance. ・Information pertaining to land acquisition will be openly disclosed, explanations will be provided, and compensation will be paid in accordance with all applicable laws and regulations.	SPC NCIP
During construction	Water quality	・In order to prevent turbid waters from flowing directly into the river, the construction of a settling basin will be considered.	SPC Construction contractor
	Noise	・Construction will be carried out in the daytime only. No construction will be carried out at night.	SPC Construction contractor
	Air quality / dust	・Dust will be produced by the passing of vehicles on the access road, which runs through the barangay of Kolambugan. In order to lessen the dust produced, the spraying of water on the road and/or speed restrictions will be put in place.	SPC Construction contractor
	Waste	・Soil produced by excavation will be disposed of in designated spoil areas. ・Careful supervision of the disposal of domestic waste produced in the construction offices or other locations will be carried out, and the prohibition of the dumping of refuse outdoors will be made explicit.	SPC Construction contractor
	Landscape	・The structure and measurements of the constructed facilities will be adjusted to ensure that they disturb the visual landscape as little as possible.	SPC
	Ecosystems	・In order to keep the impact on animals in the area, including protected species, to a minimal level, the volume of construction vehicle traffic will be monitored, and speed restrictions will be put in place. ・In order to keep the impact of noise pollution to a minimum, low-noise construction equipment will be used. ・Out of consideration for animals who make use of the river, treatment facilities will be put in place to ensure that effluent and turbid water will not be dumped directly into the river. ・Out of consideration for migratory fish which swim upstream, a fishway will be constructed at the intake weir location.	SPC Construction contractor
	Social environment	・To ensure that the influx of construction workers to the area does not cause a deterioration of public safety, measures will be put in place to maintain law and order, including meetings with local government authorities and police, and the full and appropriate training of security guards. ・While priority will be given to residents of the local barangays in terms of the hiring of construction workers, the selection process will be fair and open, with conditions for employment clearly specified.	SPC Construction contractor

		・In order to prevent accidents, construction vehicles will be required to lower their speed when traveling through inhabited areas.	
During operation	Water quality	・The required river maintenance flow rate of 0.136 m^3/s, as established by Philippine law, will be maintained. ・While the local residents do not drink the river water, it is used on an everyday basis for the washing of clothes, fishing and, in some cases, for irrigation for private gardens. By Philippine law, drinking and agricultural uses of river water are to be given priority over its use in hydro plants. Therefore, should the river fall below the required river maintenance flow rate during the dry season, operation of the plants will be suspended.	SPC
	Ecosystems	・Regular inspections will be carried out, and debris will be removed from the settling basin and water conduits when necessary. ・In order to maintain the river depth necessary for protected species to migrate in and out (20-30 cm), a minimum river flow rate of 1.3 to 2.5 m^3/s will be maintained in the recession area of the river. ・ Should the river fall below the required river maintenance flow rate during the dry season, and the water level fall significantly to a state in which aquatic ecosystems are threatened, operation of the plants will be suspended. ・Out of consideration for migratory fish which swim upstream, a fishway will be constructed at the intake weir location.	SPC
	Social environment	・A septic tank will be installed to treat any waste water produced by the on-site office, before the water is disposed of. ・Waste water produced by the on-site office will be disposed of in accordance with relevant laws.	SPC

Source: Created by the study team

6-1-8. Environmental management plans

Areas evaluated as “A-” or “B-” in the impact assessments based on the environmental study results will need to be addressed in an environmental management plan (EMP). Considering the scale of this project and the area of land for modification (3.7 ha for Wawa No. 1, 1.7 ha for Wawa No. 2), the scope of its environmental impact is expected to be relatively limited and of minor significance. Nonetheless, the SPC created to run the project will carry out the below plans for the alleviation of any environmental impact and for post-operation environmental monitoring, in order to keep negative impact to an absolute minimum.

Table 6-14: Environmental management plans

Category	Impact	Alleviation measures	Implementation period	Budget
Air quality	Air pollution caused by dust	Water sprinkling	During construction	Included in project budget
Water quality	Water turbidity caused by sediment	Installation of a settling basin	During construction	Included in project budget

Waste	Production of waste	Appropriate management and disposal of waste	During construction and operation	None needed
Noise/ vibration	Noise created by the passing of construction vehicles	Speed restrictions	During construction	None needed
Protection of fish species	Behavioral changes caused by obstacles to migration	Installation of a fishway	During construction and operation	Included in project budget
Ecosystems	Environmental changes in the vicinity of the Wawa River	Preservation of the river maintenance flow rate	During operation	None needed

Source: Created by the study team

6-1-9. Environmental monitoring plans and environmental monitoring form drafts

The planned project site lies in forestland adjacent to an area designated by the Philippine government as a Key Biodiversity Area for the protection of a wide range of animal and plant species. Furthermore, as the access road to the site will run through part of an inhabited area, it will be essential to carry out the systematic observation, measurement, analysis and monitoring of environmental impact, such as on air and water quality and ecosystems, and of social impact, such as on residents who are forced to relocate by the project.

At the same time as the environmental impact assessment study is carried out prior to construction, samples will be taken for each environmental study category in order to accurately gauge the current situation. These samples will be used as base-line data for comparison with data collected during construction and operation. Analysis will be carried out to see how this data changes over time, and how it compares to national standards.

Table 6-15: Environmental monitoring plan

Category	Item	Location	Frequency	Responsible parties
[Prior to construction]				
Natural environment	Tree survey (species and number)	Project area	Before construction begins	SPC Contractor
[During construction]				
Air quality	SO_2, CO, NO_2, TSP, PM10, etc.	Adjacent to the access road in the barangay of Kolambugan	Once every three months	SPC Contractor
Noise		Adjacent to the access road in the barangay of Kolambugan	Once every month	SPC Contractor
Water quality	pH, TSS, oils, coliform, etc.	Downstream from Wawa No. 1 power plant and water intake gate	Once every three months	SPC Contractor
Waste	Amount	Project area	Once every month	SPC Contractor
Ecosystems	Fish species	Project area	Once	SPC
[During operation]				
Water volume	Water volume	Downstream from Wawa No. 1 power plant and water intake gate	Once every month (for first year of operation)	SPC
Water quality	TSS, BOD	Downstream from Wawa No. 1 power plant and water intake gate	Once every three months	SPC
Ecosystems	Fish species	Project area	Twice (once for each dry season and rainy season)	SPC

Source: Created by the study team

Table 6-16 (1): Environmental monitoring form draft (pre-construction: tree survey)

Item	Method	Survey data	Results
Tree survey (Species and number)			

Source: Created by the study team

Table 6-16 (2): Environmental monitoring form draft (during construction: air quality)

Item	Unit	Measured value (mean)	Measured value (max.)	RA No.8749
				1 hr-average
SO_2	ppm			0.07
CO	ppm			30
NO_2	ppm			0.08
TSP	$\mu g/m^3$			
PM_{10}	µg/Ncm			150

Source: Created by the study team

Table 6-16 (3): Environmental monitoring form draft (during construction: noise)

Item	Unit	Measured value			NPCC Memorandum Circular No.2 Series of 1980 (Class A: Residence)		
		Daytime	Morning/ Evening	Nighttime	Daytime	Morning/ Evening	Nighttime
Noise	dBA				55	50	45

Source: Created by the study team

Table 6-16 (4): Environmental monitoring form draft (during construction: water quality)

Item	Unit	Measured Vlue	Class A Standards
pH	-		6.5-8.5
DO	mg/l		705.0
TSS	mg/l		50
BOD5	mg/l		5
Oil & grease	mg/l		1
Phenol (total)	mg/l		0.002
Coliform	mpn/100ml		1000

Source: Created by the study team

Table 6-16 (5): Environmental monitoring form draft (during construction: waste)

Monitoring item	Monitoring results during report period
Volume of waste generated	
Storage, collection, transportation, disposal	
Conditions of dumping sites	

Source: Created by the study team

Table 6-16 (6): Environmental monitoring form draft (during operation: water volume)

Item	Method	Data of the Survey	Result
Flow rate			

Source: Created by the study team

Table 6-16 (7): Environmental monitoring form draft (after operation: water quality)

Item	Unit	Measured Vlue	Class A Standards
pH	-		6.5-8.5
TSS	mg/l		50
BOD_5	mg/l		5
Coliform	mpn/100ml		1000

Source: Created by the study team

Table 6-16 (8): Environmental monitoring form draft (during and after operation: aquatic biota)

Item	Method	Data of the Survey	Result
Aquatic Biota （Especially fish）			

Source: Created by the study team

6-1-10. Stakeholder meetings

As part of the preparatory studies for this project, meetings have been held with related Philippine governmental departments (Department of Energy (DOE), Department of Environment and Natural Resources (DENR)), electricity companies projected as clients to purchase generated electricity (ASELCO, ANECO), representatives of the province of Agusan del Sur, in whose jurisdiction the site lies, and residents of the area around the project site, at which the developers have explained the purpose of the development undertaken by the local construction company and disclosed information pertaining to the surveys to be carried out. Thereafter, regular consultations have been held between the developers and the residents of the planned project area.

As a result of these activities, expectations are high for this project, and all concerned parties have shown cooperative intent. No voices of opposition have been raised by local residents, all of whom have exhibited a favorable response to the enterprise.

Table 6-17: Stakeholder meeting dates and participants

	Location	Date	Participants
First Stakeholder Meeting	Agusan del Sur Provincial Government Meeting Hall	July 30, 2014	・Agusan del Sur provincial government representatives (governor and representative SP member): 2 participants ・DOE: 2 participants ・Indigenous peoples' leaders: 4 participants ・SPC (project operator): 4 participants
Information Session for Residents (1)	Kolambugan Meeting Hall	July 31, 2014	Residents of the barangays of Kolambugan and Padiay Males: 36 Females: 20
Second Stakeholder Meeting	Sibagat Municipal Meeting Room	July 31, 2014	Mayor of Sibagat (female): 1 participant
Information Session for Residents (2)	Kolambugan	December 2, 2015	Residents of the barangay of Kolambugan Males: 6 Females: 14 Total: 20
	Padiay	December 3, 2015	Residents of the barangay of Padiay Males: 3 Females: 7 Total: 10

Table 6-18: Stakeholder meeting topics overview

Meeting	Date	Location	Participants	Topics
First Stakeholder Meeting	July 30, 2014	Agusan del Sur Provincial Government Meeting Hall	・Provincial government of Agusan del Sur ・DOE ・Indigenous leaders ・EPPC ・HRMCI ・THRC ・Chodai Co., Ltd.	・Explanation of the implementation of the Wawa River Small Hydropower Project with the assistance of a JICA ODA Loan ・Overview of the small hydropower project ・Schedule ・Explanation of studies to be carried out ・Request for cooperation with studies
Information Session for Residents (1)	July 31, 2014	Kolambugan Meeting Hall	・Provincial government of Agusan del Sur ・DOE ・Municipal government of Sibagat ・Indigenous leaders ・Residents of Kolambugan ・Residents of Padiay ・EPPC ・HRMCI ・THRC ・Study team	・Explanation of the implementation of the Wawa River Small Hydropower Project with the assistance of a JICA ODA Loan ・Overview of the small hydropower project ・Explanation of studies to be carried out ・Request for cooperation with studies ・Project benefits
Second Stakeholder Meeting	July 31, 2014	Sibagat Municipal Meeting Room	・Mayor of Sibagat ・Study team	・Schedule ・Explanation of studies to be carried out ・Request for cooperation with studies
Information Session for Residents (2)	December 3, 2015	Padiay	・Residents of Padiay (7 households)	・Explanation of project details ・Schedule until implementation ・Final confirmation of affected areas and land owners ・Explanation concerning land acquisition ・Q&A
	December 2, 2015	Kolambugan	・Residents of Kolambugan (8 households)	・Explanation of project details ・Schedule until implementation ・Final confirmation of affected areas and land owners ・Explanation concerning land acquisition ・Q&A

Source: Created by the study team

Table 6-19: Issues raised in questions from stakeholders

Meeting	Questions/opinions from participants	Response from study team
First Stakeholder Meeting	1. This small hydropower project is extremely important for the province of Agusan del Sur, and has the full support of the provincial government. We also believe that this plan will allow for the economic development of the project area, leading to it becoming a location for ecotourism.	
	2. We would like an explanation of who will be entering the area, and for the purpose of what kind of studies.	2. A detailed list of who will be entering the area will be provided at a later date.
	3. We understand the benefits of the plan, but we do not fully understand its potential impacts. We will need these to be explained clearly. We would also request that you explain the overall project to the local residents tomorrow.	3. We will draw up a concept paper, explain it to the residents tomorrow, and hope to receive their approval. The studies are projected to take a year to a year and a half, so we hope to build a positive relationship with the local populace.
	4. We welcome this enterprise, and give it our wholehearted support.	
Information Session for Residents (1)	1. What kind of impact will construction have on landowners?	1. Some land will need to be acquired for construction. Compensation will be paid to those whose land or land ownership rights are affected by the project, in accordance with government valuations.
	2. Will there be employment opportunities or other jobs available for residents of the two affected barangays?	2. Other than jobs for which specialist technical knowledge is required, residents of the two affected barangays will be given priority in terms of employment opportunities. The project operator and the government have already agreed to this.
	3. Once the plants are operational, will any of the profits be distributed to the barangays?	3. Profits will be shared with the barangays in accordance with relevant laws and policies.
Second Stakeholder Meeting	1. This small hydropower project has the support of the municipality of Sibagat. We have high hopes that it will create opportunities for stimulation of economic activity in the area.	
Information Session for Residents (2)	1. Individuals from outside will enter the area, and we are concerned that they will not have any understanding of the barangays and our culture.	1. Construction workers will be given safety education, and security guards will be placed at the entrance to the construction site in consideration of the safety of both the local residents and the workers.
	2. Will the creation of dams not lead to the risk of flooding?	2. As this is a run-of-the-river method hydropower project, water is not stored in a reservoir or lake. As a result, there is no risk that dams could

Meeting	Questions/opinions from participants	Response from study team
		trigger flooding.
	3. We hope that the project will lead to an improvement in the quality of roads in the area.	
	4. We hope that there will be increased employment opportunities. 5. Will proper compensation be paid for any losses incurred?	4,5. Compensation will be paid in line with local government laws and after meetings with affected residents. (For details of compensation, please see the specific plans for compensation and support.) 5. Appropriate measures will be taken in line with the plans for relocation of residents and under the guidance of Philippine law.
	6. We hope that the project will lead to an improvement in the quality of roads and the provision of electricity in the area.	

Source: Created by the study team

6-2. Land acquisition and resettlement of residents

6-2-1. Necessity of land acquisition and resettlement of residents

The acquisition of land for the construction of hydropower generation facilities (including powerhouse and water conduit) is a necessary condition for the implementation of this project. The area of land which will need modification will be approximately 3.7 ha for Wawa No. 1 and approximately 1.7 ha for Wawa No. 2. Ownership of land in the area is of two types: privately-owned land and land traditionally owned by indigenous peoples. The purchase of land traditionally owned by indigenous peoples is prohibited by law, meaning that a lease contract will need to be signed should such land be necessary for the project. Compensation is required for the purchase of privately-owned land. The SPC created to run the project will acquire land and provide compensation in accordance with the Indigenous Peoples' Rights Act of 1997 (RA 8371) and the Local Government Code of 1991 (RA 7160). There will be some small-scale resettlement of residents (two or three households) as a result of this project.

All land acquisition pertaining to this project will also follow Philippine law and the JICA Guidelines for Environmental and Social Considerations.

6-2-2. Legal framework for land acquisition and resettlement of residents

The ultimate responsibility for land acquisition pertaining to this project lies with the SPC created to run the project. As the planned project site lies within an area designated as an "ancestral domain of the indigenous people" under the Indigenous Peoples' Rights Act (IPRA; RA 8371), the details of the project must be disclosed and free, prior and informed consent (FPIC certification) must be obtained from the indigenous people before any development can begin.

Table 6-20: Philippine laws pertaining to land acquisition

Name of law	Year of enactment	Registered number
Comprehensive Agrarian Reform Law	1988	Republic Act 6657
Local Government Code	1991	Republic Act 7160
Urban Development and Housing Act	1992	Republic Act 7279
Indigenous Peoples' Rights Act	1997	Republic Act 8371
Act to Facilitate the Acquisition of Right-of-Way, Site or Location for National Government Infrastructure	2000	Republic Act 8974

Source: Created by the study team

A comparative study was carried out between Philippine laws and the various requirements posited by JICA guidelines and World Bank documentation pertaining to land acquisition, and the policy gaps between them were analyzed in the context of the social considerations of this project. The results are displayed in the table below.

Table 6-21: Comparisons between JICA guidelines and Philippine laws

No.	JICA guideline	Philippine law	Differences from the JICA guidelines	Resettlement plans for this project
1	Involuntary resettlement and loss of means of livelihood are to be avoided when feasible by exploring all viable alternatives. (JICA guidelines)	・EO 1035 (1985) Procedures and Guidelines for the Acquisition of Private Real Properties ・RA 8371 (1997) The Indigenous Peoples' Rights Act (IPRA) ・RA 7160 (1991) Local Government Code	No significant difference exists.	Damage and loss incurred through resettlement and land acquisition must be kept to an absolute minimum.
2	When avoidance is proved unfeasible, effective measures to minimize impact and to compensate for losses must be agreed upon with the people who will be affected. (JICA guidelines)	・EO 1035 (1985) Procedures and Guidelines for the Acquisition of Private Real Properties	No significant difference exists.	After first minimizing impact, compensation for losses will be agreed upon through meetings with the affected residents as part of the FPIC process.
3	People who must be resettled involuntarily and people whose means of livelihood will be hindered or lost must be sufficiently compensated and supported by project proponents etc. in a timely manner. (JICA guidelines)	・RA 8371 (1997) The Indigenous Peoples' Rights Act (IPRA)	No significant difference exists.	Through the consultations held as part of the FPIC process, compensation must be agreed upon at full replacement cost.
4	Prior compensation, at full replacement cost, must be provided as much as possible. (JICA guidelines)	・RA 7160 (1991) Local Government Code	Compensation may not necessarily be based on the full replacement cost.	Compensation for losses will be agreed upon, fundamentally at full replacement cost, through consultation with the affected residents as part of the FPIC process.
5	Compensation and other support must be provided before resettlement. (JICA guidelines)	-	Compensation payment period is not specified.	Compensation for acquired land will be done before resettlement begins.
6	For projects that will result in large-scale involuntary resettlement, resettlement action plans must be prepared and made available to the public. (JICA guidelines)	・EO 1035 (1985) Procedures and Guidelines for the Acquisition of Private Real Properties ・RA 8974 (2000) Act to Facilitate the Acquisition of Right-of-Way, Site or Location for National Government Infrastructure	No significant difference exists.	This project will not result in large-scale involuntary resettlement.
7	In preparing a resettlement action plan, consultations must be held with the affected people and their communities based on sufficient information made available to them in advance.	・DENR DAO 03-30 EIA Revised Procedural Manual, Social Agreement ・RA 8371 (1997) The Indigenous Peoples'	No significant difference exists.	Moving forward, sufficient information will be made available as part of the FPIC process, so that an agreement concerning the project can be reached during consultation with local residents. The

No.	JICA guideline	Philippine law	Differences from the JICA guidelines	Resettlement plans for this project
	(JICA guidelines)	Rights Act (IPRA)		NCIP will be present at these consultations as a third party, and will confirm the social agreement of affected residents toward the project.
8	When consultations are held, explanations must be given in a form, manner, and language that are understandable to the affected people. (JICA guidelines)	・DENR DAO 03-30 EIA Revised Procedural Manual, Social Agreement ・RA 8371 (1997) The Indigenous Peoples' Rights Act (IPRA)	No significant difference exists.	Explanations will be provided in Visayan, so that the local residents can understand.
9	Appropriate participation by affected people and their communities must be promoted in the planning, implementation, and monitoring of resettlement action plans and measures to prevent the loss of their means of livelihood. (JICA guidelines)	・EO 1035 (1985) Procedures and Guidelines for the Acquisition of Private Real Properties ・RA 8371 (1997) The Indigenous Peoples' Rights Act (IPRA) ・RA 7160 (1991) Local Government Code ・DENR DAO 03-30 EIA Revised Procedural Manual, Social Agreement	No significant difference exists.	The planning and implementation of plans pertaining to resettlement and land acquisition will be carried out in consultation with local residents.
10	Appropriate and accessible grievance mechanisms must be established for the affected people and their communities. (JICA guidelines)	-	No legal regulations are in place governing grievance-handling mechanisms.	NCIP, the company responsible for the operation of the project, will handle any grievances.
11	Affected people must have their eligibility confirmed if possible at the project development phase and be identified as soon as possible in order to prevent the subsequent inflow of ineligible people. Their details must be recorded through the use of a baseline survey, including a population census with a fixed cut-off date, an inventory of assets and a socioeconomic survey. (World Bank Safeguard Policy, OP 4.12, Clause 6)	・EO 1035 (1985) Procedures and Guidelines for the Acquisition of Private Real Properties ・RA 8368 (1997) Anti-Squatting Law Repeal Act ・RA 7160 (1991) Local Government Code	No significant difference exists.	A baseline survey and an inventory survey for those affected by resettlement and land acquisition will be carried out by the project operator at the same time as the EIA survey.
12	Displaced persons eligible to receive assistance will include those who have formal legal rights to land including customary and traditional rights recognized under the laws of the country, those who do not have formal legal rights to land at the time the census begins but have a claim to such land or assets, and those who have no	・EO 1035 (1985) Procedures and Guidelines for the Acquisition of Private Real Properties ・RA 8368 (1997) Anti-Squatting Law Repeal Act ・RA 7160 (1991) Local Government Code	No significant difference exists.	As the land has been designated as an ancestral domain of the indigenous peoples, even those members of the indigenous population without formal or legal land rights will be granted full compensation. However, affected residents who are leasing the impacted land will not be regarded as land holders.

No.	JICA guideline	Philippine law	Differences from the JICA guidelines	Resettlement plans for this project
	recognizable legal right or claim to the land they are occupying. (Paraphrased from World Bank Safeguard Policy, OP 4.12, Clause 15)			
13	Preference should be given to land-based resettlement strategies for displaced persons whose livelihoods are land-based. (World Bank Safeguard Policy, OP 4.12, Clause 11)	・EO 1035 (1985) Procedures and Guidelines for the Acquisition of Private Real Properties ・RA 8368 (1997) Anti-Squatting Law Repeal Act ・RA 7160 (1991) Local Government Code	No significant difference exists.	As a general rule, land-based resettlement strategies will be provided for displaced persons whose livelihoods are land-based, but monetary compensation will be provided instead for any displaced persons who request it.
14	Displaced persons must be offered support after displacement, for a transition period, based on a reasonable estimate of the time likely to be needed to restore their livelihood and standards of living. (World Bank Safeguard Policy, OP 4.12, Clause 6)	・RA 7279 (1992) Urban Development and Housing Act ・RA 8371 (1997) The Indigenous Peoples' Rights Act (IPRA)	No significant difference exists.	As this project is not an urban development project, RA 7279 does not apply. However, should support after displacement be requested by the indigenous people, then this will be covered by the FPIC as well, above and beyond the compensation for land acquisition specified by the IPRA.
15	Particular attention must be paid to the needs of vulnerable groups among those displaced, especially those below the poverty line, the landless, the elderly, women and children, indigenous peoples and ethnic minorities. (World Bank Safeguard Policy, OP 4.12, Clause 8)	・EO 1035 (1985) Procedures and Guidelines for the Acquisition of Private Real Properties	No significant difference exists.	Additional aid should be requested by the indigenous people, then this will be covered by the FPIC as well, above and beyond the compensation for land acquisition specified by the IPRA.
16	Where fewer than 200 people are displaced, an abbreviated resettlement plan may be agreed with the borrower. (World Bank Safeguard Policy, OP 4.12, Clause 25)	-	No laws are in place to cover small-scale resettlement plans.	As only one or two households will need to be resettled, a simple (small-scale) resettlement plan will be drawn up.

Source: Created by the survey team

6-2-3. The scale and scope of land acquisition and resettlement

As part of the study and analysis process for this project, through the examination of alternative solutions and the calculation of the best possible locations and forms for the water conduits, all efforts have been made to avoid land acquisition and resettlement of residents. Having determined that both land acquisition and resettlement are unavoidable, the study then turned its attention to their scope and scale. Some land acquisition and resettlement of residents will be necessary for the installation of power plant facilities and power lines, and the creation of access roads, but the locations of the power lines and access roads have not been finalized at this preparatory stage. The scale and scope of the

impact created by the construction of the power plant facilities themselves, the only items for which we have definitive data, are outlined in Table 6-22 below.

Table 6-22: Estimated scale and scope of land acquisition and resettlement (for power plant facilities only)

Project	Facility	Affected houses	Area of acquired land	Notes
Wawa River No. 1	Water intake gate	-	3,776 m^2	River
	Water conduit	2	26,951 m^2	Farmland, houses, forestland, etc.
	Water tank	1	1,070 m^2	Farmland, houses, forestland, etc.
	Penstock pipe	-	505 m^2	Farmland, forestland, etc.
	Spillway pipe	-	325 m^2	Farmland, forestland, etc.
	Powerhouse and substation	-	4,434 m^2	Farmland, flood plains, etc.
Wawa River No. 2	Water intake gate	-	3,861 m^2 3,876 m^2	River
	Water conduit	-	0 m^2	Forestland
	Water tank	-	1,854 m^2	Forestland
	Penstock pipe	-	4,329 m^2	Forestland
	Spillway pipe	-		Forestland
	Powerhouse and substation	-	3,216 m^2	Forestland, flood plains
	Totals	3	54,197 m^2	

Source: Created by the study team

6-2-4. Socioeconomic surveys

In the barangay of Padiay, a certain amount of land will be affected as a direct result of the installation of the power plant facilities and power lines and the creation of an access road. While this land is not privately-owned, it is designated as an ancestral domain, occupied by the same families for generations. In Kolambugan, the construction of the power plant facilities will not have any direct impact, but both privately-owned and ancestral domain land will be affected by the creation of the access road.

In order to ascertain the socioeconomic situation of the project-affected people (PAPs), a census and socio-economic (household finances) survey was carried out on all PAP households. At the same time, an inventory of loss (IOL), detailing affected assets, was carried out in as many households as possible. As a result of these surveys, the below details were ascertained regarding the socioeconomic groups to which the PAPs belong and the status of their household finances.

Results of the census and socioeconomic survey have been compiled in Table 6-23, while the results of the survey on affected assets are displayed in Table 6-24～27.

Table 6-23: Results of census and socioeconomic survey (privately-owned/leased land only)

Item		Padiay	Kolambugan
1	Land owners and lease holders affected by the project	Resettlement: 2 households Land acquisition: 7 or more households (depending on the location of the access road, these numbers may increase)	Resettlement: None Land acquisition: 4-6 households (depending on the location of the access road, these numbers may vary)
2	Interviewees	7 households	8 households
3	Participants in the project explanation meetings	Participation in the meeting of July 31, 2014: 7 households	Participation in the meeting of July 31, 2014: 7 households
4	Understanding of the project	All householders understand the project.	
5	Opinion of the project	None of the householders object to the project.	
6	Opinion concerning land provision	Provided appropriate compensation is paid, there is no problem.	
7	Land usage	Residential (2 households), farmland, commercial plantations	Farmland
8	Household sizes	Minimum of 5 people; maximum of 8 people Average of 6.4 people	
9	Housing tenure	All households owner-occupied	All households owner-occupied
10	Land tenure	6 householders own the land 1 householder leases the land	6 householders own the land 2 householders have handed down the land through generations, although actual legal ownership is unclear
11	Household income	PHP 300.00 to 400.00 per week PHP 1,200.00 to 1,400.00 per month *Note: Income from agricultural crops and timber fluctuates from month to month and year to year depending on harvest periods and age of trees.	
12	Occupations	Agriculture and forestry workers, day laborers	
13	Wages (for day laborers)	PHP 200 to 250 (with lunch provided) PHP 250 to 300 (with no lunch; snacks provided by some employers)	
14	Socially vulnerable among those impacted	The Caraga region, where the planned project site lies, had a poverty rate in 2015 of 35.3%, down 8% from 2006. The province of Agusan del Sur, also, did not feature on a list of the 16 poorest provinces in 2013, suggesting that improvements in the poverty rate are underway in the area. Despite this, however, the average yearly household income for the entire Philippines is PHP 235,000, which places all affected households below the poverty line for the Philippines. None of the affected households featured female heads of household or disabled individuals.	
15	Electrification	All households use kerosene lamps.	All households use kerosene lamps. One household uses a generator to produce electricity.
16	Have any received prior compensation for a different project?	None of the households have ever received compensation before.	None of the households have ever received compensation before.

Source: Created by the study team

6-2-5. Specific compensation and aid plans

Compensation for acquired land and forced resettlement will be determined in accordance with the Local Government Code (RA 7160) and the IPRA (RA 8371). The compensation provided for each piece of land, tree and agricultural product will be determined based on the market values of these products in the municipality of Sibagat.

(1) Compensation for loss

1) Replacement cost

A replacement cost survey (RCS) was carried out in order to establish the compensation rate for land and fixed assets tied to the land (such as buildings, fruit trees and other trees and shrubs). Rates for houses were set as buildings using standard timber built in the project area.

Table 6-24: Land market value (for rural/countryside barangays)

Municipality	Residential					Commercial				
	1st	2nd	3rd	4th	5th	1st	2nd	3rd	4th	5th
Sibagat	210	160	130	110	80	390	310	240	160	110

Source: (Ordinance No. 117, Series of 2015)

Table 6-25: Farmland market value

No.	Land	Class and Base Unit Market Value (Per Hectare)				
		1st	2nd	3rd	4th	5th
1	Abaca land	85,250	77,840	61,160	48,180	44,480
2	African oil palm land	91,410	82,270	66,600	52,230	47,010
3	Agro-industrial forest land (Mangium, Bagras, Gmelina, Mahogany and Other Species)	97,970	91,850	78,870	65,930	58,780
4	Banana land (Plantation type)	160,500	147,140	120,420	93,670	80,320
5	Banana (Plain)	49,680	46,890	41,380	35,850	33,090
6	Banana (Hillside)	33,930	32,050	28,290	24,510	22,620
7	Cacao land	62,060	58,660	51,770	44,810	41,350
8	Camote land	49,740	46,940	41,400	35,860	33,090
9	Coconut land	88,020	71,480	68,440	55,410	48,900
10	Coffee land	81,130	76,600	67,550	58,510	53,980
11	Corn land (Tiniguib)	118,670	101,220	73,880	51,190	34,900
12	Corn land (Hybrid)	184,850	154,310	102,070	67,510	53,040
13	Corn land (Grafted)	207,630	194,640	168,670	142,670	129,730
14	Falcata land	156,250	146,480	125,780	104,300	93,750
15	Fishpond land	154,170	146,900	132,140	117,440	110,120
16	Horticultural land	139,280	130,920	114,210	97,500	90,530
17	Tomato land	187,750	177,250	156,380	135,520	125,100
18	Squash land	72,840	68,760	60,670	52,580	48,530
19	Eggplant land	70,160	67,820	63,130	58,450	56,110

Source: (Ordinance No. 117, Series of 2015)

Table 6-26: Market value for each tree type

No.	Plant	Unit	1st	2nd	3rd	4th	5th
1	Abaca	tree	240	220	170	140	130
2	African oil palm land	tree	1,670	1,500	1,220	950	860
3	Agro-industrial forest	Tree	370	340	290	240	220
4	Banana (Plantation type)	hill	370	340	280	220	190
5	Banana (Plain)	hill	190	170	150	130	120
6	Banana (Hillside)	hill	130	120	110	90	80
7	Cacao	tree	170	160	140	120	110
8	Calamansi	tree	260	250	220	190	170
9	Coconut	tree	730	670	560	450	400
10	Coffee	tree	230	210	190	160	150
11	Durian (local)	tree	2,450	2,290	1,980	1,680	1,530
12	Durian (grafted)	tree	3,110	2,890	2,500	2,120	1,930
13	Falcata	tree	580	540	470	390	350
14	Guava	tree	640	600	530	460	420
15	Lanzones	tree	760	710	630	540	500
16	Mango	tree	3,900	3,740	3,300	2,860	2,640
17	Pineapple	slips	29	26	24	22	21
18	Rubber (Traditional)	tree	690	650	540	440	380
19	Rubber (Plantation)	tree	1,030	980	870	770	690

Source: (Ordinance No. 117, Series of 2015)

Table 6-27: Standard house values

Type of Structure	Class	One family Dwelling
Light Materials (Nipa house)	A: Wooden construction, structure like Nipa house or “Bahay-kubo”	1,980
Strong Materials	A: Wooden structural framing, floorings, and sidings and G.I. roofing but structural numbers are substandard.	2,170
	B: Wooden structural framing, floorings, and sidings and G.I. metal roofing.	3,290

Source: (Ordinance No. 117, Series of 2015)

(2) Plans for restoration of livelihoods

Following resettlement, the SPC created to run the project will be required to provide all support necessary to the PAPs in terms of the creation of programs for the restoration of their livelihoods and standards of living. Considering that the PAPs are poor, have low levels of higher education in comparison to urban dwellers, and that most rely on day labor or agriculture and forestry work for their livelihoods, it would be desirable for the project operator to carry out occupational training programs in order to increase their employment opportunities. Plans for the restoration of livelihoods and standards of living must be based on Philippine law, and considered in full consultation with the PAPs. This should be done firstly in the meetings as part of the FPIC process, and should be re-examined after gathering opinions from all PAPs at the design phase, once access road and power line locations have been finalized and the full scale of the project’s impact has been ascertained.

Plans for the restoration of livelihoods and standards of living are outlined in Table 6-28 below.

Table 6-28: Plans for the restoration of livelihoods and standards of living (draft)

Restoration Needs	Possible Solutions
Agricultural	➢ Sustainable agriculture, agro-forestry and food security programs ➢ Related processing activities to products/harvest for value added
Cash Income / Job Opportunities/ Regular Employment	➢ Income restoration strategy to provide for the immediate need for employment and economic opportunities at the power plant. ➢ Match manpower needs of project during construction and operations phase. ➢ Development of comprehensive and sustainable program that will address continuous supply of raw materials and food resources and to provide for sustainable income for the relocatees even after construction
Educational	➢ Skills training/vocational technical education to provide opportunities for technical jobs.

(3) Entitlement matrix

Based on the measures put in place to handle policy differences and the socioeconomic status of the PAPs outlined above, a comprehensive compensation policy for this project has been developed and put together in the form of an entitlement matrix. However, like the plans for the restoration of livelihoods and standards of living, issues of entitlement must be based on Philippine law, and considered in full consultation with the PAPs. This should be done firstly in the meetings as part of the FPIC process, and should be re-examined after gathering opinions from all PAPs at the design phase, once access road and power line locations have been finalized and the full scale of the project's impact has been ascertained. The fundamental policies will be as outlined below.

Table 6-29 is the entitlement matrix for this project.

Table 6-29: Entitlement matrix (draft)

Type of Loss	Application	Entitled Person	Compensation/Entitlements
LAND (Classified as Agricultural/ Residential/ Commercial/ Industrial/Institutional)	More than 20% of the total landholding is lost or where less than 20% lost but the remaining land holding becomes economically unviable.	PAPs with Transfer Certificate of Title (TCT) or tax declaration (tax declaration can be legalized to full title)	PAPs will be entitled to: 1) Land for land compensation should be given as the preferred option. 2) If appropriate land is not available, or at the PAP's choice, cash compensation can be provided for loss of land at 100% replacement cost. 3) Cash compensation for damaged crops at market value at the time of taking. 4) Rehabilitation assistance in the form of skills training, if the present means of livelihood is no longer viable and the PAPs will have to engage in a new income activity.
		PAPs without TCT(temporal/leased right)	PAPs will be entitled to: 1) Land for land compensation should be given as the preferred option. 2) If appropriate land is not available, or at the PAP's choice, cash compensation can be provided for loss of land at 100% replacement cost. 3) Cash compensation, for damaged crops at market value at the time of taking. 4) Rehabilitation assistance in the form of skills training, if the present means of livelihood is no longer viable and the PAPs will have to engage in a new income activity.
	Less than 20% of the total landholding loss or less than 20% loss or where the remaining structures still viable for use	PAPs with TCT or tax declaration (tax declaration can be legalized to full title)	PAPs will be entitled to: 1) Cash compensation for loss of land at 100% replacement cost at the informed request of PAPs. 2) Public Lands Act shall be compensated on Land Improvements only. 3) Holders of Certificates of Land Ownership granted under the Comprehensive Agrarian Reform Act shall be compensated for the land at zonal value. 4) Cash compensation for damaged crops at market value at the time of taking.
		PAPs without TCT (temporal/leased right)	PAPs will be entitled to: 1) Cash compensation for damaged crops at market value at the time of taking. 2) Agricultural lessors are entitled to disturbance compensation equivalent to 5 times the average of the gross harvest, for the past 3 years.
STRUCTURES (Classified as Residential/ Commercial/ Industrial)	More than 20% of the total landholding is loss or where less than 20% loss but the remaining	PAPs with TCT or tax declaration (tax declaration can be legalized to full title)	PAPs will be entitled to: 1) Cash compensation for entire structure at 100% of replacement cost. 2) Rental subsidy for the time between the submission of complete

Type of Loss	Application	Entitled Person	Compensation/Entitlements
	structures no longer function as intended or no longer viable for continued use		documents and the release of payment on land.
		PAPs without TCT (temporal/leased right)	PAPs will be entitled to: 1) Cash compensation for entire structure at 100% of replacement cost. 2) Rental subsidy for the time between the submission of complete documents and the release of payment on land.
	Less than 20% of the total landholding lost or where the remaining structure can still function and is viable for continued use	PAPs with TCT or tax declaration (tax declaration can be legalized to full title)	PAPs will be entitled to: 1) Compensation for affected portion of the structure.
		PAPs without TCT (temporal/leased right)	PAPs will be entitled to: 1) Compensation for affected portion of the structure.
ANCESTRAL LAND	Severely or marginally affected	Manobo tribe	1) Cash compensation for affected area at the amoune of one-centavo per kilowatt-hour (P0.01/kWh) which shall be computed from Wawa Mini-hydro Power Plant annual power generation ot total kilowatt hour sold to electlic cooperatives or clients. 2) Allocate funds needed for health services or medical assistance.
IMPROVEMENTS	Severely or marginally affected	PAPs with or without TCT, tax declaration, etc.	PAPs will be entitled to: 1) Cash compensation for the affected improvements at replacement cost.
CROPS, TREES, PERRENIALS			PAPs will be entitled to: 1) Cash compensation for crops, tress and perennials at current market value as prescribed by the concerned LGUs and DENR

6-2-6. Systems for the handling of grievances

Should any grievances occur relating to this project, they will be handled by the legally responsible party, the SPC, with the NCIP operating as a liaison, and in full consultation with the Barangay Captains and the Barangay Councils of Padiay and Kolambugan.

6-2-7. Implementation system for land acquisition

Meetings concerning the acquisition of land, which will form part of the FPIC process based on Philippine law, have not yet been held. The SPC created to run the project will, under the supervision of the NCIP, hold meetings locally to explain to the residents the actual processes of land acquisition, compensation rates for each type of land (including forestland, rice fields, farmland and orchards), and how the land rights will be transferred.

Under Philippine law, a title deed to the land and the submission of a tax return to prove that fixed property tax has been paid are necessary conditions to receive compensation for loss of land. However, it is quite conceivable that not all landowners in the affected area have paid taxes and have formally completed the procedures for the transfer of land rights. Therefore, as part of the upcoming detailed explanation concerning land acquisition, it may well be necessary to include an explanation of such issues as the paperwork involved in the procedures for the transfer of land rights.

6-2-8. Costs and funding sources

In order to implement this project, the SPC will provide the funding for (1) the preparation of an EIA, an EMP, and all necessary processes involved in land acquisition and resettlement of residents; (2) information sessions for residents; and (3) necessary permits and licenses, training, and the accurate execution of the EMP and monitoring plans.

6-2-9. Land acquisition schedule

As the project operator and responsible party for land acquisition, the SPC must conduct compensation negotiations through the mediation of the NCIP, and carry out all compensation payments.

The schedule for each facet of the land acquisition process is detailed in Table 6-30 below.

Table 6-30 Land acquisition schedule

	2016				2017				2018			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Finalization of access road and power line locations												
FPIC												
Compensation negotiations												
Compensation payments												
Monitoring												

6-2-10. Monitoring system implemented by the project operator, and monitoring forms

As the project operator and responsible party for land acquisition, the SPC must conduct compensation negotiations through the mediation of the NCIP, and carry out all compensation payments. The format of the monitoring forms is shown in section 6-3-2 below.

6-2-11. Consultation with local residents

Two stakeholder meeting sessions were carried out in accordance with JICA's "Guidelines for Environmental and Social Considerations"; the first of these was during the scoping phase in July 2014, and the second was during the draft report phase in December 2015.

The main questions and opinions raised during these meetings are shown in Table 6-32 below.

Three additional meetings are planned to be held with residents as part of the FPIC process (see section 6-3-1 for details).

Table 6-31: Stakeholder meeting dates and participants

	Location	Date	Participants		
			Male	Female	Total
Session 1	Kolambugan Meeting Hall	July 31, 2014	36	20	56
Session 2	Kolambugan	December 2, 2015	6	14	20
	Padiay	December 3, 2015	3	7	10

All land rights owners indicated that they had no objections or concerns with the design or methods involved in the construction of the small hydro plants, and welcomed as beneficial the construction of roads and the increased employment opportunities that would accompany the project. No landowners had any objections to providing their land to the project, provided that appropriate compensation would be paid.

Table 6-32: Issues raised in questions from stakeholders

Stakeholder meeting		Questions/opinions from stakeholders	Response from study team
Session 1	[Date] July 31, 2014 [Location] Kolambugan Meeting Hall [Meeting style] Residents' meeting	・What kind of impact will construction have on landowners?	・Some land will need to be acquired for construction. Compensation will be paid to those whose land or land ownership rights are affected by the project, in accordance with government valuations.
		・Will there be employment opportunities or other jobs available for residents of the two affected barangays?	・Other than jobs for which specialist technical knowledge is required, residents of the two affected barangays will be given priority in terms of employment opportunities. The project operator and the government have already agreed to this.
		・Once the plants are operational, will any of the profits be distributed to the barangays?	・Profits will be shared with the barangays in accordance with relevant laws and policies.

Session 2	[Date] December 2, 2015 [Location] Kolambugan [Meeting style] Individual interviews	・Individuals from outside will enter the area, and we are concerned that they will not have any understanding of the barangays and our culture. ・Will the creation of dams not lead to the risk of flooding? ・We hope that the project will lead to an improvement in the quality of roads in the area. ・We hope that there will be increased employment opportunities.	・Construction workers will be given safety education, and security guards will be placed at the entrance to the construction site in consideration of the safety of both the local residents and the workers. ・As this is a run-of-the-river method hydropower project, water is not stored in a reservoir or lake. As a result, there is no risk that dams could trigger flooding.
	[Date] December 3, 2015 [Location] Padiay [Meeting style] Individual interviews	・Will proper compensation be paid for any losses incurred? ・We hope that the project will lead to an improvement in the quality of roads and the provision of electricity in the area. ・We hope that there will be increased employment opportunities.	・Appropriate measures will be taken in line with the plans for relocation of residents and under the guidance of Philippine law.

Source: Created by the study team

Explanations were given in response to these questions and concerns, indicating that appropriate measures will be taken in line with the plans for relocation of residents and under the guidance of Philippine law. Three additional meetings are planned to be held with residents as part of the FPIC process (meeting times are yet to be confirmed).

6-3. Other issues

6-3-1. The necessity of free, prior and informed consent from the indigenous peoples

As the planned project site lies in an area inhabited by the Manobo tribe and the Visayans, FPIC must be obtained from the residents of the affected area in accordance with the IPRA.

FPIC is obtained by the NCIP in response to an initial application filed by the SPC created to run the project. As the project operator must obtain FPIC certification before the project begins (and particularly before construction begins), it is vitally important that proper explanations be provided to the local residents from this preparatory study phase so that a fundamental agreement can be reached.

The SPC has only just begun the application process for this project at the NCIP's provincial office. The next step will be a field-based investigation (FBI), in which a study team comprised of representatives of the NCIP's regional and/or provincial offices will visit the planned project site and

conduct interviews with local residents and with the SPC, after which three public consultation sessions will be held. The first of these will be attended only by the NCIP study team and local residents, at which the NCIP will explain the concept of FPIC and the rights of indigenous peoples. The second will involve all three parties: the NCIP study team, local residents and the project operator, at which the project details will be explained, and a question and answer session will be held. The third and final session is an opportunity for the local residents to make their decision. If approval for the project is granted, a memorandum of agreement (MOA) will be signed between the local residents and the project operator under the supervision of the NCIP, and a Certificate of Precondition will then be issued by the NCIP. Assuming no major problems arise, the period from application to the issuance of a Certificate of Precondition is set by law at no more than 55 days.

6-3-2. Monitoring forms (drafts)

Darft Monitoring Form (Land Acquisition / Involuntary Resettlement)

Name of person in charge and filling this monitoring form:_____
Date of filling this monitoring form:_____

A. Public Consultations

No.	Date	Place	Contents of the consultation / main comments and answers
1			
2			

B. Resettlement Activities

Activities	Planned Total	Unit	Progress in Quantity			Progress in %		Expected Date of Completion	Responsible Organizations
			During the Quarter	Till the Last Quarter	Up to the Quarter	Till the Last Quarter	Up to the Quarter		
Preparation of RAP									
Contract with External Monitoring Agency		MM							
Implementation of Census Survey									
Finalization of PAPs List based on DMS		Number of PAPs							
Calculation of compensation amount									
Negotiation and compensation		**Number of PAPs**							
Lot 1 (Brgy. Kolambugan)		Number of PAPs							
Lot 2 (Brgy. Padiai)		Number of PAPs							
Progress of Compensation Payment		**Number of PAPs**							
Lot 1 (Brgy. Kolambugan)		Number of PAPs							
Lot 2 (Brgy. Padiai)		Number of PAPs							
Progress of Land Acquisition	-	**Number of cases**							
Lot 1 (Brgy. Kolambugan)	-	Number of cases							
Lot 2	-	Number							

(Brgy. Padiai)		of cases							
Progress of Relocation of people		**Number of cases**							
Lot 1 (Brgy. Kolambugan)		Number of cases							
Lot 2 (Brgy. Padiai)		Number of cases							

・6-3-3 Environmental checklist

Table 6-33: Environmental checklist

Category	Environmental issue	Checklist questions	Yes: Y No: N	Special environmental/social considerations (reason for Yes/No answer, evidence, alleviation strategies, etc.)
1. Approvals and explanations	(1) EIA and environmental permits	(a) Have EIA reports been officially completed? (b) Have EIA reports been approved by authorities of the host country's government? (c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? (d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	(a) N (b) N (c) N (d) N	(a) They are currently being prepared. (b) EIA reports have yet to be submitted to the DENR. (c) FPIC must be obtained. (d) As the planned project site lies within a Community-Based Forest Management (CBFM) area, additional permits need to be obtained as the project progresses.
	(2) Explanations to local stakeholders	(a) Are contents of the project and the potential impacts adequately explained to the stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the stakeholders? (b) Have comments from residents and other concerned parties been reflected in the project details?	(a) Y (b) Y	(a) A stakeholder meeting was held on July 31, 2014, at which the project was explained and stakeholders' opinions were heard. As part of the ongoing FPIC process, further explanations of the details of the project will be provided, while the NCIP, a government agency, will explain to the residents about land acquisition and compensation. (b) The results of meetings with stakeholders will also be reflected in the project details going forward.
	(3) Examination of alternative solutions	(a) Have multiple alternative solutions to the project plan (including all environmental and social issues) been considered?	(a) Y	(a) Options for water conduit routes are being examined from both geological and social perspectives.
2. Pollution mitigation measures	(1) Water quality	(a) Does water quality of dam pond/reservoir comply with the country's ambient water quality standards? Is there a possibility that proliferation of phytoplankton and zooplankton will occur? (b) Does the quality of water discharged from the dam pond/reservoir comply with the country's ambient water quality standards? (c) Are adequate measures, such as clearance of woody vegetation from	(a) N/A (b) N/A (c) N (d) N (e) N/A	(a) As this project is a run-of-the-river method hydropower project, no dam pond or reservoir will be created, and water quality will not be affected by discharge. (b) As this project is a run-of-the-river method mini-hydropower project, water quality will not be changed. (c)(d) As the river maintenance flow rate will be maintained downstream, there will be no significant reduction in flow or changes in water quality.

Category	Environmental issue	Checklist questions	Yes: Y No: N	Special environmental/social considerations (reason for Yes/No answer, evidence, alleviation strategies, etc.)
		the inundation zone prior to flooding planned to prevent water quality degradation in the dam pond/reservoir? (d) Is there a possibility that reduced river flow downstream will cause water quality degradation resulting in areas that do not comply with the country's ambient water quality standards? (e) Is the discharge of water from the lower portion of the dam pond/reservoir (the water temperature of the lower portion is generally lower than the water temperature of the upper portion) planned by considering the impacts to downstream areas?		(e) As this project is a run-of-the-river method hydropower project, no dam pond or reservoir will be created.
	(2) Waste	(a) Are earth and sand generated by excavation properly treated and disposed of in accordance with the country's standards?	(a) Y	(a) Environmental impact will be minimized through the securing of an appropriate waste disposal site and the maintenance of appropriate waste disposal methods.
3. Natural environment	(1) Protected areas	(a) Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	(a) N/Y	(a) While the planned project site does not currently lie within a protected area, the municipality of Sibagat has applied to have the Wawa River area, including the planned project area, designated as the "Wawa River Basin Protected Landscape." Approval for this proposal is expected to be received during 2016, meaning that the area may then be designated a protected area.
	(2) Ecosystems	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? (b) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? (c) Is there a possibility that the project will adversely affect downstream aquatic organisms, animals, plants, and ecosystems? Are adequate protection measures taken to reduce the impacts on the ecosystem? (d) Is there a possibility that installation of structures such as dams will block the movement of migratory fish species (such as salmon, trout and eel that move between rivers and sea for spawning)? Are adequate measures taken to reduce the impacts on these	(a) N (b) Y (c) Y (d) Y	(a) While the site does not lie in a primeval forest, tropical rain forest or ecologically valuable habitat, the municipality of Sibagat has applied to have the area including the planned project site designated as the "Wawa River Basin Protected Landscape." (b) While protected species have been identified in the planned project area, the fact that the area of land for modification is small and the fact that a similar environment extends for some distance all around the area suggests that any impact will be minimal. (c) As some construction work will take place inside the river, a certain amount of temporary water turbidity is anticipated. For this reason, periodic water quality assessments will be conducted to monitor this. Once operational, the river maintenance flow rate will be sustained, meaning that the downstream area will not be affected.

Category	Environmental issue	Checklist questions	Yes: Y No: N	Special environmental/social considerations (reason for Yes/No answer, evidence, alleviation strategies, etc.)
		species?		(d) A fishway is planned at the site of the intake weir, which should reduce the impact on migratory fish species.
	(3) Hydrology	(a) Is there a possibility that hydrologic changes due to installation of structures such as weirs will adversely affect the surface and groundwater flows (especially in "run-of-the-river generation" projects)?	(a) N	(a) While a drop in the flow rate between the water intake gate and the powerhouse is expected, the river maintenance flow rate will be sustained. As surface water at the site does not have a subterranean origin, groundwater flows will not be affected.
	(4) Topography and geology	(a) Is there a possibility that reductions in sediment loads downstream due to settling of suspended particles in the reservoir will cause impacts such as scouring of the downstream riverbeds and soil erosion? Is there a possibility that sedimentation of the reservoir will cause loss of storage capacity, water logging upstream and formation of sediment deposits at the reservoir entrance? Are the possibilities of the impacts studied, and adequate prevention measures taken? (b) Is there a possibility that the project will cause a large-scale alteration of the topographic features and geologic structures in the surrounding areas (especially in run-of-the-river generation projects)?	(a) N/A (b) N	(a) As this project is a run-of-the-river method hydropower project, no dam pond or reservoir will be created. (b) Small alterations will be caused by the construction of water tanks and water conduits, but no large-scale alterations of the topographic features or geologic structures in the surrounding areas will be caused.
4. Social environment	(1) Resettlement	(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? (b) Is adequate explanation on relocation and compensation given to affected persons prior to resettlement? (c) Is the resettlement plan, including compensation at full replacement cost, restoration of livelihoods and living standards, developed based on socioeconomic studies on resettlement? (d) Will compensation be paid prior to resettlement? (e) Have compensation policies been codified in writing? (f) Does the resettlement plan pay particular attention to vulnerable	(a) Y (b) N (c) Y (d) Y (e) Y (f) Y (g) Y (h) Y (i) Y (j) Y	(a) The involuntary resettlement of two households will be caused by the construction of the Wawa No. 1 water conduit. The original plan was to construct the water conduit on the right bank of the Wawa River, but this plan would have resulted in the resettlement of more than a dozen households. Following a comparative study, the option that would minimize the impact caused by resettlement was selected. (b) Consultations concerning land acquisition are planned to be held, at which explanations will be provided. (c) In accordance with Philippine law, a social environmental study will be carried out, and a plan formulated. (d) The operator of the project will reach an agreement with the indigenous peoples and pay

Category	Environmental issue	Checklist questions	Yes: Y No: N	Special environmental/social considerations (reason for Yes/No answer, evidence, alleviation strategies, etc.)
		groups or persons, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples? (g) Will agreements with the affected persons be obtained prior to resettlement? (h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan? (i) Will a plan be developed to monitor the impacts of resettlement? (j) Has a framework been developed to handle any grievances?		compensation prior to the initiation of the project. (e) Compensation policies will be discussed as part of the FPIC process, and codified in writing as an MOA. (f) In accordance with Philippine law, a plan paying particular attention to vulnerable social groups will be drawn up. (g) Agreements will be reached through the consultations as part of the FPIC process. (h) A framework has been established whereby the issue of resettlement will be explained and discussed as part of the FPIC process, under the supervision of the NCIP, and prior consent will be obtained from the project-affected people. The operator of the project must take all necessary measures in line with this agreement. (i) Plans are being developed to monitor the impact of resettlement. (j) Should any grievances occur relating to this project, they will be handled by the SPC created to run the project.
	(2) Livelihood and standard of living	(a) Is there a possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts, if necessary? (b) Is there a possibility that the project will adversely affect the livelihoods of inhabitants through changes in the land use of the surrounding area? (c) Is there a possibility that project-related facilities will cause impacts on water navigation or road navigation in the surrounding area? (d) Is there a possibility that diseases, including communicable diseases such as HIV, will be introduced due to immigration of workers associated with the project? Are adequate considerations given to public health, if necessary? (e) Is the minimum flow required for maintaining downstream water uses secured? (f) Is there a possibility that reductions in water flow downstream or seawater intrusion will cause impacts on downstream water uses and land uses? (g) Is there a possibility that water-borne or water-related diseases (e.g., schistosomiasis,	(a) N (b) N (c) N (d) Y (e) Y (f) N (g) N (h) N	(a) The project itself will not cause any adverse effects. (b) As the planned project area includes farmland, some inhabitants will lose the means of their livelihoods. However, compensation will be paid to affected inhabitants after appropriate consultations. (c) Residents of the area do not use the Wawa River as a means of transportation. (d) While it is conceivable that the influx of workers during the construction period could result in the introduction of communicable diseases, the operator of the project will put safety measures and education programs in place in order to prevent this. (e)(f) As the river maintenance flow rate will be maintained downstream, there will be no significant reduction in flow, and no impact on water or land uses. (g) No water-borne or water-related diseases have been identified in the area, and the possibility of their occurrence is slim. (h) No such rights will be impacted.

Category	Environmental issue	Checklist questions	Yes: Y No: N	Special environmental/social considerations (reason for Yes/No answer, evidence, alleviation strategies, etc.)
		malaria, filariasis) will be introduced? (h) Will fishing rights, water usage rights or mountain and forest entrance rights in the area around the river be impacted?		
	(3) Cultural heritage	(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage sites? Are adequate measures considered to protect these sites in accordance with the country's laws?	(a) N	(a) There are no archeological, historical, cultural or religious heritage sites in the project area.
	(4) Landscape	(a) In the case that there are any features of the visual landscape which require consideration, is there a possibility that they will be adversely affected by the project? Are necessary measures taken to prevent this?	(a) N	(a) There are no particular features of the visible landscape which require consideration in the project area.
	(5) Ethnic minorities and indigenous peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples? (b) Are the land and resource rights of ethnic minorities and indigenous peoples respected?	(a) Y (b) Y	(a) Impacts on the indigenous peoples of the area will be considered and appropriate alleviation methods adopted through prior consultation with the indigenous peoples as part of the FPIC process. (b) The project operator has applied to the NCIP for FPIC, ensuring that appropriate measures are taken to protect the rights of indigenous peoples before the implementation of the project.
4. Social environment	(6) Working environment	(a) Does the project adhere to all applicable labor laws of the host country? (b) Is adequate consideration given to the safety of project participants in terms of the hard aspects of the project, such as the installation of accident prevention facilities and equipment, and the proper management of hazardous materials? (c) Are adequate contingency plans and measures developed and implemented to cover the soft aspects of the project, such as accident prevention programs and public health programs? (d) Have appropriate measures been put in place to ensure that security	(a) Y (b) Y (c) Y (d) Y	(a) The project will adhere to all applicable Philippine labor laws. (b) The project will adhere to all safety protocols during the construction phase. (c) The project operator is required to conduct safety education programs and draw up safety management plans. (d) The project operator will conduct education programs for all security staff, and appropriate supervision will also be carried out.

Category	Environmental issue	Checklist questions	Yes: Y No: N	Special environmental/social considerations (reason for Yes/No answer, evidence, alleviation strategies, etc.)
		staff involved in the project do not adversely affect the safety of people involved in the project or local residents?		
5. Other	(1) Impact during construction	(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)? (b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts? (c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?	(a) Y (b) Y/N (c) Y	(a) Measures to alleviate pollution during construction are specified in the EMP. (b) Temporary water turbidity caused by construction is predicted, meaning that aquatic biota may be affected. Water quality tests will be conducted monthly during the construction period to ensure that no significant damage is being inflicted to the habitat of aquatic biota. (c) There is a possibility that the passing of construction vehicles may damage air quality through the production of dust, create noise and lead to traffic accidents. Strategies to alleviate these problems are outlined in the EMP.
	(2) Accident prevention	(a) Is a warning system established to alert the inhabitants to water discharge from the dam?	(a) N/A	(a) Not applicable
	(3) Monitoring	(a) Will the proponent develop and implement monitoring programs for the environmental items that are considered to have potential impacts? (b) How are the items, methods and frequencies included in the monitoring program judged to be appropriate? (c) Will the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)? (d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	(a) Y (b) - (c) Y (d) Y	(a)(b) An environmental monitoring plan has been developed, and the party responsible (the project operator) will carry out a monitoring program based on this plan. (c) As the responsible party, the SPC will establish and maintain a monitoring framework during both construction and operation. (d) Monitoring methods and frequencies are specified in the DENR's DAO 03-30.
6. Points of attention	Reference to other environmental checklists	(a) Where necessary, pertinent items described in the Forestry Projects checklist should also be checked (e.g., projects in the mountains including large areas of deforestation). (b) In the case of dams and reservoirs, such as irrigation, water supply, and industrial water	(a) N/A (b) N/A (c) N/A	(a) Not applicable (b) Not applicable (c) Not applicable

Category	Environmental issue	Checklist questions	Yes: Y No: N	Special environmental/social considerations (reason for Yes/No answer, evidence, alleviation strategies, etc.)
		purposes, where necessary, pertinent items described in the Irrigation Projects and Water Supply checklists should also be checked. (c) Where necessary, pertinent items described in the Power Transmission and Distribution Lines checklist should also be checked (e.g., projects including installation of electric transmission lines and/or electric distribution facilities).		
	Precautions for use of environmental checklists	(a) If necessary, the impacts to transboundary or global issues should be confirmed (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	(a) N/A	(a) Not applicable

Note 1) Regarding the term "country's standards" mentioned in the environmental checklists, in the event that environmental standards in the country where the project is located diverge significantly from international standards, appropriate environmental considerations are made, if necessary. In cases where local environmental regulations are yet to be established in some areas, considerations should be made based on comparisons with appropriate standards of other countries (including Japanese experiences).
Note 2) Environmental checklists provide general environmental items to be checked. It may be necessary to add or delete an item taking into account the characteristics of the project and the particular circumstances of the country and locality in which it is located.
Note 3) Text used in this checklist is based on the checklists provided by JICA as the “JBIC Guidelines for Confirmation of Environmental Considerations; 12. Dams and Reservoirs” and “13. Other Electric Generation.”

Chapter 7 Project Cash Flow Analysis & Acquisition of Funding

7-1. Investigation of business scheme for securing capital from financial institutions

After meeting with the BDO, the Development Bank of the Philippines (DBP), and the International Finance Corporation in regards to the investment environment for renewable energy projects within the Philippines, we learned that each company is actively pursuing investment and lending opportunities within the field. Therefore, it is possible to secure capital from local financial institutions at interest rates around 7%, but since they are not long-term fixed interest investments, it is difficult to actively consider their use given the desire to eliminate uncertainty over the long-term given the long lifespans of renewable energy projects. In addition, the terms are focused more on the needs of the lending institutions than the entity receiving the capital due to the risks associated with foreign exchange rates.

There are two main points to consider when securing capital for renewable energy projects within the Philippines. First, when using feed-in tariffs (FIT), a PPA based on the FIT will not be obtained until after the project is complete. Since the electricity sales cannot be guaranteed during construction, securing capital before a PPA is in place will rely on the credit worthiness of the corporations involved. However, it is possible to deal with the project finances once a PPA has been obtained, assuming the necessary conditions are met.

Second, there are already numerous small-scale renewable energy projects in the sector, meaning it is possible that some institutions may be averse to lending to such projects. In response to this, it is useful to engage in multiple projects under a single holding company in order to increase the project's scale and secure capital more easily.

The usual conditions for securing capital for renewable energy projects are listed in Table 7-1: General financing conditions for renewable energy projects in the Philippines below, although they often differ depending on the project.

Table 7-1: General financing conditions for renewable energy projects in the Philippines

Interest rate	Approx. 7%. However, it is not a long-term fixed rate.
Repayment period	Approx. 10-15 years (incl. an approximate 3 year grace period)
Project financing ratio	Approx. 70% (upper limit)

Source: Created by the study team

Additionally, based on the financial analysis conducted in this chapter, we have revised the project costs detailed in Chapter 5.

The estimated construction costs covered in Chapter 5 were calculated using construction unit costs that take into account the price rises based on the complete materials of the Asiga Project and applied them to the specifications and construction of each structure determined by the schematic design for this particular project. With the Asiga Project, the companies in charge of the project negotiated its procurement contracts directly as the contractor, meaning that the construction costs estimated by the

consultants became the actual bid amounts (bid acceptance ratio of 100%).

Generally speaking, when dealing with public works and grant assistance projects, the bid acceptance ratio created by dividing the successful bid amount by the projected costs is usually lower than in the case of negotiated contracts. For this particular project, we expect a reduction in the project costs since bidding for the construction, including the civil engineering and building equipment, will be opened to Philippine companies as well in order to encourage a competitive bidding environment.

Since there is no data on bid acceptance ratios for public works projects in the Philippines, we have instead gathered procurement records from grant assistance projects conducted in 2014 and listed up the results in Table 7-2-1. Based on this data, the average bid acceptance ratio was 98.8% when a negotiated contract and only one bidder were involved, and it decreased to 78.9% when multiple companies placed bids, leading to a prominent decrease in the procurement costs. Additionally, since these are actual results from projects led by Japanese companies receiving grant assistance from JICA, it is believed that an even greater reduction in the bid acceptance ratio can be expected since the bid amounts reflect the risk involved with Japanese companies doing business in these developing countries, which will be partially mitigated with this project by including Philippine companies in the bidding process.

Table 7-2-1: Procurement record of grant aid projects implemented by Japanese government in FY 2014

No	Country	Project Name	Signing Date	Number of Bidders	Contract Price (JPY)	Predetermined Price (JPY)	Bid Acceptance Ratio
1	Solomon Islands	The Project for Improvement of Honiara Port Facilities	09/30/14	1	2,520,000,000	2,595,000,000	97.1%
2	Lao PDR.	The Project for Construction of Sekong Bridge on NR16B in the Southern Region of Laos	10/31/14	5	1,620,685,000	2,060,125,000	78.7%
3	Myanmer	The Project for National Single Window and Customs Modernization by Introducing Automated Cargo Clearance System	10/27/14	1 (Negotinated Contract)	3,208,000,000	Not Discrosed	-
4	Myanmer	The Project for National Single Window and Customs Modernization by Introducing Automated Cargo Clearance System	10/27/14	1 (Negotinated Contract)	657,000,000	Not Discrosed	-
5	Mozambique	The Project for Construction of Health Science Institute in Maputo	01/14/15	Negotinated Contract	133,440,000	133,441,000	100.0%
6	Mozambique	The Project for Construction of Health Science Institute in Maputo	01/16/15	Negotinated Contract	1,635,000,000	1,632,045,000	100.2%
7	Nicaragua	The Project for Construction of Paso Real Bridge	01/23/15	2	1,105,000,000	1,393,600,000	79.3%
8	Myanmer	The Project for Construction of New Thaketa. Bridge	02/27/15	4	3,360,000,000	3,982,500,000	84.4%
9	Tanzania	The Project for Reinforcement of Power Distribution in Dar es Salaam	12/09/14	3	3,809,600,000	4,254,136,000	89.6%
10	Paraguay	Project for Improvement of the Drinking Water System for Coronel Oviedo City	05/20/15	1	1,677,000,000	1,722,800,000	97.3%
11	Cambodia	The Project for the Improvement of the National Road No. 1 and The Project for Improvement of the National Road No.1 Urban Section	03/23/15	5	1,231,374,000	1,703,406,000	72.3%
12	Zambia	The Project for Groundwater Development in Luapula Province Phase 3	05/29/15	1	645,000,000	646,101,000	99.8%
13	Luanda	Project for Development of Irrigation Scheme in Ngoma District	05/29/15	1	1,353,000,000	1,353,306,000	100.0%
14	Pakistan	The Project for Upgrading of Mechanical System for Sewerage and Drainage Services in Gujranwala	05/15/15	2	500,000,000	619,623,000	80.7%
15	Pakistan	The Project for Upgrading of Mechanical System for Sewerage and Drainage Services in Gujranwala	05/15/15	2	271,000,000	351,177,000	77.2%
16	Myanmer	The Project for Enhancing Technological Universities in Myanmar	04/03/15	2	152,000,000	Not Discrosed	-
17	Myanmer	The Project for Enhancing Technological Universities in Myanmar	04/03/15	Negotinated Contract	414,000,000	Not Discrosed	-
18	Myanmer	The Project for Enhancing Technological Universities in Myanmar	07/10/15	2	348,300,000	Not Discrosed	-
19	Myanmer	The Project for Enhancing Technological Universities in Myanmar	07/10/15	1	322,112,000	Not Discrosed	-
20	Myanmer	The Project for Enhancing Technological Universities in Myanmar	07/10/15	5	787,800,000	Not Discrosed	-
21	Saint Vincent and the Grenadines	The Project for Improvement of Fishery Equipment and Machinery in the Commonwealth of Dominica	06/11/15	3	346,500,000	431,697,000	80.3%
22	Uganda	Project for Improvement of Queensway. Substation	05/18/15	3	1,888,000,000	2,402,000,000	78.6%
23	Grenada	The Project for Improvement of Fishery Equipment and Machinery in Grenada	06/25/15	4	339,000,000	437,248,000	77.5%
24	Saint Lucia	The Project for Improvement of Fishery Equipment and Machinery in Saint Lucia	05/27/15	3	427,000,000	501,828,000	85.1%
25	Bhutan	The Project for Replacement of Old Ambulances (Phase II)	07/17/15	1	154,810,000	159,000,000	97.4%
26	Antigua and Barbuda	The Project for Improvement of Fishery Equipment/Machinery in Antigua and Barbuda	11/06/15	4	514,000,000	544,000,000	94.5%
27	Commonwealth of Dominica	The Project for Improvement of Fishery Equipment and Machinery in the Commonwealth of Dominica	11/20/15	4	107,970,000	136,704,000	79.0%
28	Federation of Saint Christopher and Nevis	The Project for Improvement of Fishery Equipment and Machinery in Saint Christopher and Nevis	11/13/15	4	114,440,000	157,993,000	72.4%
29	Myanmer	The Project for Port EDI for Port Modernization	10/01/15	2	838,000,000	1,570,000,000	53.4%
Average bid acceptance ratio among the projects of negotinated contract and only one bidder.							98.8%
Average bid acceptance ratio among the projects out of negotinated contract and only one bidder (yellow hatched).							**78.9%**

Source: Created by the investigation team based on the JICA website

In consideration of the above, this project plans to open the bidding process to Philippine companies

for the civil engineering and construction work, so we have used a reduction in the bid amount (79%) for the estimated construction costs in order to calculate the project costs. Additionally, quality is an important consideration for this project, so it plans to utilize Japanese-made generator equipment and therefore uses costs calculated by comparing estimates from several Japanese manufacturers and looking at actual implementations of similar equipment overseas. Therefore, cost reductions for the generator equipment due to the participation of Philippine companies in the bidding process have not been factored into the cost calculations.

As a result, the estimated costs were calculated at 81.5% for the Wawa No. 1 project, and 81.2% for the Wawa No. 2 project. The project costs based on this financial analysis are detailed in Table 7-2-2.

Table 7-2-2: Project cost breakdown considering bid acceptance ratio

Unit: PHP 1,000

No.	Item	Estimated Cost		Cost considering Bid Acceptance Ratio*	
		Wawa No. 1	**Wawa No. 2**	**Wawa No. 1**	**Wawa No. 2**
1.	**Preparatory works**	64,571	255,861	51,011	202,130
2.	**Civil works & building works**	741,750	1,589,003	585,983	1,255,312
3.	**Electro mechanical works**	**130,859**	**256,199**	**130,859**	**256,199**
4.	**Engineering services**	58,859	135,053	46,499	106,692
5.	**Administrative expenses**	84,974	178,085	57,123	140,687
	Total	**1,081,013**	**2,414,201**	**881,481**	**1,961,021**

*: The cost of the Electro mechanical works does not take into consideration the bid acceptance ratio because it will utilize equipment imported from a Japanese manufacturer through a negotiated contract.

In this chapter, we investigated the business plans for both the Wawa No. 1 and Wawa No. 2 projects based on these conditions.

In order to perform an analysis of the financial and investment effects, a financial model was created to evaluate the project on a cash flow basis when looking at the expenses (business expenses for the initial investment and maintenance costs after operations begin) compared to the profit generated by selling the electricity generated from the plant.[1]

7-2. Cash flow analysis

7-2-1. Business plan and financial analysis for Wawa No. 1

(1) Wawa No. 1 business plan

The premises behind the business plan for Wawa No. 1 are listed in Table 7-3 below.

[1] Items such as depreciation are included for accounting purposes. Depreciation was calculated over a period of 20 years, to match the period of the project, with a remaining value of 0.

The resulting business plan for 10 years following the start of operations for the plant is detailed in Table 7-4.

Since the income generated from the sale of electricity is relatively low compared to the construction costs, the loan cannot be repaid and there is negative cash flow after the plant begins operations.

Table 7-3: Principle conditions assumed in the Wawa No. 1 business model

Category	Subcategory	Amount		Comments
Basic specifications	Total expenses	881,481	1,000 PHP	-
	Rated output	2,580	kW	-
	Operating ratio	30	%	-
	Generated power volume	6,764	1,000 kWh	-
	Purchase price	5.9	PHP/kWh	-
	Power purchased annually	39,870	1,000 PHP	-
Capital structure	Senior loan	440,741	1,000 PHP	-
	Senior loan ratio	50	%	60% when taking fund management into account
	Equity	440,741	1,000 PHP	-
	Equity ratio	50	%	-
Senior loan conditions	Interest rate	7.0	%	Based on actual results of Asiga small hydro power project.
	Principal repayment grace period	2	years	–
	Repayment period	15	years	-
Operating costs	Maintenance costs	3,567	1,000 PHP	-O&M; general management costs; local contribution costs, based on ER1-94 (Benefits to Host Communities Pursuant to ER1–94)

Source: Created by the study team

Table 7-4: Wawa No. 1 business plan (cash flow)

Project Year	1	2	3	4	5	6	7	8	9	10
Unit 1000PHP	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Power purchased – Wawa No.1	0	0	16,613	39,870	39,870	39,870	39,870	39,870	39,870	39,870
Power purchased – Wawa No.2	0	0	0	0	0	0	0	0	0	0
Power purchased	0	0	16,613	39,870	39,870	39,870	39,870	39,870	39,870	39,870
O&M	0	0	(1,125)	(2,700)	(2,700)	(2,700)	(2,700)	(2,700)	(2,700)	(2,700)
Administrative Cost	0	0	(333)	(800)	(800)	(800)	(800)	(800)	(800)	(800)
Local Contribution Fee (ER1-94)	0	0	(28)	(68)	(68)	(68)	(68)	(68)	(68)	(68)
EBITDA	0	0	15,126	36,303	36,303	36,303	36,303	36,303	36,303	36,303
Capital Investment	0	0	0	0	0	0	0	0	0	0
Taxes	0	0	(322)	(1,661)	(1,661)	(1,572)	(1,528)	(1,484)	(1,440)	(1,396)
Interest expense	0	0	0	0	(34,371)	(32,665)	(30,839)	(28,885)	(26,794)	(24,557)
Principal payments	0	0	0	0	(24,379)	(26,086)	(27,912)	(29,866)	(31,956)	(34,193)
Cash Available for Distribution	0	0	14,794	36,642	(24,064)	(24,020)	(23,976)	(23,932)	(23,888)	(23,844)

Source: Created by the study team

(2) Wawa No. 1 financial analysis

The financial indicators for this project are detailed in Table 7-5.

The IRR was calculated from the cash flow over the 20 year FIT period and the cash flow and terminal value of the project from the 21st year onwards. Additionally, the discount rate used for calculating the NPV utilized an equity basis value of 10.0%, which is based on the capital costs commonly used as a benchmark within the Philippines as obtained from our various meetings with different companies and projects. However, the project basis value of 9.06% is a WACC calculated from the capital costs and the average percentages of the amount borrowed over the project period (Average Gearing Rate: 29.24%), while taking into account corporate tax rates.

Table 7-5: Wawa No. 1 financial indicators

Indicator	Equity base	Ref: Project base
FIRR	0.07%	-0.00%
NPV	79,137 1,000 PHP	302,405 1,000 PHP
DSCR	Average DSCR: 0.59 Minimum DSCR: 0.59	

Source: Created by the study team

Since the cash flow is negative, it hinders the ability for financing, and the FIRR is lower than the hurdle rate (discount rate). Considering that NPV must be positive in order for the investment to be considered attractive, it will be necessary to fundamentally rethink the project if it is to secure the proper funding.

7-2-2. Business plan and financial analysis for Wawa No. 2

(1) Wawa No. 2 business plan

The premises behind the business plan for Wawa No. 2 are listed in Table 7-6 below.

Table 7-6: Principle conditions assumed in the Wawa No. 2 business model

Category	Subcategory	Amount	Comments
Basic specifications	Total expenses	1,961,020 1,000 PHP	−
	Rated output	10,200 kW	−
	Operating ratio	34 %	−
	Generated power volume	30,824 1,000 kWh	−
	Purchase price	5.9 PHP/kWh	−
	Power purchased annually	180,822 1,000 PHP	−
Capital structure	Senior loan	980,510 1,000 PHP	−
	Senior loan ratio	50 %	Same as Wawa No. 1
	Equity	980,510 1,000 PHP	-
	Equity ratio	50 %	-
Senior loan conditions	Interest rate	7.0 %	Same as Wawa No. 1
	Principal repayment grace period	2 years	-
	Repayment period	15 years	-
Operating costs	Maintenance costs	5,912 1,000 PHP	Same as Wawa No. 1

Source: Created by the study team

The resulting business plan for 10 years following the start of operations for the plant is detailed in Table 7-7.

Unlike Wawa No. 1, the Wawa No. 2 project features a positive cash flow from the start of

operations, and therefore should not have any obstacles to its financing.

Table 7-7: Wawa No. 2 business plan (cash flow)

Project Year	1	2	3	4	5	6	7	8	9	10
Unit 1000PHP	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Power purchased – Wawa No.1	0	0	0	0	0	0	0	0	0	0
Power purchased – Wawa No.2	0	0	0	75,342	180,822	180,822	180,822	180,822	180,822	180,822
Power purchased	0	0	0	75,342	39,870	39,870	39,870	39,870	39,870	39,870
O&M	0	0	0	(1,942)	(4,661)	(4,661)	(4,661)	(4,661)	(4,661)	(4,661)
Administrative Cost	0	0	0	(394)	(945)	(945)	(945)	(945)	(945)	(945)
Local Contribution Fee (ER1-94)	0	0	0	(128)	(306)	(306)	(306)	(306)	(306)	(306)
EBITDA	0	0	0	72,879	174,909	174,909	174,909	174,909	174,909	174,909
Capital Investment	0	0	0	0	0	0	0	0	0	0
Taxes	0	0	0	(1,507)	(5,537)	(5,439)	(5,340)	(6,966)	(8,160)	(8,773)
Interest expense	0	0	0	0	(72,800)	(69,185)	(65,318)	(61,179)	(56,751)	(52,013)
Principal payments	0	0	0	0	(51,637)	(55,251)	(59,119)	(63,257)	(67,685)	(72,423)
Cash Available for Distribution	0	0	0	71,372	44,937	45,035	45,133	43,507	42,313	41,700

Source: Created by the study team

(2) Wawa No. 2 financial analysis

The financial indicators for this project are detailed in Table 7-5. Additionally, its IRR and NPV were calculated using the same methods as for the Wawa No. 1 project.

Table 7-8: Wawa No. 2 financial indicators

Indicator	Equity base	Ref: Project base
FIRR	6.65%	5.88%
NPV	577,194 1,000 PHP	1,283,880 1,000 PHP
DSCR	Average DSCR: 1.33 Minimum DSCR: 1.29	

Source: Created by the study team

Although the FIRR is slightly below the hurdle rate (discount rate), the NPV value is high, meaning that the project should easily qualify for financing.

When looking at the Debt Service Coverage Ratio (DSCR), which is a common index used to show a project's ability to repay debt, the average DSCR during the repayment period is 1.29 with a low value of 1.33, which is a level that does not present a large obstacle towards realizing the investment efficiency of the project when looked at from the perspective of its overall financing.

Calculating EIRR

In order to assess the economic benefits of this project from the perspective of the efficient distribution of natural resources in the national economy, the Economic Internal Rate of Return (EIRR) is calculated as follows: with EIRR, a return is calculated on the assumption that "while costs reduce national income (= economic cost), the benefits enhance national income (= economic benefit).[2]

To determine the economic cost, we calculated the Standard Conversion Factor, which is a coefficient used to convert the cost of nontradable commodities to international standard costs.[3]

$$SCF = (I+E) / [(I+Id) + (E+Ed)]$$

I: Total imports (CIF)　E: Total exports (FOB)　Id: Total import duties　Ed: Total export duties

As a result, an SCF of 0.95 based on the five year average is used for the Philippines (Table7-9).

Table 7-9: SCF calculations

Item (million Pesos)	2008	2009	2010	2011	2012	5 year average
Total imports	2,523,760	2,052,770	2,477,980	2,620,220	2,623,611	2,459,668
Total exports	2,199,788	1,830,251	2,324,984	2,092,735	2,198,931	2,129,338
Import duties	260,248	220,307	259,241	265,108	289,866	258,954
Export duties	-	-	-	-	-	0
SCF	0.95	0.95	0.95	0.95	0.94	0.95

Source: JETRO, World Bank, World Development Indicators

The preparatory, civil engineering & construction costs, engineering, management and other costs were listed as domestic currency expenses, and items such as the generators were listed as foreign currency expenses, and the two were combined to calculate the total costs of the project. Additionally, items such as interest, taxes, and dues have been removed from the economic expenses since they do not consume resources when looking at society as a whole. The resulting economic expenses are listed up in Table 7-10.

[2] Excerpt from JICA "Calculation Manual for Internal Rate of Return (IRR) in International Yen Loans"
[3] Excerpt from JICA "Calculation Manual for Internal Rate of Return (IRR) in International Yen Loans"

Table 7-10: Economic expense calculations

(Thousand Pesos)	Cost Item	Wawa No. 1	Wawa No 2
Domestic currency expenses	Preparatory	51,011	202,130
	Civil engineering/construction Expenses	585,983	1,255,312
	Engineering	46,499	106,692
	Management costs, etc.	67,129	140,687
	Total	750,622	1,704,821
	SCC	0.95	0.95
	Economic expenses (1)	713,091	1,619,580
Foreign currency expenses	Generator equipment	130,859	256,199
	Economic expenses (2)	130,859	256,199
Total economic expenses		843,950	1,875,779

Source: Created by the study team

To calculate the economic benefit, the basic method is to look at the value of savings versus replacement costs throughout the project (value of replacement cost savings).[4] In 2013, the cost of generating power within the Philippines rose to 17.8 PHP/kWh[5], making it higher than the FIT price. The economic benefit was therefore calculated by comparing the difference in selling the power at the FIT price as opposed to the value of replacement cost savings.

Looking at the economic cost and benefit, a table detailing the cash flow can be created and used to calculate the EIRR (Wawa No. 1: Table 7-11, Wawa No. 2: Table 7-12). Additionally, the maintenance and running costs are based on the O&M costs. Increases in prices do not correspond with resource consumption, so they have been removed from the calculations.

[4] Excerpt from JICA "Calculation Manual for Internal Rate of Return (IRR) in International Yen Loans"

[5] NPC Annual Report 2013

・Operating Expense 7,127,852,883 PHP *Source: NPC Annual Report (P16)

・Total Energy Sales 399,846 MWh *Source: NPC Annual Report (P12)

・"Operating Expense" ÷ "Total Energy Sales" = 17.82649541 PHP/kWh

Table 7-11: Wawa No. 1 EIRR calculations

Thousand Peso	Economic Cost	O&M Cost	Total Cost	Alternative Electric Generation Cost	Small Hydro Power Cost	Economic Benefit	Net Benefit
1	353,213		353,213				-353,213
2	346,879		346,879				-346,879
3	181,389		181,389				-181,389
4		2,160	2,160	120,399	39,908	80,492	78,332
5		2,160	2,160	120,399	39,908	80,492	78,332
6		2,160	2,160	120,399	39,908	80,492	78,332
7		2,160	2,160	120,399	39,908	80,492	78,332
8		2,160	2,160	120,399	39,908	80,492	78,332
9		2,160	2,160	120,399	39,908	80,492	78,332
10		2,160	2,160	120,399	39,908	80,492	78,332
11		2,160	2,160	120,399	39,908	80,492	78,332
12		2,160	2,160	120,399	39,908	80,492	78,332
13		2,160	2,160	120,399	39,908	80,492	78,332
14		2,160	2,160	120,399	39,908	80,492	78,332
15		2,160	2,160	120,399	39,908	80,492	78,332
16		2,160	2,160	120,399	39,908	80,492	78,332
17		2,160	2,160	120,399	39,908	80,492	78,332
18		2,160	2,160	120,399	39,908	80,492	78,332
19		2,160	2,160	120,399	39,908	80,492	78,332
20		2,160	2,160	120,399	39,908	80,492	78,332
Total	881,481	36,720	918,201	2,046,786	678,429	1,368,357	450,156
						EIRR	4.3%

Source: Created by the study team

Table 7-12: Wawa No. 2 EIRR calculations

Thousand Peso	Economic Cost	O&M Cost	Total Cost	Alternative Electric Generation Cost	Small Hydro Power Cost	Economic Benefit	Net Benefit
1	639,257		639,257				-639,257
2	440,138		440,138				-440,138
3	645,097		645,097				-645,097
4	236,528		236,528				-236,528
5		2,625	2,625	548,667	181,862	366,806	364,181
6		2,625	2,625	548,667	181,862	366,806	364,181
7		2,625	2,625	548,667	181,862	366,806	364,181
8		2,625	2,625	548,667	181,862	366,806	364,181
9		2,625	2,625	548,667	181,862	366,806	364,181
10		2,625	2,625	548,667	181,862	366,806	364,181
11		2,625	2,625	548,667	181,862	366,806	364,181
12		2,625	2,625	548,667	181,862	366,806	364,181
13		2,625	2,625	548,667	181,862	366,806	364,181
14		2,625	2,625	548,667	181,862	366,806	364,181
15		2,625	2,625	548,667	181,862	366,806	364,181
16		2,625	2,625	548,667	181,862	366,806	364,181
17		2,625	2,625	548,667	181,862	366,806	364,181
18		2,625	2,625	548,667	181,862	366,806	364,181
19		2,625	2,625	548,667	181,862	366,806	364,181
20		2,625	2,625	548,667	181,862	366,806	364,181
Total	1,961,020	42,000	2,003,020	8,778,675	2,909,786	5,868,890	3,865,870
						EIRR	12.7%

It is said that the common discount rate for social projects is 12%, meaning that the Wawa No. 1 project comes in under this amount. However, the Wawa No. 2 project has an EIRR of greater than 12%, so it demonstrates suitable social value.

7-3. Sensitivity analysis

In regard to the implementation of this project, an FIRR sensitivity analysis was performed on the three factors that have the largest effect on investment efficiency in order to verify the stability of cash flow; project costs, loan interest, and purchase price. The results of the sensitivity analysis are as detailed below.

(1) Project costs

Hydro power is characterized by having lower costs at the operation stage when compared to other power generation projects, but having large initial investment costs. It is also characterized by a high ratio of building and structure construction costs from among project costs, and indeed in this project they account for almost 70% of the project costs. Furthermore, when project costs are divided into “preparatory construction,” “building and structure construction,” “power generating machinery,” “engineering” and “management expenses, etc.” and the performance of past hydro power projects and other factors are considered, it is building and structure construction that has the highest possibility of fluctuation due to reasonably expected uncertainties.

Therefore, from among the project expenses that represent the investment in this project, we investigated how the FIRR changed with the building and structure construction costs altered in increments of 10%, within the -10% to +30% range (Wawa No. 1: Table 7-13-1; Wawa No. 2: Table 7-13-2). Furthermore, as changes in building and structure construction costs will also affect the capital that is required, the amount of required capital has also been adjusted for each scenario.

Table 7-13-1: FIRR sensitivity analysis for building and structure construction costs (project costs) for Wawa No. 1

Scenario	Project Costs (Thousand Pesos)	Of Which Building and Structure Construction Costs (Thousand Pesos)	Equity IRR	DSCR (Average/minimum)
Base Case + 30%	1,145,925	761,778	-0.47%	0.46／0.45
Base Case + 20%	1,057,777	703,180	-0.61%	0.48／0.48
Base Case + 10%	969,629	644,581	-0.28%	0.52／0.51
Base Case	**881,481**	**585,983**	**0.07%**	**0.59／0.59**
Base Case - 10%	793,333	527,385	0.50%	0.60／0.59

Source: Created by the investigation team

Table 7-13-2: FIRR sensitivity analysis for building and structure construction costs (project costs) for Wawa No. 2

Scenario	Project Costs (Thousand Pesos)	Of Which Building and Structure Construction Costs (Thousand Pesos)	Equity IRR	DSCR (Average/minimum)
Base Case + 30%	2,549,327	1,631,906	6.55%	1.07／1.06
Base Case + 20%	2,353,225	1,506,374	6.60%	1.13／1.12
Base Case + 10%	2,157,123	1,380,843	6.62%	1.19／1.14
Base Case	1,961,021	1,255,312	6.65%	1.33／1.29
Base Case - 10%	1,764,919	1,129,781	6.68%	1.33／1.29

Source: Created by the study team

Since the purpose of a financial analysis is to measure the effects of a stress test on a base case, it is difficult to demonstrate reasonable viability for the Wawa No. 1 project, but the FIRR for the Wawa No. 2 project does not deviate greatly from the base case, meaning there is no reason it should not be considered a reasonable investment.

(2) Loan interest

The financial model assumes an interest rate of 7.0% for this project. The interest rate will change

depending on factors such as the market situation at the point the loan is made, and so is another factor that will affect the realization of this project.

Changes in FIRR with loan interest altered in increments of 0.5% between -0.5% (loan interest: 6.5%) to +1.5% (loan interest: 8.5%) are as shown in Table 7-14-1 and Table 7-14-2.

Table 7-14-1: FIRR sensitivity analysis based on interest rates (Wawa No. 1)

Scenario	Interest Rates	Equity Base FIRR	DSCR (Avg / Min)
Base Case + 1.5%	8.50%	-0.09%	0.54／0.53
Base Case + 1.0%	8.00%	-0.03%	0.55／0.55
Base Case + 0.5%	7.50%	0.02%	0.57／0.57
Base Case	**7.00%**	**0.07%**	**0.59／0.59**
Base Case – 0.5%	6.50%	0.12%	0.62／0.61

Source: Created by the study team

Table 7-14-2: FIRR sensitivity analysis based on interest rates (Wawa No. 2)

Scenario	Interest Rates	Equity Base FIRR	DSCR (Avg / Min)
Base Case + 1.5%	8.50%	6.15%	1.22／1.17
Base Case + 1.0%	8.00%	6.32%	1.26／1.21
Base Case + 0.5%	7.50%	6.49%	1.29／1.25
Base Case	**7.00%**	**6.65%**	**1.33／1.29**
Base Case – 0.5%	6.50%	6.81%	1.37／1.33

Source: Created by the study team

As with the project costs detailed in (1), it is difficult to demonstrate viability as a business for the Wawa No. 1 project, but the FIRR for the Wawa No. 2 project does not deviate greatly from the base case, meaning there is no reason it should not be considered a reasonable investment.

(3) Purchase price

The selling price of the electricity generated is also a large factor in the financial evaluation of this project. A Feed-in-Tariff system is already available in the Philippines, and is set at 5.90 Peso/kWh for hydro power.

At present, changes in the FIT price for hydro power are unlikely to occur, but in the case of solar power, it was announced in 2015 that there will be a drop in the FIT price from 9.68 Peso/kWh to 8.69 Peso/kWh, a reduction of 11.4%. As they are the only source of income for this project, they directly affect cash flow and so a sensitivity analysis was performed in 5% increments for the purchase price, starting from -15% and increasing to +5% (Table 7-15-1, Table 7-15-2).

Table 7-15-1: FIRR sensitivity analysis for power sale price (Wawa No. 1)

Scenario	Purchase Price (Peso/kWh)	Equity Base FIRR	DSCR (Avg / Min)
Base Case - 15%	5.02	-0.78%	0.50／0.49
Base Case - 10%	5.31	-0.48%	0.53／0.52
Base Case - 5%	5.61	-0.20%	0.56／0.56
Base Case	**5.90**	**0.07%**	**0.59／0.59**
Base Case + 5%	6.20	0.32%	0.63／0.62

Source: Created by the study team

Table 7-15-2: FIRR sensitivity analysis for power sale price (Wawa No. 2)

Scenario	Purchase Price (Peso/kWh)	Equity Base FIRR	DSCR (Avg / Min)
Base Case - 15%	5.02	5.05%	1.15／1.12
Base Case - 10%	5.31	5.61%	1.21／1.17
Base Case - 5%	5.61	6.14%	1.27／1.23
Base Case	**5.90**	**6.65%**	**1.33／1.29**
Base Case + 5%	6.20	7.15%	1.39／1.35

Source: Created by the study team

As with the project costs detailed in (1) and the loan interested detailed in (2), it is difficult to demonstrate viability as a business for the Wawa No. 1 project, but the FIRR for the Wawa No. 2 project does not deviate greatly from the base case, meaning there is no reason it should not be considered a reasonable investment.

(4) Three sensitivity analyses when looking at two factors

In this section, we will cover the results of a sensitivity analysis when looking at multiple combinations of the three factors previously covered: project costs, loan interest, and purchase price. The subject of the analysis will be the equity base FIRR, and will examine the three cases listed in the tables below: project costs & loan interest (Table 7-16-1), project costs & purchase price (Table 7-16-2), and loan interest & purchase price (Table 7-16-3).

Since the difficulty in demonstrating the business feasibility of the Wawa No. 1 project has already been demonstrated, this sensitivity analysis will only look at the Wawa No. 2 project. In either case, when looking at both factors in a worst case scenario, or at least something close to it, the FIRR rates decline, but not so much that they would call into question the business feasibility of the project.

Table 7-16-1: FIRR sensitivity analysis for project costs x loan interest (Wawa No. 2)

Loan interest / **Civil engineering / construction costs (same)**		BC -0.5%	**Base case**	BC +0.5%	BC +1.0%	BC +1.5%
		6.50%	**7.00%**	7.50%	8.00%	8.50%
BC + 30%	1,631,906	6.69%	6.55%	6.41%	6.27%	6.12%
BC + 20%	1,506,374	6.75%	6.60%	6.44%	6.28%	6.11%
BC + 10%	1,380,843	6.77%	6.62%	6.48%	6.33%	6.18%
BC	**1,255,312**	6.81%	6.65%	6.49%	6.32%	6.15%
BC - 10%	1,129,781	6.87%	6.68%	6.50%	6.32%	6.12%

Table 7-16-2: FIRR sensitivity analysis for project costs x purchase price (Wawa No. 2)

Purchase price (Peso/kWh) / **Civil engineering / construction costs (same)**		BC +5%	**Base case**	BC -5%	BC -10%	BC -15%
		6.20	**5.90**	5.61	5.31	5.02
BC + 30%	1,631,906	7.02%	**6.55%**	6.07%	5.40%	5.07%
BC + 20%	1,506,374	7.08%	**6.60%**	6.09%	5.47%	4.85%
BC + 10%	1,380,843	7.11%	**6.62%**	6.13%	5.61%	5.02%
BC	**1,255,312**	**7.15%**	**6.65%**	**6.14%**	**5.61%**	**5.05%**
BC - 10%	1,129,781	7.08%	**6.60%**	6.09%	5.47%	4.85%

Table 7-16-3: FIRR sensitivity analysis for loan interest x purchase price (Wawa No. 2)

Purchase price (Peso/kWh) / Loan interest		BC +5%	**Base case**	BC -5%	BC -10%	BC -15%
		6.20	**5.90**	5.61	5.31	5.02
BC + 1.5%	8.50%	6.66%	6.15%	5.63%	5.02%	4.21%
BC + 1.0%	8.00%	6.82%	6.32%	5.80%	5.26%	4.40%
BC + 0.5%	7.50%	6.99%	6.49%	5.97%	5.43%	4.73%
BC	**7.00%**	7.15%	6.65%	6.14%	5.61%	5.05%
BC – 0.5%	6.50%	7.32%	6.81%	6.30%	5.77%	5.22%

7-4. Methods for acquiring capital

7-4-1. Investigations regarding acquisition of capital from financial institutions

(1) Feasibility of securing capital for this project

This project is an infrastructure project capable of generating a long-running and stable cash flow, so its nature does not fit well with short-term or variable interest rate financing, making them difficult to consider when looking at it from the business owner's perspective.

Therefore, as mentioned previously, financing from governmental financial institutions such as JICA and JBIC in addition to private financial institutions is also a possibility.

(2) Possibility of using facilities and financing systems from JICA and JBIC

JICA offers two types of financing, a two-step loan facility called the JICA Environmental Development Project (EDP) and foreign investment financing that could be used for financing this project. The principle loan conditions for each are detailed in Table 7-17 and Table 7-18 below.

The deadline for the EDP facility is approaching, making it difficult to utilize with this project. With JICA, although there are issues to be worked out with the FIT system in the Philippines, it may be possible to use foreign investment financing system.

Table 7-17: JICA EDP financing conditions

Item	**Conditions**
Interest	PDST-R1 (10-year treasury bond) rate + spread (spread is set independently within the above range by the DBP based on credit risk of end user etc.) Fixed interest during the financing period.
Repayment Period	Within 15 years (Repayment Grace Period: Includes maximum repayment grace period of 5 years for non-water supply related projects and maximum of 3 years for water supply related projects).
Currency	Philippines Peso
Other	・ Effective period: Scheduled to close in January 2016. Investigations and discussions were held in December 2015 to extend the period by one year since there were approximately JPY 6 bn of unallocated funds remaining, but the credit facility was reached in April 2016, so there is no possibility to use this facility for the project. ・ In the case of a private company, investment rate must be at least 20%.

Source: Created by the study team referring to JICA website

Table 7-18: JICA foreign investment financing conditions

Item	Conditions
Interest	Based on the lending rates for the fiscal loan fun, and taking borrowers credit etc. into account, interest is set so that the required grant element (GE) for official development assistance is at least 25%, including the repayment period.
Repayment Period	In principle within 20 years (maximum 25 years) (of which in principle repayment grace period is 5 years or less (maximum 10 years))
Currency	Yen, local currency (Indonesia Rupiah, Philippines Peso, etc.)
Other	・ Financing ratio: In principle 70% of the total project costs is the upper limit (80% if deemed particularly necessary) ・ Based on our meetings with JICA, the following two points must be considered: ➢ Currently, FITs can only be obtained after construction has been completed, leaving the risk that power cannot be sold at the FIT price during the construction period. JICA cannot provide financing until after the PPA is completed, so methods on securing financing before the PPA must be investigated. ➢ It might be possible, as with the Asiga Project, to conclude a power sale contract with the local electric cooperative (Agusan del Norte Electric Cooperative (ANECO) in the

Item	Conditions
	case of the Asiga Project, and Agusan del Sur Electric Cooperative (ASELCO) for this project) prior to completion of construction without FITs. However, since JICA would be taking it on as a sub-sovereign project, it is necessary to obtain a sub-sovereign risk evaluation of the electric cooperative and other entities when initiating the financing process.

Source: Created by the study team referring to JICA website

In the case of JBIC, it offers two types of financing for this type of project, export finance and investment finance. The principle conditions for each are detailed in Table 7-19 and Table 7-20 below.

For this particular project, even if power generators made by Japanese manufacturers are used and qualify for export financing, the export portion of the project only makes up around 20% of the total costs, so it is difficult to rely only on export financing, which would increase the capital burden on the project operator side. Furthermore, both financing systems are centered on power purchases based in Philippine Pesos, while the loans are provided in either US dollars or Japanese yen, meaning the borrowers and importers must assume a certain amount of currency exchange rate risk, making the hurdle of using these systems relatively high.

JBIC also features the facility commonly referred to as GREEN (Global action for Reconciling Economic growth and ENvironmental preservation), which is detailed in Table 7-21 below. It is similar to the two-step loan utilized by the Asiga Project, and it is believed that this project is a good candidate for the program. However, there are currently no local banks within the Philippines participating in the GREEN program, meaning that it cannot be used in its current form.

Table 7-19: JBIC export finance conditions

Item	Conditions
Interest	In accordance with the Organization for Economic Cooperation and Development (hereafter "OECD") arrangement on officially supported export credits.
Repayment Period	In accordance with the OECD arrangement on officially supported export credits, in principle 2-10 years. However, the longest period offered for renewable energy proposals is 18 years.
Currency	Yen or US dollars.
Other	・ For interest rates, credit risks for borrowers and structure risks are added as margins. ・ In regard to credit guarantees, ① corporate credit, ② a guarantee for a bank with strong credit or ③ project finance are used in general.

Source: Created by the study team referring to JBIC website

Table 7-20: JBIC investment finance conditions

Item	Conditions
Interest	Determined according to the project (slightly lower than standard private financial institution interest rates)
Repayment Period	Determined based on cash flow
Currency	Yen or US dollars
Other	・ A requirement for a Japanese corporation to invest in a local SPC ・ Credit guarantees are the same as for JBIC export finance (Table 7-19)

Source: Created by the study team referring to JBIC website

Table 7-21: JBIC GREEN financing conditions

Item	Conditions
Interest	Determined based on the project.
Repayment Period	Determined based on the project.
Currency	Philippines Peso is possible (depending on local banks in the Philippines)
Other	・ The project must be proven to provide a reduction in greenhouse gases, based on the "Guidelines Relating to Measurement, Reporting and Verification of Greenhouse Gas Emission Reductions in Global Environmental Protection Business of Japan Bank for International Cooperation" (J-MRV guidelines that stipulated the fundamental approach, procedures etc. relating to the measurement, reporting and verification of reductions in greenhouse gas emissions) that were established for financing for business development, etc. (GREEN) ・ The project must be located in a developing country and have a high environmental protection effect, such as using high level environmental technology to establish a solar or high energy efficiency power station, the introduction of energy saving facilities etc. ・ Credit conditions are the same as for JBIC export finance (Table 7-19).

Source: Created by the study team referring to JBIC website

There is a strong desire by financial institutions to invest in renewable energy projects within the Philippines, and there are numerous systems available, but the business feasibility of the Wawa No. 1 project is low, meaning that the business plan will need to be fundamentally rethought in order to secure the necessary capital and run it as a profitable business.

Therefore, at the current moment, it must be said that only the Wawa No. 2 project has demonstrated its feasibility as a business based on the economic and financial analyses.

For the Wawa No. 2 project, there is a possibility of using senior loans from the local financial institutions within the Philippines, but the conditions of the various facilities and financing systems through entities like JICA are probably more favorable.

On the other hand, securing equity must take into account the needs of foreign capital. There is a

limit to the number of players willing to assume risk within the Philippines, which means that if securing equity for the project is a problem, investment from foreign players could help towards that end.

However, since there are numerous small-scale renewable energy projects in existence, there is often a concern that the scale is too small for foreign capital. In order to increase the scale, measures such as combining multiple projects under a single holding company, or investing through the use of a fund may be considered.

(3) Possibility of mezzanine lenders

Mezzanine financing exists to help cover the gap when senior loans and equity are insufficient to raise enough capital to cover a project's total costs. Common techniques include mezzanine loans, class shares, and subordinated bonds. The repayment for mezzanine loans falls below that of senior loans, but the interest rates are usually slightly higher. However, local financial institutions within the Philippines are actively promoting financing, so the requirements for mezzanine financing are quite low.

(4) Possibility of support systems such as the JCM, and improving business feasibility

When looking at the current FIRR and NPV for the Wawa No. 1 project, it is difficult to expect any marked improvement in the economic indicators, barring any large changes in the supposed conditions. For the Wawa No. 2 project, it is fine from a feasibility standpoint, but it is not so profitable that it will be able to easily secure capital without any difficulties. Therefore, it will be imperative to eliminate any uncertainties regarding the project, and secure financing that provides capital over a long period of time, and at low and stable interest rates, in order to ensure the project's continued success.

In December 2015, Japan and the Philippines signed a memorandum of understanding regarding a Joint Crediting Mechanism (JCM) between the two countries.[6] Under the JCM, Japan's contributions to the reduction and absorption of greenhouse gas emissions through the use of technologies and related measures, products, systems, services, and infrastructure used to offset greenhouse gas emissions in developing countries are quantitatively evaluated and are also utilized to achieve Japan's reduction targets. According to the Ministry of the Environment, there are 16 other countries signed to this JCM, with the Philippines now joining as the 17th signatory.

In order to promote the JCM program, the Ministry of the Environment will provide financial assistance of up to 50% of the initial investment for equipment procurement costs, and is already engaging in support for businesses engaged in JCM projects, according to the Global Environment Centre Foundation.

In addition to utilizing the facilities and financing systems by entities such as JICA and JBIC, if assistance programs such as this can provide funding assistance for additional surveys or initial investment costs, a certain degree of increase in the project's profitability can be reasonably expected. Therefore, the next step in realizing this project will be to begin exchanging information with the

[6] According to press documents released by the Ministry of the Environment on December 8, 2015, a JCM between the two countries was signed by Ms. Tamayo Marukawa, Minister of the Environment, and H.E. Mr. Ramon Paje, Secretary of the Department of Environment and Natural Resources, at the COP 21 conference in Paris on December 7 (local time).

relevant institutions such as the Ministry of the Environment and the Global Environment Centre Foundation (GEC).

Chapter 8 Risk Analysis & Mitigation Strategies

8.1 Risk analysis for project implementation

In this investigation, we analyzed the possible risks associated with the implementation of this project, as well as the necessary measures to mitigate their potential impact. A list of the different kinds of risk this project may face is included in the table below.

Main Risk Category	**Inspection Points (Sample)**
Sponsor risk (sponsor assessment)	Investor composition (existence of core sponsors, role-sharing between investors, conflict of interests, etc.)
	Performance (financial, technical) of core sponsors
	Performance (financial, technical) of other sponsors
Construction risk/technical risk (EPC contractor assessment)	Technical ability of the EPC contractors
	Financial position of the EPC contractors
	Business plan details (applicable technology, project costs, construction schedule, etc.)
	EPC contract details (main contract terms: Fixed Lump Sum, Turn Key, Date Certain, etc.)
	Sponsor support details (if applicable)
Operator risk (operator assessment)	Technical ability of the operating body
	Financial position of the operating body
	O&M contract details (incentives, mechanisms, etc.)
	Possibility of alternative operating bodies (existence, ability, etc.)
	Sponsor support details (if applicable)
Offtaker risk	Performance of offtaker/lessee
	Sponsor support details (if applicable)
	(If no long-term contract) Demand, competitiveness, and competition plan for the energy generated, rate structure/pricing power for the energy generated, sponsor support details (if applicable)
Raw material/fuel procurement risk	Performance of raw material/fuel suppliers (including procurement conditions for raw material/fuel)
	Raw material/fuel supply contract details (contract period, quantity, contract amount, etc.)
	Sponsor support details (if applicable)
Other risks	Socio-environmental risk (including land acquisition)
	Related infrastructure and utility risk
	Interest rate and foreign exchange rate risk
	Price fluctuation risk
	Natural disaster/force majeure risk
	Political risk (war, civil war, riots, terrorism, laws/permits & licenses, expropriation, requisition/nationalization, contract non-fulfilment, etc.)

Source: Created by the study team

8.1.1 Sponsor risk

A diagram detailing the scheme for this project is included below. The project aims to create an SPC to carry out the business, and its members include Chodai Co., Ltd., Kiso-Jiban Consultants Co., Ltd., Equi-Parco Construction Company, which is the largest general contractor on the island of Mindanao, as well as Twinpeak Hydro Resources and Hydro Resources Management and Consultancy Inc. Equi-Parco also plans to front more than half of the investment in the SPC.

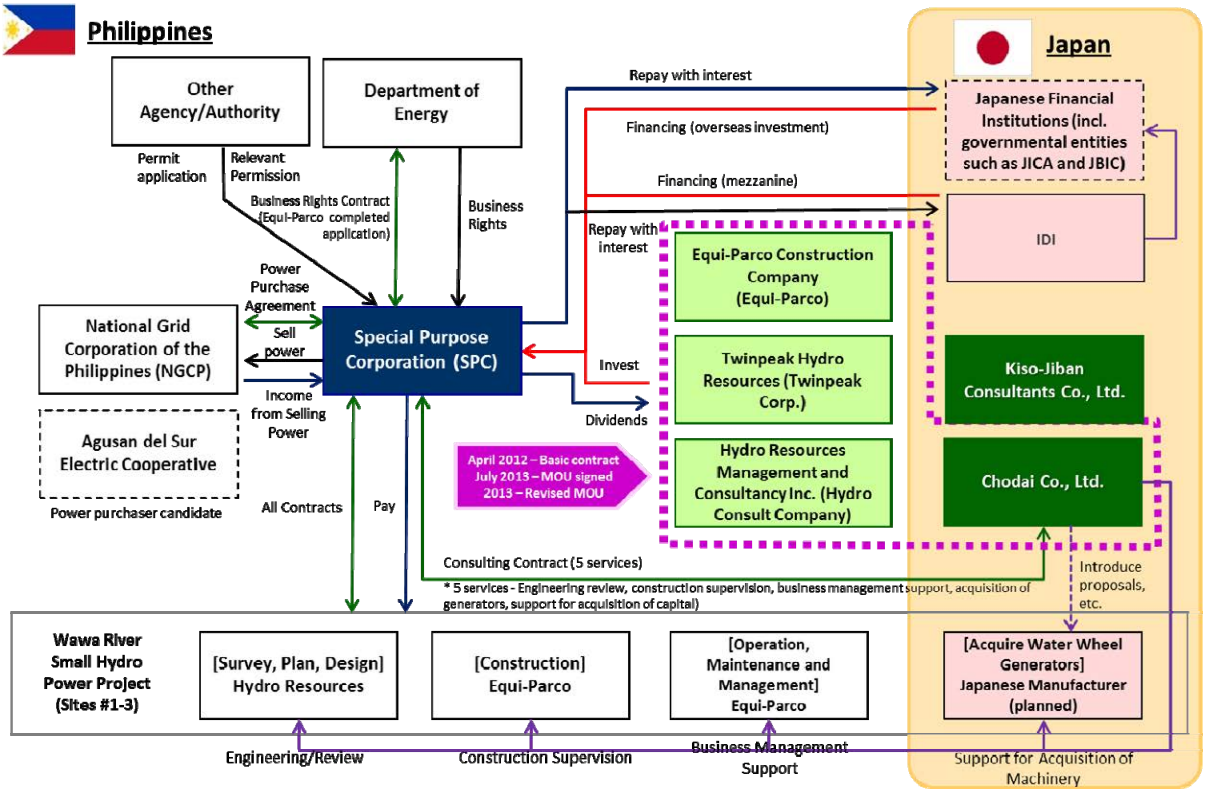


Fig. 8-1: Project scheme diagram

Source: Created by the study team

- TWINPEAK HYDRO RESOURCES CORPORATION

- Official Name: TWINPEAK HYDRO RESOURCES CORPORATION
- Address:P-3, Ambangan, Ambago, Butuan City, Agusan del Norte, Philippines
- Established: October 20, 2011
- President: Motohide Takano
- Organizational Structure: Business investment company
- Capital: 151 million Philippines peso
- Total Assets:164 million Philippines peso
- External Rating: －
- Employees: 2
- Business Description: A business investment company located in Butuan City in the province of Agusan del Sur, it is a joint venture with Ronnie Lagnada, COO of Equi-Parco. It plans and develops water supply and energy projects centered in Butuan, and is participating in the SPC as a project implementing body.
- Financial Situation: It was established in 2011, but did not begin actual business operations until recently, so its financial status cannot be properly evaluated. It recently accrued a profit of PHP 700,000.

HYDROPOWER RESOURCES MANAGEMENT AND CONSULTANCY, INC.

- Official Name: HYDROPOWER RESOURCES MANAGEMENT AND CONSULTANCY, INC.
- Address: Door 7, Dy Apartment, Santan St., Butuan City
- Established: June 22, 2011
- President: Hendrick R. Menegdeg
- Organizational Structure: Consulting company
- Capital: 3 million Philippines peso
- Total Assets: 3.5 million Philippines peso
- External Rating: －
- Employees: 20
- Business Description: It is a small hydro power consulting company with its headquarters located in Quezon City in Metro Manila. It was established by a former employee of the National Power Corporation. It has a wealth of experience in consulting for small hydro power projects throughout the Philippines, and has experience in O&M as well. It also worked with Marubeni Corporation on the Smith-Bell power plant on the island of Luzon.
- Financial Situation: In 2013, it faced some financial difficulties due to its operating expenses and other factors, but it recently turned a profit of PHP 7.6 million.

Risks regarding business performance and credit ratings will be mitigated by the participation of Japanese corporations and the credit ratings of the parent corporations and others involved with this project. The Philippine companies have participated in the pre-feasibility study for this project, as well as developed and maintained relationships through other hydro power plant projects, so it is believed that the partner risk concerning this project is also quite low.

8.1.2 Construction risk

Construction risk includes the possibility of unfinished facilities, delays in the construction period, increases in project costs, natural disasters, additional costs due to cost overruns, decreases in profitability due to construction delays, changes to the EPC contract terms, and more. In addition to creating a viable and realistic schedule and a construction management plan, it will be necessary to examine the project costs by analyzing the materials market, perform a financial analysis and investigation of the track record of the EPC contract partners, and determine via the EPC contract the responsibility of each party in regards to the payment of additional costs such as liquidated damages.

The investors in this project, including Chodai Co., Ltd., Kiso-Jiban Consultants, and Hydro Resources Management and Consultancy Inc., have a long history of technical consulting, and will provide a detailed inspection of the business costs for the project. Additionally, the construction management will be handled by Equi-Parco Construction, which is a primary investor of the project and has vast experience in managing the construction of infrastructure projects. In regards to the generator equipment, Japanese manufacturers will be called upon to participate in the bidding process, and an investigation is being conducted in regards to the technology and price offered by each company, in addition to their financial condition, track record, and other details. Furthermore, the EPC contract will clearly state the responsibilities of each party in regards to additional costs such as liquidated damages and how they will be dealt with.

8.1.3 Operator risk

The main source of risk in this area is an operator that does not possess the necessary ability to

manage the project. The operation and O&M for this project will be handled by Equi-Parco Construction, which is a primary investor in the project, and also has experience working with several small hydro power projects, making it possible to obtain top-level staff to engage in the operation of the power plant. With one of the primary investors also participating in the operation of the project, risks concerning the O&M contract are not anticipated.

8.1.4 Offtaker risk

There are two possibilities for purchasing the electricity generated from this project; sell it to the National Grid Corporation of the Philippines (NGCP), based on a FIT system, or sign a bilateral contract with either NGCP or the local power distribution company, Agusan der Sur Electric Cooperative Inc. (ASELCO).

When selling electricity under a FIT system, one thing to keep in mind is that selling the energy requires official approval from the Department of Energy (DOE). It will therefore be necessary to maintain regular communication with the DOE to obtain information and to keep up on trends for other FIT project candidates (current status and completion schedule, timing of FIT approval). Moreover, in the case of a FIT system, it takes the form of a contract with the government, so while adverse impacts such as contract nonfulfillment are not expected, it will be necessary to enlist a legal firm to review the terms and condition of the legal agreement while also considering the use of Nippon Export and Investment Insurance as well as a Multilateral Investment Guarantee Agency (MIGA) to protect against political risk.

In the case of a bilateral contract, it will be necessary to review the contract details as well as the financial capability and contract fulfillment ability (via contracts with other companies, etc.) of the two corporations listed above. When speaking with ASELCO in regards to the contract, they indicated their intent to provide purchasing terms for the electricity generated that are in line with the FIT system. Some general information on ASELCO is included below.

- Official Name: The Agusan del Sur Electric Cooperative, Inc. (ASELCO)
- Address: Barangay San Isidro, San Francisco, Agusan del Sur
- Established: August 26, 1977
- President: Joel Q. Jumonong
- Organizational Structure: Privately held, not-for-profit electric company established under the supervision of the National Power Corporation
- Capital: 694.16 million Philippines peso
- Total Assets: 1,387.79 million Philippines peso
- External Rating: AAA (KPS Rating, 2012)
- Employees: 200 (current as of September 2014)
- Business Description: It is an electricity supply (distribution) company based in Agusan del Sur. It supplies electricity to 314 barangays (current as of September 2014) and has 90,118 customers (current as of December 2014). It owns a total of five power plants.
- Financial Condition: In 2013, it posted a loss due to depreciation and interest rates on its loan repayments, but it gained additional contracted customers in 2014, enabling it to be PHP 73 mn in the black. Going forward, it is expected to obtain even more customers, and it has received a AAA rating from the NEA, so its financial condition is expected to remain positive.

This project is currently investigating the use of the FIT system, and is examining the use of NGCP as a possible offtaker for the energy produced due to its reliability and stability. Therefore, as

mentioned above, it will be necessary to carefully examine the trends for other FIT applicant candidates (current status and completion schedule, timing of FIT approval).

Additionally, in the case of a bilateral contract, ASELCO has indicated a willingness to purchase the electricity generated under the same terms as the FIT system. Therefore, in such an event, it will be necessary to carefully examine the contract terms such as price and contract period.

In June 2015, the "Mandating All Distribution Utilities to Undergo Competitive Selection Process (CSP) in Securing Power Supply Agreement (PSA)" (Department Circular No. DC2015-06-0008) was issued, decreeing that all purchasing organizations (DU: Distribution Utilities) must engage in CSP when purchasing electricity in order to ensure pricing competitiveness. The PSA to be signed is subject to a review by the DOE or NEA through a third party organization. At the same time, the price must also receive prior approval from the ERC. Therefore, it will be necessary to monitor the trends concerning the guidelines stated in the notification mentioned above. Depending on the circumstances, it may take a considerable amount of time before the PSA can be signed.

8.1.5 Raw material/fuel procurement risk (including water rights)

Raw material risks for hydro power plants include reductions or changes in the river flow of the river supplying the water, and the obtaining of water usage rights.

To help reduce these risks, this project is analyzing long-term flow rate data as well as checking for the existence of other infrastructure projects along the upper river basin.

Additionally, utilizing public water resources such as a river requires obtaining approval of the water usage rights from the National Water Resources Board (NWRB). The application method consists of submitting a water usage rights application to the local government (province) office in the area of the project designated as an official agent by the NWRB (e.g. local water usage bureau). The annual rates for water usage rights are detailed in the table below.

	Base Cost	Less than 10 liters/sec	10 liters/sec - 50 liters/sec	More than 50 liters/sec
Powerhouse	5,000 Pesos	2.75 Pesos per 1 liter/sec	4.25 Pesos per 1 liter/sec	5.50 Pesos per 1 liter/sec

This project plans to begin working with the relevant office to secure water usage rights in Agusan del Sur. Additionally, depending on the river used (mainly environmental concerns), it may be necessary to submit an investigative report such as a Sustainability Plan and Ecology Study, so this topic will need to be researched before beginning work on the project.

8.1.6 Other risks

(1) Socio-environmental risk

To implement this project, it will be necessary to confirm the process for obtaining the required approvals and creating an environmental permit application that follows all of the relevant Philippines environmental laws when drawing up the project's business plan. This project will have a large environmental impact, making it an Environmentally Critical Project (ECP), so an Environmental Impact Assessment Statement (EIAS) must be submitted to the Department of Environmental and Natural Resources (DENR) in order to obtain an Environmental Compliance Certificate (ECC).

Additionally, in consideration of indigenous people living within the project's target location, the

processes set by the National Commission on Indigenous Peoples (NCIP) must be followed, such as The Indigenous Peoples Rights Act of 1997 (Republic Act No.8371), and public discussions and hearings must be held to build consensus with the indigenous people in the area.

This project has begun drafting an EIAS and is carrying out the necessary procedures to submit it for approval.

(2) Land acquisition risk

The target location for this project falls on public land, meaning that a lease will need to be signed between the SPC and the local government. The SPC will also need to specify in the contract a location to store the materials used during construction and all of the relevant duties and procedures required to acquire the necessary land for such a purpose.

(3) Related infrastructure and utility risk

The preparation and maintenance of things such as access roads to the project are being looked into as part of the scope of this project. Additionally, the cost of connecting the power transmission and distribution lines to the electric grid will be borne by the project, and it is planned that a contract will be made with the offtaker serving as the main contact for the operation and maintenance of the lines after the construction is completed.

(4) Capital acquisition, interest rate, and foreign exchange risk

This project plans to secure capital from the members of the consortium in the form of investment and financing, as well as overseas loans and investments from JICA, so a detailed analysis of the total project costs will be undertaken while researching the contract terms for the investment and financing conditions in order to prevent any excessive cost overruns. Furthermore, the project plans to use a fixed interest rate loan in order to avoid any risk from fluctuating exchange rates. In regards to currency exchange risk, we will check on the possibility of changes to the current guidelines from the central bank in regards to overseas remittances and exchanges, while also looking into the possibility of swap transactions.

(5) Price fluctuation risk

The procurement contracts for the machinery and operating duties of this project need to take into account the possibility of price fluctuations, so it is planned to include provisions within the contracts to revise the costs (either up or down) during the design and construction phases. Additionally, we plan to set aside sufficient reserve funds to cover any fluctuations that may occur.

(6) Natural disaster/force majeure risk

Expected risks in this area include natural disasters that can interrupt business operations, as well as country risks including economic and political troubles that may affect the project.

This project will look to obtain private insurance, as well as other options from Japanese (e.g. Nippon Export and Investment Insurance) and international institutions (e.g. Multilateral Investment

Guarantee Agency (MIGA) from the World Bank Group).

Additionally, according to travel information (travel warnings) issued by the Japanese Foreign Ministry, Agusan del Sur and the surrounding areas are classified as Level 2, which means that non-essential travel to the area should be avoided. This situation is unlikely to change in the near future, and considering that armed groups are prevalent in the Mindanao area, it will be necessary to gather information from sources such as the local embassy and JICA in the event of an emergency.

(7) Licensing risk

Some possible risks regarding permits and licenses for the project are listed below.

- Invalid renewable energy service contract
- Invalid environmental permits
- Invalid water usage rights permits

This project will confirm all of the conditions and factors that can lead to the various types of licenses and permits to be declared invalid or canceled, and will draft contract language that avoids putting the project at a disadvantage or in a one-sided deal. While carefully monitoring the project's progress, we will keep in regular contact with the relevant approval bodies in order to mitigate any other possible risks. Lastly, we plan to draft contract terms that assign responsibility for approvals regarding other items such as the EPC and O&M with our contract partner companies.

8.2 Preparing contracts necessary for project implementation

In addition to listing up and analyzing the different types of risk stated above as well as examining the various legal structures involved, we believe the main contracts and provisions necessary will include the following.

- Renewable energy service contract
- Basic contract and investment contract between partner companies
- Offtaker contract (FIT or bilateral contract)
- EPC contract
- O&M-related contract, etc.

This project is employing the services of Equi-Parco Construction's legal adviser in order to confirm the various terms and conditions which can invalidate or discontinue the various contracts required, and to help draft contracts and provisions that avoid disadvantages or one-sided terms for the project.

For the offtaker contract, natural disasters, explosions, typhoons, earthquakes, mechanical failures, and more can all lead to interruptions in the supply of electricity, so we will look to utilize private insurance and other measures in order to indemnify the SPC from damages (reduction in profits). Additionally, while signing a PPA based on FITs is done after the completion of construction on the project, prior approval of a signed PPA is required in order to receive foreign investment from JICA, so it will be important to pay close attention to each step of the process. As mentioned above, the notice issued by the Department of Energy in June 2015 known as No. DC2015-06-0008 requires that all PPAs undergo a price review by the ERC, and receive approval from the DOE or the NEA.

Therefore, it is possible that it may take more time than previously expected to sign an agreement when dealing with a bilateral contract.

With the EPC (construction) contract agreement, the assets during construction are under the management of the contractor until the hand-over after completion, so in principle the contractor takes on all of the responsibility until the project begins operations. Additionally, the risk of cost and time overruns generally fall upon the contractor as well, at least to the extent possible.

With the operation (O&M) contact, it will be necessary to add insurance clauses to the operations contract between the SPC and the operator in order to ensure proper maintenance of the completed assets and to ensure the profits generated from the plant’s operation through the presence of sufficient property insurance.

Chapter 9 Project Impacts and Impact Verification

9-1. Project impacts

The results of the study of the project plans have revealed the following project impacts.

9-1-1. Electricity supply impact

As was demonstrated in Chapter 1, both the island of Mindanao in general and the Caraga region in the northeast of the island in particular suffer from a serious electricity supply deficiency. Peak demand for the island of Mindanao is around 1,580 MW (2013 data), but a maximum supply deficit of 600 MW is experienced at six o'clock in the evenings, the peak hour for the switching on of lights. The Caraga region, where the planned project site is located, suffers from such severe electricity shortages that daytime power stoppages are a frequent occurrence. Peak demand for the Caraga region is 146 MW, of which the networks of the power distribution utilities ANECO and ASELCO, to which this project will provide power, face demands of 57 MW and 27 MW respectively, meaning that between them these network areas represent just under 60% of the region's demand. The Wawa No. 1 plant is projected to have an output capacity of 2.6 MW (yearly generated energy of 6,764 MWh) and Wawa No. 2 an output capacity of 10.2 MW (yearly generated energy of 30,824 MWh). These figures equate to 15% of the peak demand on the ANECO and ASELCO networks of 84 MW, representing a significant boost to the electricity supply capacity of the area.

9-1-2. Economic impact

From an economic perspective, the following direct and indirect effects can be expected.

(1) Direct effects related to construction

This refers to the direct effects brought about by the civil engineering, mechanical and electrical works necessary for the construction of the power plants. A hydro plant requires the construction of a wide variety of facilities, including a weir, a water conduit, water tanks and a powerhouse, meaning that the employment of several construction workers, operators of heavy machinery (along with procurement of the machinery itself) and supplementary workers can be anticipated.

(2) Indirect effects related to construction

The procurement of materials necessary for construction such as cement, reinforcing steel, generators for temporary power supply and their fuel will all be necessary. The provision of everyday supplies for the workers who will gather in the area will also be required.

(3) Employment and other indirect effects once plants are operational

Once construction of the power plants is complete, they will be commissioned to produce electricity, at which time they will require staff to operate and oversee the generating facilities, and engineers to maintain them. These workers will need specialist knowledge of civil engineering or electromechanical engineering, and will be given special training in order to acquire this expertise.

Somewhere between 10 and 20 individuals will be employed as system operators, while an additional seven to eight will be needed for maintenance of the civil engineering and electromechanical elements of the plants. Aside from these technical positions, others will be

employed in administrative positions for tasks such as accounting, warehouse management, driving and cleaning.

Indirect effects include the procurement of additional materials and the selling of everyday goods in the area, which will increase in response to influxes of workers during temporary or regular inspections.

Further, in accordance with Philippine law, a fixed percentage of all electricity sales must be distributed to the local community, providing direct economic benefits.

9-1-3. Environmental impact

(1) Impact on the reduction of CO_2

As detailed in Chapter 6 of this report, a 19,432 metric ton yearly reduction in CO_2 emissions, proportionate to a yearly electricity production of 37,588 MWh, can be expected.

(2) Environmental impact assessment

As indicated in the “Pollution mitigation measures” section of the “Environmental checklist” (Table 6-33) in Chapter 6, while the production of earth and sand waste and material scraps is expected during the construction phase, no significant impact on the environment is anticipated once the plants are operational.

Under the “Natural environment” section of the same table, it is also noted that while a certain amount of environmental impact is expected in the water depletion zone caused by the construction of the weir, the installation of a fishway to assist migratory fish species should ensure that impact is insignificant.

In the “Social environment” section, it is noted that one to two households will be the subject of involuntary resettlement. However, in terms of the project’s impact on the poor, ethnic minorities and indigenous peoples, a positive effect is expected.

9-2. Impact of this study

As shown in Fig. 5-8 in Chapter 5, “Graph of river flow at the Wawa River observation station (Wawa River observation station)” the measurement of actual flow conditions as part of this study has enabled us to have a better understanding of the actual state of the river.

9-2-1. Impact of studies on river flow and topography

As a result of the study findings outlined in Fig 5-8 (“Graph of river flow at the Wawa River observation station (Wawa River observation station)”) and the topographical study that was carried out, the optimum design for the plant facilities was able to be ascertained. As a result of this, Wawa No. 1 was designated for construction on the left bank, while the two water intake locations for Wawa No. 2 were able to be fed into the one powerhouse through the use of a tunnel for the water conduit. The resulting generating capacities of each plant are 2.6 MW (yearly generated energy of 6,764 MWh) for Wawa No. 1 and 10.2 MW (yearly generated energy of 30,824 MWh) for Wawa No. 2.

9-2-2. Profitability assessment of the hydro plant development project

A profitability assessment of Wawa No. 1 and Wawa No. 2 as designed under the optimum design described above was carried out in Chapter 7, “Project Cash Flow Analysis & Acquisition of Funding.” It was determined in this chapter that there would be difficulties in establishing the profitability of Wawa No. 1. Furthermore, while Wawa No. 2 could prove profitable, this is by no means guaranteed. Bearing these results in mind, it will be necessary to investigate the possibility of a further lowering of EPC costs or of cutting direct expenditure through the use of subsidies and grants.

Chapter 10: Project Report Summary

10-1. Host country situation and necessity of the project

10-1-1. Host country situation

With a population of 94.01 million (2010 estimate) increasing 2.3% annually, positioning it to benefit from the “demographic bonus” for the next forty years, the Philippines is one of the countries in Southeast Asia with the greatest market potential. Additionally, after growing at a yearly rate of 5% to 7% for the five years leading up to the 2008 global financial crisis, then undergoing a period of stagnation (yet still maintaining positive yearly growth) due to its effects, the Philippine economy rebounded to record growth of 7.3% in 2010, underlining its stable progress.

Peak demand for the island of Mindanao is around 1,580 MW (2013 data), but a maximum supply deficit of 600 MW is experienced at six o’clock in the evenings, the peak hour for the switching on of lights. The Caraga region, in the northeast of the island, suffers from the lack of a single significant electricity-generating facility, leading to chronic power shortages.

10-1-2. Necessity of the project

Peak demand for the Caraga region, where the planned project site is located, is 146 MW (“NGCP Transmission Development Plan,” v.1, p.26) of which the networks of the power distribution utilities ANECO and ASELCO, in whose area this project will lie, face demand of 57 MW and 27 MW respectively, meaning that between them these network areas represent almost 60% of the region’s demand (ANECO, ASELCO annual reports). The Wawa No. 1 plant is projected to have an output capacity of 2.6 MW (yearly generated energy of 6,764 MWh) and Wawa No. 2 an output capacity of 10.2 MW (yearly generated energy of 30,824 MWh). These figures equate to 15% of the peak demand on the ANECO and ASELCO networks of 84 MW, representing a significant boost to the electricity supply capacity of the area.

The Caraga region suffers from such severe and chronic electricity shortages that daytime power stoppages are a frequent occurrence. It is believed that these stoppages are a result not only of an insufficient energy supply, but also of insufficiently developed distribution infrastructure for power transmission. When the fact that Mindanao’s electric power grid is currently entirely independent and unable to receive any power supply from other islands is taken into consideration, it is clear to see that even though the electricity provided by this project would be to a very restricted area, a supply increase of around 15% would be extremely significant for the region as a whole.

10-2. Project plans

The establishment of an enterprise in this region to provide electrical power to help relieve this situation of critical shortage is of tremendous significance. For industrial development, in particular, the stable supply of electricity is an absolute necessity. With these pressing needs in mind, this project has been developed around the construction of ecologically friendly, run-of-the-river method small hydro plants. The development plans have been formulated along the lines detailed below.

10-2-1. Master plan

This hydropower-generation project plan consists of the construction of two power plants, Wawa No. 1 and Wawa No. 2.

The basic details of Wawa No. 1 are as follows.

Water intake weir location:	Downstream from the confluence of the Wawa and Manangon Rivers
Headrace route:	Open conduit on the Wawa River left bank
Maximum usable flow:	10.0 m^3/s
Head:	32.6 m
Maximum power output:	2,580 KW
Yearly generated energy:	6,764 MWh
Capacity factor:	30.0%

The basic details of Wawa No. 2 are as follows.

Water intake weir location:	Two intake weirs; one on each of the Wawa and Manangon Rivers
Headrace route:	Tunnel-style, linking the two intake locations
Maximum usable flow:	7.60 m^3/s
Head:	155.5 m
Maximum power output:	10,200 KW
Yearly generated energy:	30,824 MWh
Capacity factor:	34.4%

10-2-2. Environmental and social studies

As detailed in earlier chapters of this report, a 19,432 metric ton yearly reduction in CO_2 emissions, proportionate to a yearly electricity production of 37,588 MWh, can be expected.

In terms of environmental impact, as outlined in the “Pollution mitigation measures” section of the “Environmental and social impact evaluation projections based on the field study” table, while the production of earth and sand waste and material scraps is expected during the construction phase, no significant impact on the environment is anticipated once the plants are operational. Under the “Natural environment” section, it is also noted that while a certain amount of environmental impact is expected in the water depletion zone caused by the construction of the weir, the installation of a fishway to assist migratory fish species should ensure that impact is insignificant. Furthermore, in the “Social environment” section, it is noted that one to two households will be the subject of involuntary resettlement. However, in terms of the project’s impact on the poor, ethnic minorities and indigenous

peoples, a positive effect is expected.

As shown in the above results, no factors that should prove an impediment to the implementation of the project have been identified.

10-2-3. Economic and financial evaluation

The primary economic and financial indicators for Wawa No. 1 and Wawa No. 2 are summarized in Table 10-1 below.

Table 10-1: Economic and financial indicators

	FIRR	NPV	EIRR
Wawa No. 1	0.07%	79,137 thousand pesos	4.3%
Wawa No. 2	6.65%	577,194 thousand pesos	12.7%

Source: Created by the study team

As this is an IPP project, the fundamental economic indicators when considering its profitability should be those used by private enterprise when deciding whether to approve and invest in a project: primarily FIRR and NPV, as well as sensitivity analysis results.

Analyzing the economic indicators from such a viewpoint, we can see that Wawa No. 1 cannot be declared an attractive enough project for any private enterprise to determine it to be profitable and to invest in its future. On the other hand, while Wawa No. 2 has an FIRR that is slightly below the hurdle rate (discount rate; 10% of capital cost), its NPV value is high, meaning that the project should easily qualify for financing. Furthermore, Wawa No. 2's Debt Service Coverage Ratio (DSCR), a common index used to show a project's ability to repay debt, returns an average value of 1.33 with a low value of 1.29, indicating a level that should not be problematic in terms of its viability as an investment.

However, in light of the project's current FIRR and NPV values, it will be imperative to eliminate any uncertainties regarding the project, and make use of JICA or similar facilities to improve profitability, in order to secure financing that provides long-term capital at low and stable interest rates. In addition to this, if the use of aid programs such as the JCM program can provide funding assistance for additional surveys or initial investment costs, and a reasonable increase in the project's profitability can be expected, then this will serve to make the project's realization a more realistic proposition.

At the same time, it has become clear that the possibility of additional cost reductions must be investigated, in the form of the use of local technical expertise, a re-evaluation of projected rates, a shortening of the construction period through a streamlining of the schedule, and other cost-saving efforts. Regarding Wawa No. 2, the construction of a tunnel-style water conduit is almost unprecedented in the Philippines, leading to the possibility that there may be some aid or subsidies available for such technological development. As well as procuring funding, it is vital that every effort is made to reduce the amount of funding required by any such means available.

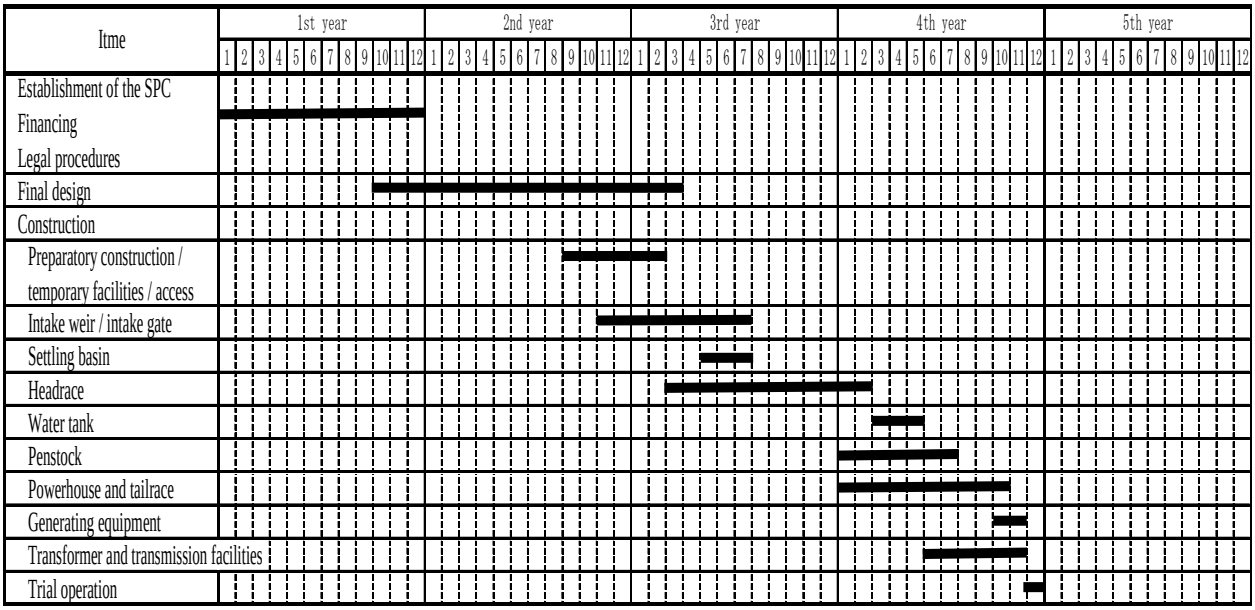
10-2-4. Project implementation schedule

It is desirable for construction to begin as soon as possible, while bearing in mind the still pressing

needs for a lowering of construction costs, the procuring of financing, and the shortening of the construction period.

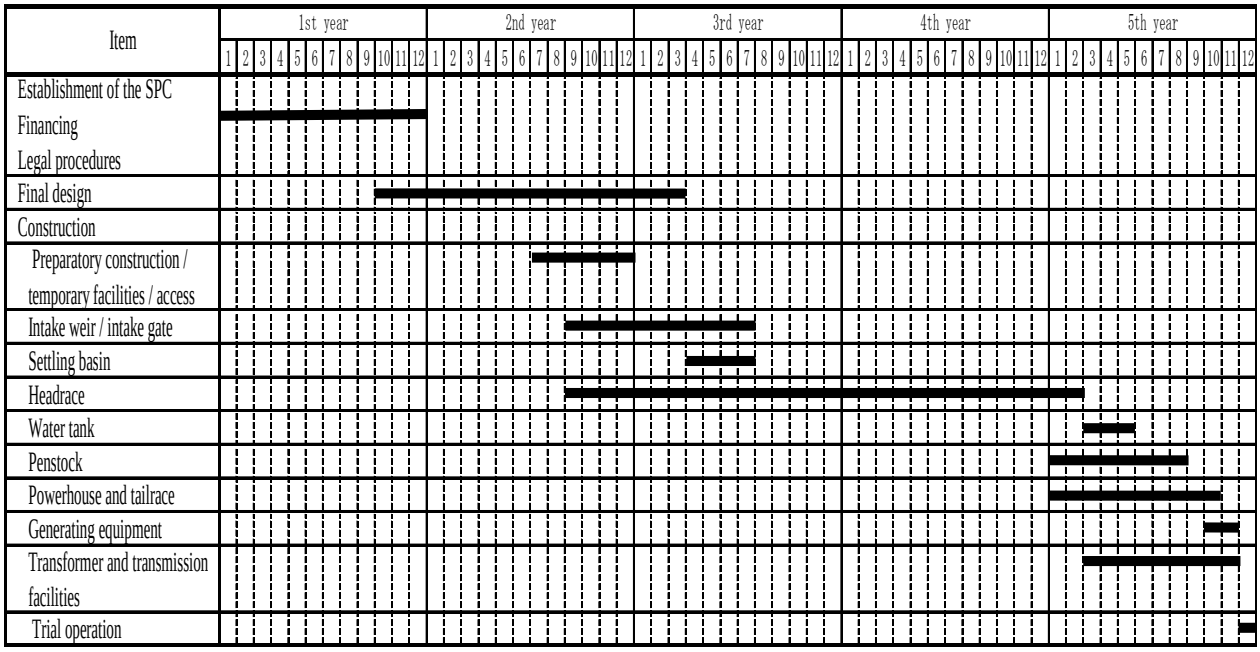
The basic general schedule is projected to be as laid out in the diagrams below.

Schedule for Wawa No.1



Source: Created by the study team

Schedule Wawa No.2



Source: Created by the study team

10-2-5. Advantages enjoyed by Japanese corporations and their benefits to this project

There are a number of advantages enjoyed by Japanese companies in the field that will have

beneficial effects for the development of this project.

Firstly, as a result of both environmental and technical concerns, it has been determined that Wawa No. 2 will use a tunnel-style water conduit. However, the Philippines does not have a long history of tunnel excavation technology, and it is believed that such a tunnel for a small hydro plant, in particular, has no precedent in that country. Hereafter, with the development of small hydro plants likely to spread into mountainous areas, the tunneling technology used in this project is likely to occupy a particularly significant position as the pioneering example in the field. Additionally, Japanese corporations have significant past experience in construction schedule management, civil engineering construction technology, and in particular tunnel excavation technology, which gives them a significant advantage over corporations from a country such as the Philippines, where such experience is extremely limited.

With respect to technology involved in electricity generation, Japanese corporations do not have an advantage when it comes to the unit prices at which machinery can be provided, but they do have an advantage in terms of delivery reliability, product quality and the supply of maintenance parts. Bearing in mind these factors, Japanese corporation-produced machinery has an advantage over other machinery when viewed in terms of life-cycle costs. The benefits of the involvement of Japanese companies can be appreciated in these areas as well.

10-2-6. Action plan

As shown above, it has been proven that this project is a necessary one in the context of the electricity supply situation of the region, and that the effect of its inception would be extremely significant from the perspective of the development of the regional economy. Furthermore, there are no environmental or social issues that should prove major impediments to the carrying out of the enterprise.

Therefore, the key points in the smooth execution of this business plan are believed to be the ability to lower construction costs and the ability to secure long-term, low-interest financing along with aid or other subsidies, in order to improve the profitability of the project. Regarding construction costs, we plan to investigate in detail the potential use of local construction technology, as well as re-evaluate construction unit costs, minimize the labor required and shorten the construction period.

In terms of aid and other subsidies, we intend to expand our field of investigation as far as JCM and other similar agencies, in order to secure funding and help lower the necessary costs of the project.

In all of the ways outlined above, while taking into account the various risks made clear through this feasibility study, we plan to make every effort to further improve the profitability of the enterprise through the investigation of practical and realistic cost reduction strategies identified via detailed studies of the situation on the ground and via the formulation of comprehensive plans for each aspect of the project.