

16.7 Cost Estimate of the Project

16.7.1 General

Since this is a Pre-Feasibility Study, the cost estimates presented here are considered rough cost estimates. A more precise and detailed project cost estimates shall be available during the Feasibility Study or detailed design stage.

16.7.2 Construction Cost

Bridge cost was estimated by superstructure type, sub-structure and foundation type for each bridge.

Tunnel cost was estimated by items which consist of tunnel construction, tunnel lighting, tunnel emergency facility and electric room. Especial tunnel construction was set as tunnel excavation pattern shown in **Figure 16.5-23**.

Table 16.7-1 shows the construction cost for each item. The unit cost for each item and the detailed cost estimate for bridge and tunnel are shown in **Appendix-16-2**.

Table 16.7-1 Construction Cost of the Project

Item	Unit	Quantity	Unit Cost (Mil. Peso per unit)	Cost (PhP Million Peso)
1. Embankment Section	km	2.27	227.6	517
2. High Cut Section	km	4.68	782.2	3,661
3. Tunnel	km	10.12		24,216
4. Bridge	km	7.49		14,626
5. Underpass	No.	5	52.1	261
6. Overpass	No.	5	55.6	278
7. Interchange	No.	5	331.0	1,655
8. Traffic Control & Toll Collection	No.	1	859.0	859
9. Widening Existing Road	km	2.00	136.4	545
Total				46,618

16.8 Construction Plan of the Project

16.8.1 Construction Planning

Detailed Construction Planning will be finalized during the detailed design stage. Proposed project packaging and construction plan are presented in the following sections.

16.8.2 Proposed Construction Packaging

Majority of the construction works under the Project will involve large construction scale which will require special construction work items, such as Tunnel Construction and Special Bridge construction method using Japanese technology. The Metro Cebu Circumferential Road Construction Project will require tunnel construction in many sections along its road alignment. In view of the foregoing, Construction Packaging is best planned out during the Detailed Design Stage.

Proposed Construction of Cebu Circumferential Road Project is divided into Six (6) Sections and the details are presented in **Table 16.8-1**.

Table 16.8-1 Proposed Sections of the Project

Section	Length	Major Construction Item	Construction Period
Section-1	L=3.40km STA. 0+000 ~ STA.3+400	Tunnel No.1 (L=621 m + 597 m) PC-Box Bridge (L=570 m) PC-I Girder Bridge (L=960 m +330 m) Interchange No 1. Trumpet Type	32 months
Section-2	L=3.60 km STA. 7+000 ~ STA.10+400	Tunnel No.2 (L=812 m + 846 m) PC-Box Bridge L=660 m PC-I Girder Bridge L=570 m Interchange No 2. Y Type	34 months
Section-3	L=3.40km STA. 7+000 ~ STA.10+400	Tunnel No.3 (L=280 m + 238 m) Tunnel No.4, (L=290 m + 253 m) Tunnel No.5 (L=753 m + 740 m) Steel Truss Bridge L=210 m PC-Box Girder Bridge L=160 m PC-I Girder Bridge L=360 m Interchange No 3. Y Type	33 months
Section-4	L=5.20 km STA. 10+400 ~ STA.15+600	Tunnel No.6 (L=734 m + 721 m) Tunnel No.7 (L=763 m + 739 m) Tunnel No.8 (L=838 m + 819 m) Tunnel No.9 (L=724 m + 722 m) PC-Box Girder Bridge L=155 m PC-I Girder Bridge L=540 m Interchange No 4. Partial Cloverleaf Type	50 months
Section-5	L=4.40 km STA. 15+600 ~ STA.19+900	Tunnel No.10 (L=401 m + 397 m) Tunnel No.11 (L=488 m + 618 m) Tunnel No.12 (L=816 m + 810 m) Steel-Narrow Box Girder Bridge L=280 m PC-I Girder Bridge L=2,085 m Interchange No 5. Trumpet Type	41 months
Section-6	L=4.66 km STA. 19+900 ~ STA.24+560	Tunnel No.13 (L=429 m + 473 m) Tunnel No.14 (L=215 m + 194 m) Tunnel No.15 (L=232 m + 215 m) Tunnel No.16 (L=1,724 m + 1,734 m) PC-I Girder Bridge L=610 m	50 months

Source: JICA Study Team

16.8.3 Construction Casting Yard

Most construction activities of the project will involve the manufacture and installation of a number of Steel Box Girders, Steel Truss type bridge and PC-I AASHTO Girder within the construction yard and these manufactured steel box girder and steel truss bridge will be transported to the project construction site according to implementation schedule using both sea and land transportation, depending on the requirements. The selection of the construction casting yard near the construction site, therefore is a better option to minimize the material transport activities.

The construction casting yard is temporary in nature but the production activities therein shall involve large volume of materials, such as preparation of concrete materials through concrete

batching plant, assembling of Steel Bridge structures and asphalt materials produced from Asphalt Concrete Batching plant for pavement work. The temporary construction facility yard for Tunnel construction will be at the Tunnel entrance area and minimum area size is 100 m x 30 m. The contractor will select the proper locations of the construction casting yard and the temporary construction facility for tunnel during the tender procedure.

16.8.4 Construction Method for Tunnel Construction and Election of Each Bridge




Tunnel Excavation has two methods which is drill & blasting (D&B) and mechanical excavation. D&B method is generally applied in hard rock mass, and mechanical excavation is generally applied in middle hard rock mass and soft rock mass see **Section 16.5.7**.



Bridge Construction at very deep valley of more than 50m will use the Traveler Crane System and Election Girder System as shown in **Table 16.8-2**.

The assembling of Steel Bridge will be located near the new bridge construction area along the construction site. After assembling each span of steel bridge this will be elected following the election system identified.

Standard AASHTO PC-I girder will be made at casting yard and transfer to construction site by trailer and election by election girder at deep valley site and election by track crane at less than 20m height.

Table 16.8-2 Bridge Election System for Each Type of Bridges

Bridge Type	Proposed Election System	Sample Picture
Steel Narrow Box Girder (Deep Valley)	Election Girder System	
Steel Truss Bridge (Deep Valley with River)	Traveler Crane System	
PC Continuous Box Girder (Deep Valley)	Cantilever System	

Bridge Type	Proposed Election System	Sample Picture
PC-I Girder Bridge (Viaduct)	Track Crane	
PC-I Girder Bridge (Deep Valley with Road)	Election Girder System	

Source: Yahoo Web Site

16.8.5 Construction site and access Road

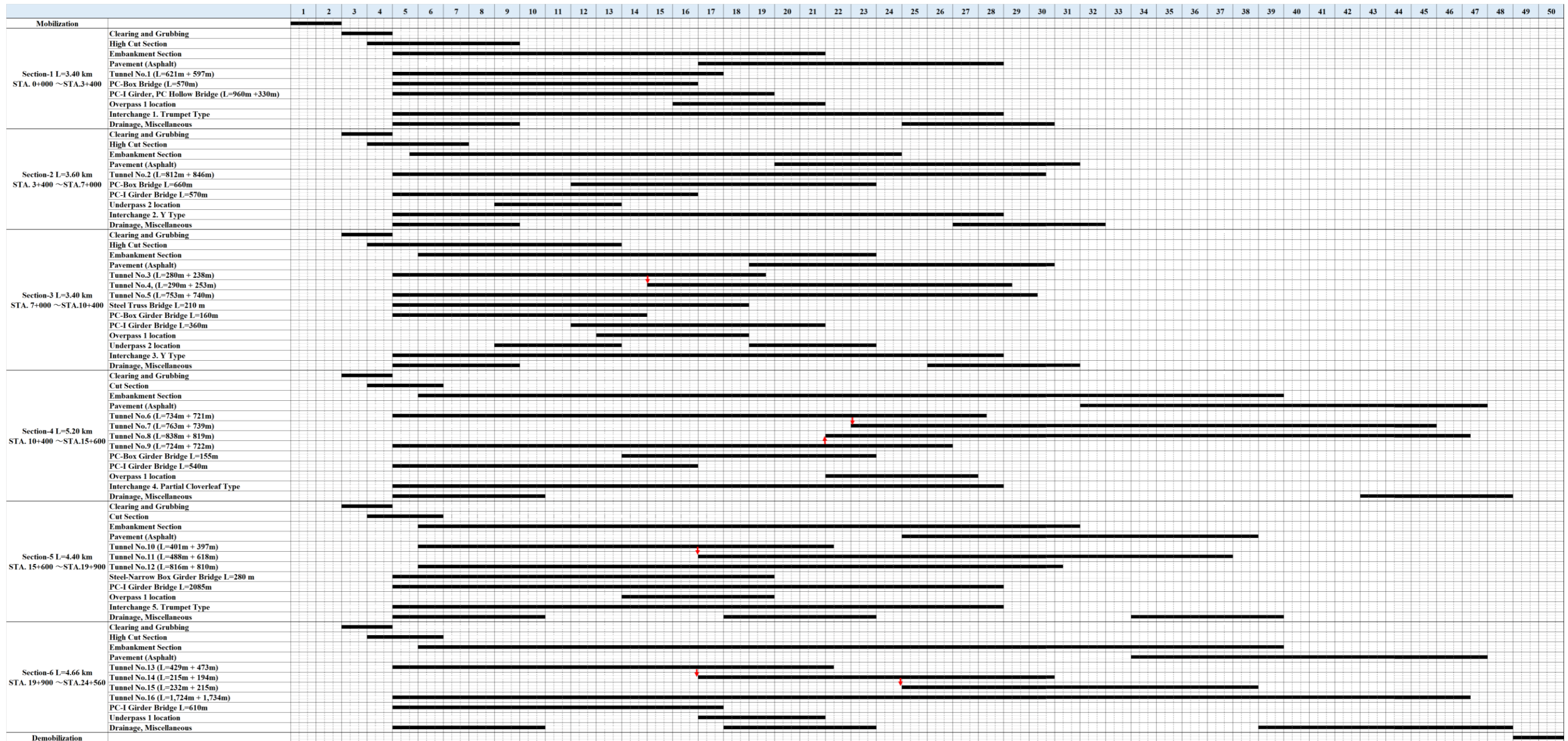
This Metro Cebu Circumferential Road Construction Project site is located in the mountainous area of Metro Cebu in Cebu Island. Access to and from construction site will be from the existing road to be used as temporary road to casting yard and construction site. Temporary road will be constructed along construction site to be utilized during construction. This temporary road will be used for delivery of construction materials to construction site. Casting yard is the place for stockpiling materials, such as steel, formworks and scaffoldings for construction of piers and bridges. The set up for Concrete Batching Plant and Asphalt concrete Batching Plant is also located within the casting yard. Access to and from tunnel construction site will use temporary road inside Interchange construction area for Tunnel No.1, No.2, No.3, No.5, No.6, No.9, No.10, No.12, No.13, No.16.

16.8.6 Construction Schedule

The construction schedule did not take into consideration the ROW acquisition-related activities, such as demolition and transfer of houses and structures, which means that the construction schedule assumes that ROW acquisition for the Project has been completed and that each section has been cleared already. Based on the above condition, the total construction period for the construction of the Metro Cebu Circumferential Road project will be 50 months. If divided into Six (6) packages (package is the same as section), construction period for each package is shown in **Figure 16.8-1**.

16.8.7 Traffic Management and Safety during Construction

Traffic Management during the construction of this project shall be coordinated with the LGUs concerned and Traffic Management Units of the concerned Philippine National Police who will assist the implementing agency and the contractors in managing traffic along the project sites during construction.



Source: JICA Study Team

Figure 16.8-1 Construction Schedule for Metro Cebu Circumferential Road Project

16.9 Environmental and Social Considerations

Relevant studies on CCR as a part of this masterplan is "pre-feasibility study level" without fixed conditions hence further study and evaluation shall be implemented during the Feasibility Study (F/S) stage. Therefore, relevant studies on environmental and social considerations of this report are also pre-feasibility study level and shall further studied and updated during the F/S.

16.9.1 Project Component and Impacts on Environment

CCR will be a bypass road that passes through the congested Cebu Urban Area. The proposed project outline based on the survey with a map of the target area is elaborated in "16.1 Outline of the Project". The project components which will cause adverse impact are: road construction, interchanges, tunnels and bridges as shown in "Section 16.4".

This Pre-F/S is carried out without fixed conditions such as associated projects by other proponents, relevant activities including soil borrow pits, quarry pits, construction roads, camp yards, pre-acquired land for the project among others. Hence further confirmation shall be implemented during the F/S. As far as the Pre-F/S in this master plan survey is concerned, implementation timing is not decided, and other specific plans or reasonably defined developments are not found. Therefore, the survey focuses on direct impact caused by the project during the Pre-F/S stage, and the possibility of cumulative impact will be considered during the F/S.

In order to conduct initial environmental and social environmental impact assessment at pre-F/S, LGUs in and around the proposed project area are selected as the study area. The Project will traverse five (5) LGUs as presented in the table below.

Table 16.9-1 LGUs in the Proposed Project Area

Island	Region	Province	Municipality/ City	Barangays	Length of the Project Alignment
Visayas	Region VII: Central Visayas	Cebu	Minglanilla	TubodLinao, Pakine	25 km
			Talisay City	Cadulawan, Lagtang, Maghaway	
			Cebu City	Bacayan, Banilad, Budla-an, Buhisan, Bulacao, Busay, Guadalupe, Kalunasan, Kinasang-an Pardo, Pardo, Quiot Pardo, San Jose, Sapangdaku, Talamban, Tisa	
			Mandaue City	Casili, Tawason	
			Consolacion Municipality	Casili, Danglag, Lamac, Pulpogan, Sacsac, Tolotolo	
Total		1	5	27	-

Source: JICA Study Team

Since the proposed alignment will traverse many existing community roads and rivers, the project components will include tunnels, bridges, underpass/over pass roads and box culverts to avoid intersecting with the existing roads and water flow, as shown in **Table 16.9-2** and **Table 16.9-3**.

Table 16.9-2 Proposed Project Structures

Propose Road Structures	Number of Sections
Tunnels	16 (32 tubes)
Bridges	20
Overpass	5
Underpass	5

Source: JICA Study Team

Table 16.9-3 Existing Crossing Transportations

Existing Roads and Rivers	Number of Crossing Points
Community Roads	67
Rivers	11

Source: JICA Study Team

16.9.2 Baseline of Environmental and Social Conditions

The following descriptions are collected information on pollution, natural environment, reserved areas of natural protection and cultural heritages, land use and social conditions of land acquisition and involuntary resettlement.

(1) Socio-Economic Conditions

1) Population

Based on the 2015 statistical survey, study area has a population of 1.77 Million as shown in **Table 16.9-4**.

Table 16.9-4 Population of the Proposed Project Area

Municipality/ City	Area (km ²)	Population	Population Density (Person/km ²)
Minglanilla	65.6	132,135	2,014
Talisay City	39.87	227,645	5,710
Cebu City	315.00	922,611	2,929
Mandaue City	25.18	363,654	14,402
Consolacion Municipality	147.20	131,528	894

2) Education Opportunity

Cebu city is considered as the main education hub in the Visayas. There are 107 primary schools in the city, 70 of which are public schools and 37 are private schools. The public elementary schools are mostly located in various lowland and upland barangays. Public elementary schools are in relatively good to excellent conditions. Most of the school buildings are concrete structures and have the necessary facilities. Secondary Education for the population of the City of Cebu School is provided to both private and public schools. There are 83 secondary-level schools in the city, 52 of which are public schools and 31 are private schools. Most of the public schools offering secondary education are located in barangays located in the lowland and upland areas of the city while public school areas area observed to be in good to excellent conditions. Most of the school buildings are concrete structures and have the necessary facilities. The city is the center of education in the Central and Southern Philippines. There are 35 universities and colleges in the city, three of which are owned by the government.

Mandaue city has 27 public elementary schools and 17 secondary schools. The elementary schools are located in 23 barangays but there are also some schools that are accessible without schools to adjacent barangays. The elementary schools occupy a total area of 10.13 hectares while the secondary schools occupy 4.68 hectares of land. The public schools cover 14.81 hectares of total land. Mandaue City has 30 private schools provide primary, secondary, and post-secondary education. Such schools are situated in various parts of town and are accessible by public transport. These private schools cover a combined 26-hectare area. At secondary level, the ratio of teachers to pupils in public schools is 1:40 and 1:13 in private schools. The classroom-pupil ratio in primary education is 1:56 and 1:71 in high; the private school level is 1:17 and 1:35 respectively in elementary and secondary schools.

In Cebu City, the literacy rate of Population 10 years old and over constitute the 97% of the total population. Population in the group of 15 to 19 are 98.64% literate. Elderlies aging 70 and over constitute the 83.83% literacy rate.

In Mandaue City, the literacy rate of population five (5) years old and over constitute the 96% of the total population. It is estimated that 37% of the population aged five (5) years of age and above has completed high school.

3) Health Status

Cebu City is second in terms of quality of the medical services available to Manila. Private hospitals in the city provide excellent medical facilities not only to the city and the provincial residents but also to those in the regions of Visayas and Mindanao. The total hospital bed capacity of the city is 3,370 more than half of which for private hospitals, or about 63%, belong. Apart from the services and medical staff available at the city-run hospital and other public hospitals, the city government is making efforts at barangay level to meet the health needs of its citizens.

In Mandaue City, there are 27 barangay health centers situated in each barangay of the city. Each health center has a total of one (1) or two (2) rooms. There are five (5) main hospitals in Mandaue; three (3) are privately operated, and two (2) are owned by the government. The five (5) hospitals had a total size of 428 beds. There is a minimum of 1,004 medical staff for both the government and private hospitals and medical facilities (CLUP, 2019).

According to "EIA Statement of Cebu-Mactan Bridge and Coastal Road Construction Project (2019)", the average birth rate, morbidity rate and mortality rate in 2009-2013 in Mandaue City are shown in **Table 16.9-5**. Similar ratios of each indicator are expected in other municipalities and cities.

Table 16.9-5 Rate of Birth, Morbidity, and Mortality in Mandaue City

Birth Rate	Morbidity Rate	Mortality Rate
23.8/1,000 people (crude birth rate)	40/1,000 people	3.5/1,000 people (crude death rate)
3.3/1,000 people (total fertility rate)		9.9/1,000 people (infant mortality rate)

(2) Pollution Items

1) Air Quality

The results of air quality monitoring in 2018 at two locations for 24 hours in Mandaue City indicated that the tested parameters for air quality (TSP, SO₂, NO₂) were within the National Ambient Air Quality Guideline Values (NAAQGV) of the DENR.

Table 16.9-6 Air Quality Monitoring Results

Parameters	DENR NAAQGV Standards (µg/Ncm)	WHO Air Quality guidelines for PM, ozone, nitrogen dioxide and sulfur dioxide	Station 1 (µg/Ncm)	Station 2 (µg/Ncm)
TSP / PM10	230 *TSP	50µg/m ³ (24-hour mean) *PM10	97 *TSP	112 *TSP
SO ₂	180	500µg/m ³ (10-minute mean)	2	<1
NO ₂	150	200µg/m ³ (1-hour mean)	<1	2

Source: EIS of the Depressed Structure at Intersection of U.N. Avenue and Plaridel Road, 2019

2) Water Quality

Based on the water quality monitoring tested in Butuanon River at two stations in 2018, TSS, pH, Temperature, Color, Lead, Arsenic, Mercury, and Cadmium were within the prescribed environmental guideline value for the Class D water (Navigable water) except for BOD, Fecal Coliform, and Oil and grease. The high amount of BOD and fecal coliform in the river might be caused by the organic matter from the discharges of nearby settlers. The high levels of oil and grease may be caused by the wastewater from developments, industrialization, and other human activities.

Table 16.9-7 Water Quality of Butuanon River

Parameters	DENR Standards (Ambient Class D)	IFC/WB EHS Guidelines	Water Quality Results	
			Upstream	Downstream
Biochemical Oxygen Demand (BOD), <i>mg/L</i>	15	30	285	433
Total Suspended Solids (TSS), <i>mg/L</i>	110	50	46	47
pH	6.0-9.0	6.0-9.0	7.0	6.7
Temperature, <i>deg C</i>	25-32	-	25	25
Color, <i>TCU</i>	150	-	50	30
Fecal Coliform, <i>MPL/100</i>	400	400	35 x 10 ⁵	54 x 10 ⁴
Oil and Grease, <i>mg/L</i>	5	10	6	6
Lead, <i>mg/L</i>	0.1	0.2	<0.01	<0.01
Arsenic, <i>mg/L</i>	0.04	0.1	<0.001	<0.001
Mercury, <i>mg/L</i>	0.004	0.01	<0.0001	<0.0001
Cadmium, <i>mg/L</i>	0.01	0.1	<0.003	<0.003

Note: Red font means non-conformity with DAO 2016-08;

ND – Not Determined

Source: EIS of the Depressed Structure at Intersection of U.N. Avenue and Plaridel Road, 2019

3) Waste

Population of Cebu City is dense in the south part and there are observed typical problems related to urbanization including waste management. Due to stable and high economic growth in Cebu City, amount of solid waste is increasing and it is estimated that around 500t of waste are generated in Cebu City. With such background, Cebu City is facing issues on solid waste such as lack of collection vehicles, lack of private dumping sites, illegal dumping to river and ocean, and 3Rs activities. (Source: Solid Waste Management and Resource Recycling Project in Inayawan, Cebu City, Pilot Survey for Disseminating SME's Technologies under JICA scheme, 2015)

4) Soil Contamination

According to the baseline surveys of "EIA Statement of Cebu-Mactan Bridge and Coastal Road Construction Project (2019)", there were not observed severe soil contamination cases around the CCR sites except the area close to existing dumping sites such as Inayawan Sanitary Landfill.

5) Noise and Vibration

The noise level monitoring stations were co-located with the air quality sampling stations as discussed above, which were set near schools along the existing road. The noise level results in 2018 at two locations were beyond the guideline value for Class AA area (Sensitive Receptor Areas). (Source: Environmental Impact Statement (EIS) for Depressed Structure at Intersection of U.N. Avenue and Plaridel Road, Mandaue City, DPWH 2018)

Table 16.9-8 Noise Monitoring Result

Time of sampling	NPCC Class AA standards (dB)	IFC/WB EHS Guidelines	Station 1 (dB)	Station 2 (dB)
Morning	45	-	72.8	57.0
Daytime	50	55/70*	72.3	55.6
Evening	45	-	72.2	54.4
Nighttime	40	45/70*	69.1	51.7

* Daytime 7:00-22:00 / Night time 22:00 - 7:00

* 55 and 45 in Residential/Institutional/Educational Area, 70 in Industrial/commercial area

Source: *EIS of the Depressed Structure at Intersection of U.N. Avenue and Plaridel Road, 2019*

6) Ground Subsidence

The present water supply of the Metro Cebu area mainly comes from groundwater sources extracted from the coastal aquifer that stretches from Liloan to the southern part of Cebu City. It is estimated that close to 98% of the supply is from groundwater sources. However, outstanding ground subsidence due to groundwater and other kinds of activities have not been observed or reported so far. (The Roadmap Study for Sustainable Urban Development in Metro Cebu, JICA 2015)

7) Offensive Odor

Specific sites such as areas close to existing dumping sites of Inayawan Sanitary Landfill and waterways around Talisay City were reported as source of offensive odor. (The Master Plan and Feasibility Study for Improvement of Water Supply and Sanitation in Metro Cebu, JICA, 2007).

8) Bottom Sedimentation

Because of incomplete drainage system and wastewater treatment system, both inland water and sea water is facing pollution. Therefore, bottom sedimentation in such areas might be degraded due to polluted water.

(3) Natural Environment

1) Protected Area

"The revised procedural manual for DENR Administrative Order (DAO) 2003-30: Implementing Rules and Regulations (IRR) for the Philippine Environmental Impact Statement (EIS) System" specifies 12 Environmental Critical Areas (ECAs) categories, as listed in **Table 16.9-9**. DENR-EMB decide on the relevance of the ECA categories to the project location. ECA as defined is an area considered environmentally sensitive wherein the magnitude or impacts are easily recognized if proposed projects are built, developed, or implemented in it. It is expected that the Project area is within three (3) categories namely:

[No.6] Areas hard-hit by natural calamities;

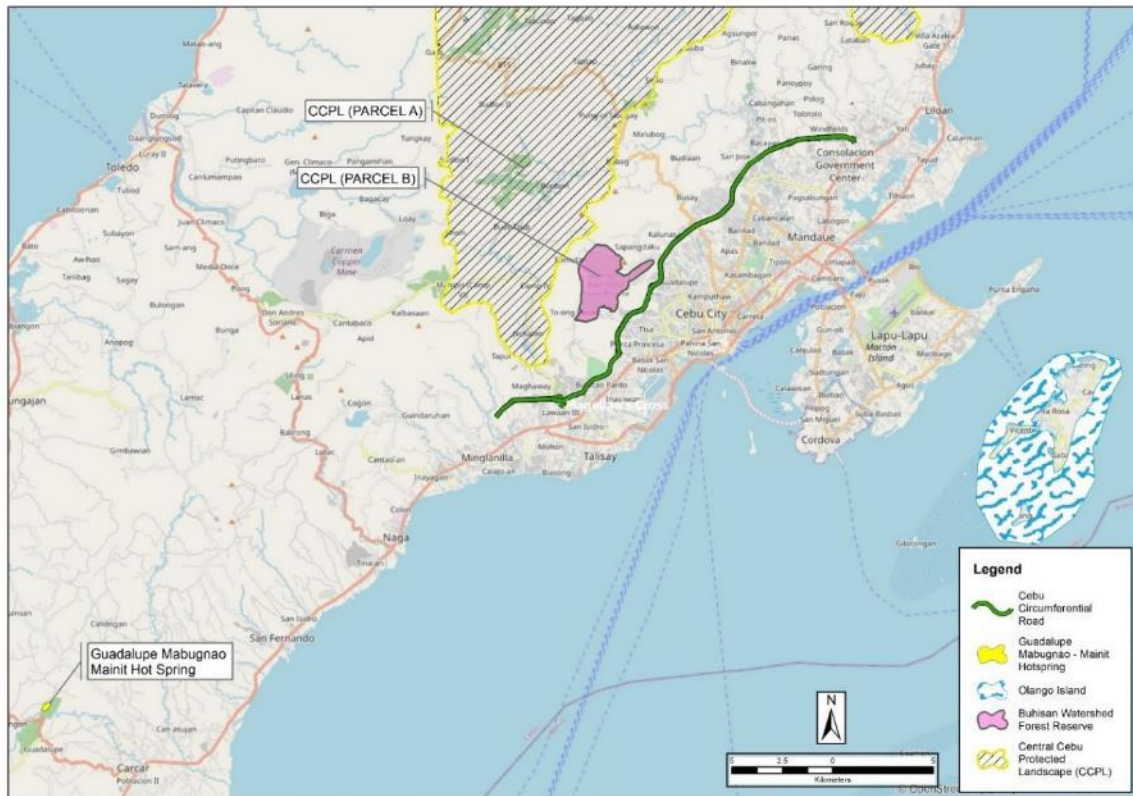
[No.7] Critical Slope (>50%or>27°), and;

[No.10] Water Bodies (for domestic use, or support wildlife/fishery)

Table 16.9-9 Environmentally Critical Areas (ECAs) within or near the Project Site

No.	ECA Category	ECA within the proposed project	Remarks
1	Protected Areas (declared by National laws or local ordinances)	None	Central Cebu Protected Landscape (CCPL- Parcel B) under RA 9486 is the nearest protected area from the proposed project site, approximately 0.4 km away. (see Figure 16.9-1)
2	Aesthetic Potential Tourist Spots	None	The nearest aesthetic potential tourist spot, the Cebu Taoist Temple, is about 1.0 km away from the proposed project site. (see Figure 16.9-2)
3	Wildlife Habitat	None	CCPL- Parcel B under RA 9486 is the nearest protected area from the proposed project site, approximately 0.4 km away. (see Figure 16.9-1)
4	Unique Historic, Archaeological, Geological Site	None	Magellan's Cross (approximately 4.4 km), Fort San Pedro (approximately 4.8 km) are the nearest historical site from the proposed project site. (see Figure 16.9-2) Source: Best Cebu Tourist Spots Guide 2020, and Guide to the Philippines
5	Ancestral Lands	None	Not applicable. (as verified from NCIP Region 7)
6	Hard-Hit by Natural Calamities	✓	The project area is in and around the low to high landslide hazard area. (see Figure 16.9-4)
7	Critical Slope	✓	Portion of the proposed circumferential road will traverse critical slope (>50%) (see Figure 16.9-5)
8	Prime Agricultural Lands	None	Not applicable. The project area is highly urbanized.
9	Recharge Areas of Aquifers	None	The CCPL Parcel B, which covers Buhisan Watershed Forest Reserve, is approximately 0.4 km away from the project area. (see Figure 16.9-1)
10	Water Bodies (for domestic use, or support wildlife/fishery)	✓	The proposed circumferential road will traverse six (6) identified water bodies and their watershed area including tributary streams at approximately 11 points in reference to the satellite map. (See Figure 16.9-3)
11	Mangrove Areas	None	Not applicable. (The proposed project will not be in/near mangrove area)
12	Coral Reefs	None	Not applicable. (The proposed project will not be in/near marine /coastal area). . The nearest coral reefs are more than 5km far from the alignment in the nearest location and there is Cebu City between the road and the reef areas.

Source: JICA Study Team



Source: *Protected Planet, and Guidebook to Protected Areas of the Philippines, BMB –DENR, 2015*

Figure 16.9-1 ECAs near the Study Area



Source: *Best Cebu Tourist Spots Guide 2020, and Guide to the Philippines*

Figure 16.9-2 Aesthetic Potential Tourist Spot near the Study Area

2) Ecosystem

The Central Cebu Protected Landscape (CCPL) is a 29,062-hectare protected area composed of Parcel A and Parcel B located in the mountains and drainage basins of Central Cebu. It covers five (3) Watershed Forest Reserve Areas and 2 National Park Areas into one aims to protect the biodiversity and manage the water supply, development, and anthropogenic activities in Metro. Of these five (5) PAs, Buhisan Watershed Forest Reserve is tagged as the nearest PA located less than 1 km away from the project alignment. This watershed supplies water to the Buhisan Dam, the source of surface water of Metropolitan Cebu Water District. CCPL also serves as habitat for a number of endemic species and threatened species.

Apart from providing water resource to Metropolitan Cebu, CCPL (both Parcel A and B) also serves as habitat for a number of endemic species and threatened species. Recent surveys reveal flora species such as Teak (*Tectona grandis*), Binunga (*Macaranga bicolor*), Kakawate (*Gliricidia sepium*), Patikan (*Euphorbia hirta*), Ipil-ipil (*Leucaena leucocephala*), Gmelina (*Gmelina arborea*), and Mahogany (*Swietenia macrophylla*) thriving in the area; while wildlife species such as Black Shama (*Copsychus cebuensis*), Streak-breasted Bulbul (*Ixos siquijorensis*), Rufous-colored Kingfisher (*Todiramphus winchelli*), and Philippine Tube-nosed Fruit Bat (*Nyctimene rabori*) may be found in the area.

According to the results of EIA study for Cebu-Mactan Bridge and Coastal Road Construction Project (implemented with JICA's study as Category-A), most of the birds, mangrove species and seaweeds listed in IUCN are classified as LC (Least Concern). The project area of that project is coastal area where relatively rich natural environment is observed. Some kind of birds categorized EU (*Calidris tenuirostris*), VU (*Egretta eulophotes*) and NT (*Tringa brevipes*) are observed in Olango Island and will not come into inland areas of the project of CCR.

In addition, impact due on coral reefs around the sea areas shall be confirmed further in following F/S-Study, although direct impact may not be expected at this pre-F/S stage.

3) Hydrology

The project area will be traversing six (6) identified water bodies, specifically, one (1) creek, the Mahiga Creek, and five (5) rivers, namely, the Bulacao, Kinalumsan, Guadalupe, Lahug, and Butuanon River.

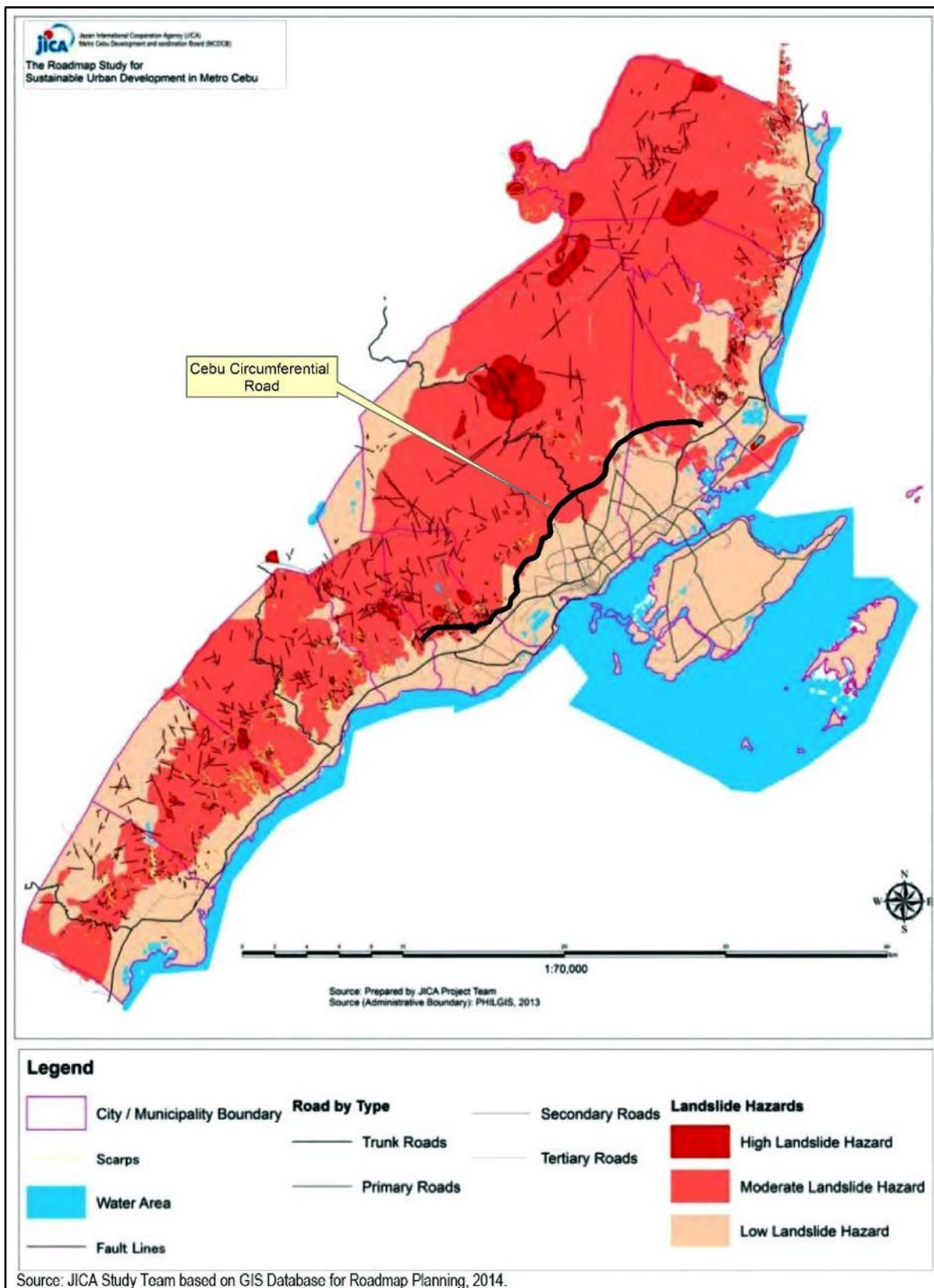


Source: JICA Study Team

Figure 16.9-3 River Network Map in and around the Study Area

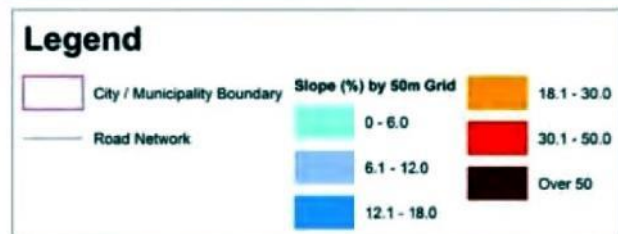
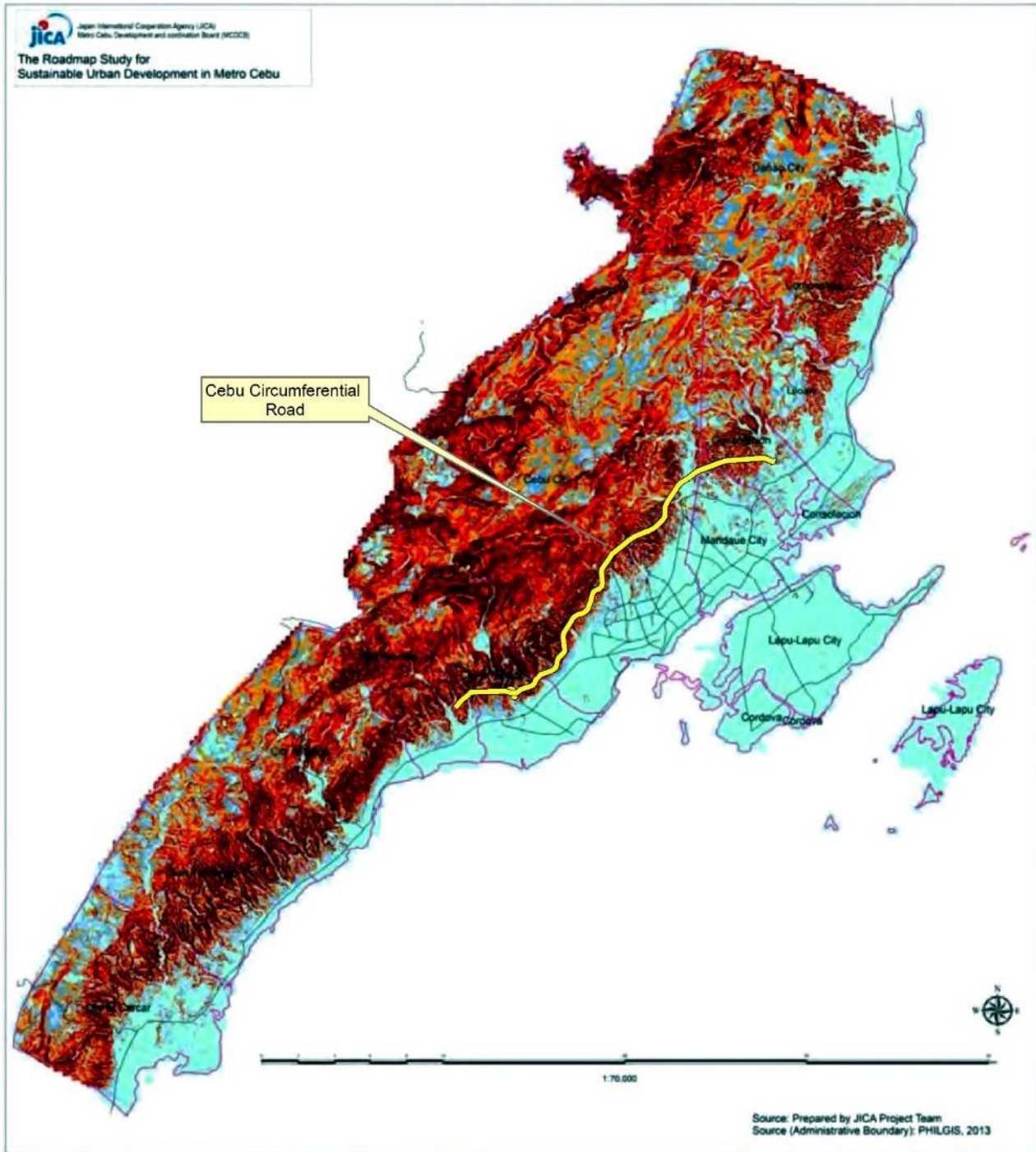
4) Topography and Geology

The project area generally lies on slope gradient of 18% and above which may be found on the upland areas of the Metro Cebu. The project site is located along the edge of the urbanized area and contains very significant variations in elevation with hills and valleys. As a general characteristic of the project site, following figures show land slide risks and slope of land.



Source: *The Roadmap Study for Sustainable Urban Development in Metro Cebu, JICA 2015*

Figure 16.9-4 Landslide Hazard Map in Metro Cebu



Source: JICA Study Team based on GIS Database for Roadmap Planning, 2014.

Source: The Roadmap Study for Sustainable Urban Development in Metro Cebu, JICA 2015

Figure 16.9-5 Slope Map in Metro Cebu

(4) Social Environment

1) Land Acquisition and Resettlement

There have been many experiences of land acquisition and resettlement in and around the project areas including projects under safeguard policies of Asian Development Bank (ADB) and JICA's Environmental and Social Considerations. Procedures of land acquisition and resettlement follows country system of the Philippines.

2) Poverty

Cebu City is one of the areas where poverty reduction is recognized as important social issue. Based on "National Statistical Coordination Board" around 23% of the population (around 1 Million) in Cebu Province was classified into poverty incidence among population in 2012. The ratio of poverty is decreasing from 30% of 2006.

3) Ethnic Minority and Indigenous People

There are no approved or on-going application for Certificate of Ancestral Domain Title (CADT) in Cebu Province, as of December 2019, in accordance with the national distribution maps of CADTs provided by the National Commission on Indigenous Peoples (NCIP).

4) Local Economy such as Employment and Livelihood

Cebu is a historical port city and most of its local economy are related to port business. In addition, Cebu is famous resort island which attracts both international and domestic tourists with its rich natural tourism resources. Therefore, service sectors including tourism and transportation are dominant local economy which provides employment and livelihood opportunities to the local people. Also, the primary industries such as farming and fishery are common as local economy.

5) Land use and Usage of Local Resources

The location of the proposed Circumferential Road generally traverses urbanized area and portions of pasture area and forest area. Based on the existing confirmed land uses, aggregated urban areas account for 15.1% of Metro Cebu's territorial lands.

6) Water Usage

Both surface/river water and groundwater are used for portable water. The Master Plan and Feasibility Study for Improvement of Water Supply and Sanitation in Metro Cebu (2007, JICA) reported many irrigation schemes in the area of Cebu City and river water is used for them.

7) Existing Social Infrastructures and Services

The project area of CCR has many rural communities with existing social infrastructures including school, hospital, public/social service buildings and infrastructure such as rural road networks.

8) Social Institution such as Socially Related Capital and Decision-making Organizations

There is different level of local government entities such as municipality, barangay, village, etc. as social institution. Also, there are different kinds of public and private organizations in the field of specific industry/occupation, gender, NGO, etc.

9) Children's Rights

Child labor cases in Philippines are commonly reported and it may occur in the survey area. Children's rights in the survey area may be related to poverty.

10) Infectious Diseases such as HIV/AIDS

HIV/AIDS cases in Philippines are usually connected to prostitution workers and it may be common in the survey area.

(5) Others

1) Transboundary Impact and Climate Change

There are internationally common recognitions on transboundary impact and climate change such as greenhouse effect gas emission in industry, transportation, and other relevant sectors in the survey areas.

16.9.3 Legal and Institutional Framework of Environmental and Social Considerations

Laws and Regulations related to environmental and social issues in the Philippines are summarized in **Chapter 13 Strategic Environmental Assessment** of this report. Based on both legal frameworks in Philippines and the JICA Guidelines for Environmental and Social Considerations, April 2010 (hereinafter, "JICA Environmental Guidelines"), Categorization of CCR is estimated as follows.

(1) Categorization of EIA in Line with PEISS

Environmental Compliance Certificate (ECC) will be acquired as a requirement by the DENR before the project implementation. Based on the ECA categories, the proposed Cebu Circumferential Road is considered as the ECA project because it will traverse areas which are hard-hit by natural calamities, areas with water bodies which are used for domestic and wildlife/fishery support, and areas with critical slope.

In addition, based on the project threshold for coverage screening and categorization, the proposed 25-km circumferential road is classified as an ECP as it goes beyond the minimum 20-km threshold limit for national roads. As such, for the project to secure an ECC, it will require an Environmental Impact Statement (EIS) Report which shall be applied in the DENR-EMB Central Office. Moreover, the proposed tunnel components are also classified as an ECP since it passed beyond the 1-km threshold limit for tunnels to be classified as environmentally critical.

(2) Categorization of the Project in accordance with the JICA Environmental Guidelines

Category A defined by the JICA Guidelines for Environmental and Social Considerations, April 2010 (hereinafter, "JICA Environmental Guidelines") generally includes i) projects in sensitive sectors, ii) projects that have characteristics that are liable to cause adverse environmental impact, and iii) projects located in or around environmental sensitive areas. Moreover, a project causing large-scale involuntary resettlement and or a project area inhabited by indigenous people are classified under Category A. Projects are classified as Category B if potential adverse impacts on the environment and society are less adverse than those in Category A.

Based on the above guidelines, the Project is seemed to be classified as Category A by JICA because the project is considered as a large-scale road and bridges project, large scale involuntary resettlement under the JICA Environmental Guidelines. The categorization shall be reviewed during feasibility study based on the detail data of the number of affected persons in ROW.

16.9.4 Alternative Comparison

Comparison of alternative alignments for CCR is described in **Section 16.4.2** of this chapter.

16.9.5 Scoping and ToR for Environmental and Social Considerations Surveys

(1) Scoping

Scoping means choosing alternatives for analysis, a range of significant and potentially significant impacts, and study methods. ✓ mark is applied for environmental items which will be affected by the project or cannot be decided without additional surveys. Scoping is executed for different phases of pre-construction/construction and operation in each environmental item. Items without ✓ in both two phases are not the target of following survey and evaluation if there are enough reasons that the items will not be affected by the project. Following table shows the result of scoping of CCR

Table 16.9-10 Result of Scoping of CCR

No	Item	Selection Status		Reasons for Selection
		PCS/CS	OS	
1	Air Quality	✓	✓	[CS] Construction vehicles may cause air pollution temporally. [OS] Negative impact on air quality is expected due to exhaust gas from vehicles.
2	Water Quality	✓	✓	[CS] Construction activities (such as cutting/filling works with surface erosion), construction vehicles, camp yards may cause water pollution through drainage water. [OS] Drainage from road structure may cause water pollution in water bodies along the road.
3	Waste	✓		[CS] Construction waste including concrete, asphalt, cut trees and soil may be generated through construction activities. [OS] No serious impacts are expected, because there is no plan of service / parking area which generate waste.
4	Soil Contamination	✓		[CS] There is a possibility of soil contaminant by oil leakage from construction vehicles and soil generated by the project. [OS] Operation of roads may not cause soil contamination both directly and indirectly.
5	Noise and Vibration	✓	✓	[CS] Construction vehicles may cause noise and vibration temporally. [OS] Ambient noise and vibration along CCR may cause negative impact on sensitive receivers such as residential area, school, and hospital.
6	Ground Subsidence	✓	✓	[CS/OS] Landfilling and tunnel works may cause ground subsidence in the area of soft soil and other specific conditions.
7	Offensive Odor	✓		[CS] There is a possibility of offensive odor by construction activities. [OS] Operation of roads may not cause offensive odor both directly and indirectly.
8	Bottom Sediment	✓		[CS] There is a possibility of impact on the river bottom sediment by leaked oil from construction vehicles and flown soil caused by earthwork. [OS] Operation of roads may not cause bottom sediment both directly and indirectly.
9	Protected Area	✓	✓	[CS/OS] The project may cause impact to protected areas nearby.
10	Ecosystem	✓	✓	[CS/OS] The project may cause impact such as tree-cutting activities on ecosystem including indicator species along the project site. Coral reefs along the costal sea may be affected if turbid water is discharged. Additionally, there is a possibility that the change of the surrounding atmosphere environment, such air quality, noise/vibration and lighting, and would influence the surrounding ecosystem, especially CCPL.

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No	Item	Selection Status		Reasons for Selection
		PCS/CS	OS	
11	Hydrology	✓	✓	[CS/OS] There is a possibility of changes to hydrology because the project across some rivers.
12	Topography and Geology	✓		[CS] Topography might change by land cutting in the valley and tunnel construction. There are possibilities of land slide and soil erosion due to slope cutting and/or land filling works. [OS] Operation of roads may not cause geographical and topographical changes both directly and indirectly.
13	Land Acquisition and Resettlement	✓		[PCS] Land acquisition and resettlement with more than hundreds are required to secure land for road and other facilities/structures of CCR. [CS/OS] No additional resettlement is expected.
14	Poverty	✓		[PCS/CS] Vulnerable groups including poor households may be targets of resettlement. Some of them may get or lose their livelihood during construction phase. [OS] No additional impact on poverty groups.
15	Ethnic Minority and Indigenous People	✓	✓	[PCS/CS/OS] Ethnic minority and/or indigenous people may live along the project area.
16	Local Economy such as Employment and Livelihood	✓		[CS] Employment opportunity can be created due to the project construction. On the other hand, construction activities may cause temporal inconvenience such as access hinderance to the local economy. Employment and livelihood of project affected households are also affected by resettlement activities. [OS] No additional impact is expected during operation stage.
17	Land Use and Usage of Local Resources	✓	✓	[CS] Loss of farmland and forests for new roads are expected. Land and local resources such as trees of project affected households are also affected by resettlement activities. [OS] CCR may pause some negative impact on land use such as development of forest areas and using of water resources.
18	Water Usage	✓	✓	[CS] There is a possibility of unexpected discharge of ground water due to the tunnel excavation. Also, river water may be affected by earthworks. Water usage of the affected area may be affected by resettlement activities. [OS] Operation of roads may cause impact on water usage both directly and indirectly.
19	Existing Social Infrastructure and Services	✓		[PCS/CS] Existing social infrastructure may be affected by land acquisition and construction. [OS] Highway may bring positive impact on exiting road networks around the area.
20	Social Institutions such as Socially Related Capital and Decision-making Organizations	✓		[CS] There is a possibility of the temporary physical community division by construction. [OS] No additional impact is expected.
21	Misdistribution of Benefit and Damage			Misdistribution of benefit and damage caused by the road construction is not expected.
22	Local Conflicts of Interest		✓	[CS] No serious impacts are expected. [OS] Community separation by newly constructed highway may cause conflicts of interest.
23	Cultural Heritage			Magellan's Cross (approximately 4.4 km), Fort San Pedro (approximately 4.8 k) are the nearest historical site from the proposed project site. No serious impacts are expected because there are no outstanding cultural heritages around the area.
24	Landscape	✓		[CS] There is a possibility of disturbance of landscape by the road structures especially tunnels and bridges.

No	Item	Selection Status		Reasons for Selection
		PCS/ CS	OS	
				[OS] Operation of roads may not cause impact on landscape both directly and indirectly.
25	Gender	✓		[CS] Women may be affected when they commute to working places during the construction period. There might be gaps on working conditions such as wage between men and women when local employment is considered. [OS] Improved access by the project may cause positive impact on gender.
26	Children's Right	✓		[CS] There is a possibility of occurrence of child labor [OS] Due to the improvement of traffic congestion of existing road, traveling time to school and hospital will become faster and safer.
27	Infectious Diseases such as HIV/AIDS	✓		[CS] Infectious diseases are possible to be spread due to inflow of construction workers. [OS] Operation of roads may not cause impact on infectious diseases both directly and indirectly.
28	Labor Environment including Safety	✓		[CS] Due to construction activities, labor environment may be affected. [OS] Operation of roads may not cause impact on labor environment diseases both directly and indirectly.
29	Accident	✓	✓	[CS] Traffic accident related to construction vehicles and accident in construction sites are expected. [OS] Traffic accident may increase due to increased traffic volume.
30	Transboundary Impact and Climate Change	✓	✓	[CS] and [OS] Greenhouse Effect Gasses may increase due to construction machinery / vehicles and newly generated traffic.

Note) Project stage: PCS: Pre-construction stage, CS: Construction stage, OS: Operation stage

Source: JICA Study Team

(2) ToR for Environmental and Social Considerations Surveys

Based on the scoping results in the previous section, terms of references (ToR) for necessary surveys on environment are developed to determine project induced impacts. Possible impact to be caused by the project implementation will be evaluated qualitatively based on the existing secondary data, interview with concerned parties and examining project design. **Table 16.9-11** shows the ToR for environmental and social considerations survey.

Table 16.9-11 ToR for Surveys of Environmental and Social Considerations

No.	Item	Survey Item	Survey Method
1	Air Quality	(1) Relevant standards on Environment (Domestic, Japanese, WHO's, etc.) (2) Status of air quality items	(1) Existing material (2) Secondary data/information from past projects nearby (3) Qualitative evaluation based on expected traffic volume and construction vehicles
2	Water Quality	(1) Relevant standards on Environment (Domestic, Japanese, WHO's, etc.) (2) Status of water quality items	(1) Existing material (2) Secondary data/information from past projects nearby (3) Qualitative evaluation based on expected construction methods
3	Waste	(1) Waste management process	(1) Secondary data/information from past projects nearby (2) Qualitative evaluation based on expected construction methods and facilities

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No.	Item	Survey Item	Survey Method
4	Soil Contamination	(1) Protection method against oil leakage	(1) Confirmation on implementation plan of construction vehicles (2) Qualitative evaluation based on expected construction methods
5	Noise and Vibration	(1) Relevant standards on Environment (Domestic, Japanese, WHO's, etc.) (2) Status of water noise and vibration	(1) Existing material (2) Secondary data/information from past projects nearby (3) Qualitative evaluation based on expected traffic volume and construction vehicles
6	Ground Subsidence	(1) Soil conditions	(1) Past study around the area (2) Qualitative evaluation based on expected construction methods
7	Offensive Odor	(1) Possible events causing odor	(1) Collection of necessary information on construction method (2) Qualitative evaluation based on expected construction methods
8	Bottom Sediment	(1) Construction method causing sedimentation	(1) Collection of necessary information on construction method (2) Qualitative evaluation based on expected construction methods
9	Protected Areas	(1) Situation of registration (2) Outline of the protected areas	(1) Relevant laws and regulations (2) Past study around the area (3) Qualitative evaluation based on expected construction methods
10	Ecosystem	(1) Situation of general ecosystem (2) IUCN listed species	(1) Past field surveys on occurrences of fauna and flora (2) IUCN Website etc. (3) Qualitative evaluation based on expected construction methods
11	Hydrology	(1) Situation of surface water such as river and lake (2) Impact during construction	(1) Past field surveys (2) Confirmation of construction methods (3) Qualitative evaluation based on expected construction methods
12	Topography and Geology	(1) Construction method causing changes of topography and geology	(1) Collection of necessary information on construction method (2) Qualitative evaluation based on expected construction methods
13	Land Acquisition and Resettlement	(1) Size of impact (area, structure, etc.) (2) Compensation policy	(1) Aerial photos, design, etc. (2) Existing surveys including resettlement action plan (RAP) (3) Qualitative evaluation based on expected project effects
14	Poverty	(1) Distribution of poverty groups	(1) Existing surveys and Statistics (2) Qualitative evaluation based on expected project effects
15	Ethnic Minority and Indigenous People	(1) Distribution of ethnic minority and indigenous people	(1) Existing surveys and Statistics (2) Qualitative evaluation based on expected project effects
16	Local Economy such as Employment and Livelihood	(1) Local economic status	(1) Existing surveys and Statistics (2) Qualitative evaluation based on expected project effects
17	Land Use and Usage of Local Resources	(1) Land use status	(1) Existing surveys and existing maps (2) Qualitative evaluation based on expected project effects

No.	Item	Survey Item	Survey Method
18	Water Usage	(1) Water usage status in rivers and other resources (2) Impact during construction	(1) Existing surveys and literature material (2) Confirmation of construction methods (3) Qualitative evaluation based on expected impact on water use
19	Existing Social Infrastructure and Services	(1) Distribution of residential areas, school, hospital, and etc.	(1) Existing surveys and literature material (2) Qualitative evaluation based on expected project effects
20	Social Institutions such as Socially Related Capital and Decision-making Organizations	(1) Social institutions and possible impact	(1) Existing surveys and literature material (2) Qualitative evaluation based on expected project effects
21	Local Conflicts of Interest	(1) Expected conflicts	(1) Project design and distribution of interest (2) Qualitative evaluation based on expected project effects
22	Landscape	(1) Scenic areas	(1) Existing surveys and literature material (2) Qualitative evaluation based on expected structures and topographical changes
23	Gender	(1) Impact on gender	(1) Existing surveys and literature material (2) Qualitative evaluation based on expected project effects
24	Children's Right	(1) General situation/possibility of child labor	(1) Existing surveys and literature material (2) Qualitative evaluation based on expected project effects
25	Infectious Diseases such as HIV/AIDS	(1) General situation/possibility of infectious diseases	(1) Existing surveys and literature material (2) Qualitative evaluation based on expected project effects
26	Labor Environment including Safety	(1) General situation/possibility of labor environment	(1) Existing surveys and literature material (2) Qualitative evaluation based on expected project effects
27	Accident	(1) Expected increases of accident	(1) Existing surveys and literature material (2) Qualitative evaluation based on expected project effects
28	Transboundary Impact and Climate Change	(1) Elements related to cross boundary impacts, cumulative impacts, and climate change	(1) Collect information based on highway construction and management (2) Qualitative evaluation based on expected project effects

16.9.6 Results of Surveys

(1) Air Quality

There are residential areas (Lagtang, Quiot Pardo, Busay, and Talamban) along the proposed alignment. In general, the large-scale project will require many heavy construction vehicles/equipment.

[Construction Stage]

Air quality around the construction areas and relevant locations will be degraded due to exhaust gas from construction machineries and vehicles. Also, earthworks may generate particulate matters such as PM10 and PM2.5. Level of air pollution may depend on locations, therefore, further monitoring (baseline) surveys are required during F/S.

[Operation stage]

Increased traffic may cause air pollution along the road and tunnel areas on typical elements such as NO₂, SO₂, CO and particulate matters. In some sections, unpaved road will be improved and particulate matters may decrease as a result. It may cause higher level of pollution on specific elements such as SO₂ and NO_{CO} which might be under domestic standard as baseline data. Level of air pollution may depend on locations, therefore further monitoring (baseline) surveys with forecasting analysis are required during F/S.

(2) Water Quality

The Project will traverse 11 rivers /creeks, namely six (6) identified water bodies, specifically, one (1) creek, the Mahiga Creek, and five (5) rivers. The project area is located in the area of water bodies for domestic defined as the ECA (**Table 16.9-9**).

[Construction Stage]

Water quality around the construction areas and relevant locations including camp yards will be degraded if wastewater is discharged inadequately, especially oil leakage from consecution machineries. Earth works also cause turbid water to the surrounding environment. Level of water pollution may depend on locations, therefore, further monitoring (baseline) surveys are required during F/S.

[Operation stage]

There is no construction plan of service areas which may discharge domestic wastewater, therefore, severe water pollution may not occur during the operational phase.

(3) Waste

[Construction Stage]

Construction waste which is generated by the project will be excavated soil, debris and muck waste from tunnels, cut trees, asphalt mass and etc. Also, domestic waste from construction yards is expected.

(4) Soil Contamination

The Project will include construction of tunnels and bridges, soil excavation and land filling.

[Construction Stage]

Wastewater from construction areas including tunnels may cause soil contamination, if wastewater is not treated appropriately. Furthermore, there is a possibility of soil contamination due to the unexpected leakage/ mishandling of oil and other chemicals, in the all earthwork area including the main road area and borrowing pit, etc. In case that on-site soil had already polluted, dumping soils and muck from tunnels also have possibility of soil contamination when they are dumped other places.

(5) Noise and Vibration

There are residential areas (Lagtang, Quiot Pardo, Busay, and Talamban) along the proposed alignment. In general, the large-scale project will require many heavy construction vehicles/ equipment.

[Construction Stage]

Construction machineries and vehicles may cause certain level of noise and vibration around the construction area. Background noise level along the planned alignment is not so high because

most of the area is rural regions. Level of noise and vibration may depend on locations, therefore, further monitoring (baseline) surveys are required during F/S.

[Operation stage]

Both new alignment section and widening/improvement of existing road section will be affected by noise and vibration during operation phase. Due to increased vehicles and attracted new demand of traffic, some areas may exceed national standard in the future. Level of noise and vibration may depend on locations, therefore, further monitoring (baseline) surveys are required during F/S.

(6) Ground Subsidence

[Construction Stage] & [Operation stage]

It is difficult to forecast ground subsidence caused by project activities, however, it can be said that there is possibility of ground subsidence based on construction methods and natural conditions of the project. Not only soft soil areas but also tunnel sections are the high-potential areas of ground subsidence. Changes of overweight on ground and underground flow may cause ground subsidence. Potential and risk of ground subsidence should be discussed further with geological data and basic designs in following study phases such as F/S.

(7) Offensive Odor

[Construction Stage]

As long as appropriate waste management and equipment maintenance are implemented, severe offensive odor cases are not expected. However, construction camp yards may cause offensive odor from its waste and wastewater.

(8) Bottom Sediment

The Project will traverse about 11 rivers/streams. Working in the river might be occurred.

[Construction Stage]

River crossing points may be affected on bottom sediment by construction activities. Earth works and other works inside rivers can cause direct sedimentation as well as turbid water. In case that crossing river bottom sediment had already polluted, dumping soils in the riverbed also have possibility of soil contamination when they are dumped other places.

(9) Protected Area

CCPL- Parcel B under RA 9486 is the nearest protected area from the proposed project site, approximately 0.4 km away.

[Construction Stage] & [Operation stage]

Based on literature survey on legally designated areas, CCR project may not affect CCPL directly. The alignment runs along border of urbanized areas and hilly areas, therefore, project areas are already developed with certain degree. However, construction activities may have negative impacts on the natural environment of protected areas near the project alignment. Besides, during the operation stage, traffic activities also may have negative impacts on it due to pollution and roadkill. Further information and field surveys on conditions of CCPL's boundary and buffer areas shall be confirmed and discussed with DENR during F/S.

(10) Ecosystem

Land use along the proposed alignment is mostly used as arable land. Trees are part of the project area. Central Cebu Protected Landscape (CCPL) under RA 9486 is the nearest protected area from the proposed project site, approximately 0.4 km away.

[Construction Stage]

Construction activities and existence of road structures may have impact (such as damage of trees and vegetation, loss of nest/feeding area/breeding area, and migration inhibition, division of the habitation area, road killing, noise/vibration due to the new traffic flow, etc.) on surrounding ecosystem along the project alignment. Further information and field surveys on birds and other key species including distribution of coral reefs confirmed in the Cebu island should be discussed during F/S. To understand information of habitat and key species based on actual project sites, further monitoring (baseline) surveys are required during F/S.

[Operation stage]

Operation of vehicles on the newly installed roads may not cause outstanding impact on existing ecosystem along the project alignment.

(11) Hydrology

The project includes many tunneling sections. The Project will traverse about 10 rivers.

[Construction Stage]

Tunnel construction may disturb existing underground water flow and surface water flow too. Also, works inside river such as piers for bridges and sheet piles may cause hydrological changes.

[Operation stage]

Discharge water from tunnels may change hydrology including underground water flow and surface water flow.

(12) Topography and Geology

The Project will include tunnel excavation and land filling activities. The project area is in and around the low to high landslide hazard area. The project area is located in the area of high susceptibility to landslide and critical slope area defined as the ECA (**Table 16.9-9**).

[Construction stage]

Cut and fill works including tunnels, slope, and road construction may change topography and geology. To estimate size, location and impact, further design and related surveys on geology and topography are required in following phases such as F/S. Following table and figures show observation results of general situation of topography with information of structures and photos.

Table 16.9-12 Site Observations

Location (from west to east)	Observations
A: Lagtang, Talisay City	A number of house structures will be traversed by the alignment. The slope protection measure is present on the left side.
B: Tisa, Cebu City	A number of house structures will be traversed by the alignment. This portion of alignment is characterized with extreme slope gradient. Its topography is basically hilling and valleys
C: Talamban, Cebu City	A number of house structures will be traversed by the alignment on both sides. This portion of alignment is characterized with extreme slope gradient.
D: Bacayan, Cebu City	The proposed alignment will traverse a number of timber species. It will also intersect the river as shown in the picture.
E: Lamac, Consolacion Municipality	A number of house structures will be traverse by the alignment. This is the location of the end point of the proposed alignment.

Note: Stations (A-E) in this table are shown in **Figure 16.9-6**.

Source: JICA Study Team

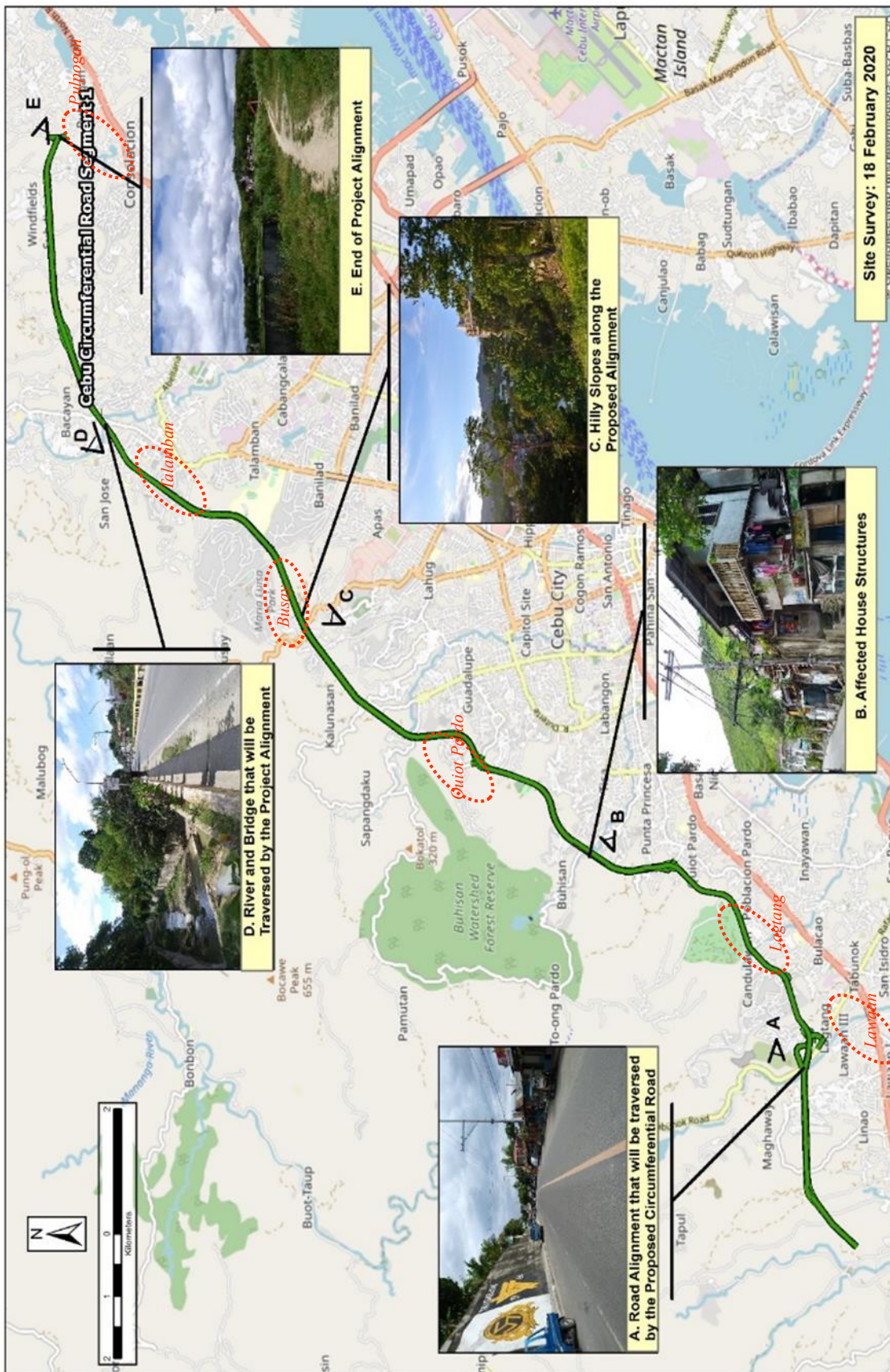


Figure 16.9-6 Proposed Project Site MAP

Source: JICA Study Team

(13) Land Acquisition and Resettlement

There are residential areas (Lagtang, Quiot Pardo, Busay, and Talamban) along the proposed alignment.

[Pre-Construction Stage]

Based on rough counting survey by using satellite photos, approximately 1,900 structures may be affected by the project. Among the number, around 1,200 structures are affected by the road construction while remaining 700 structures may be affected by junctions and other related facilities. Presumed form of impact is physical relocation, partial slice of structure, loss of secondary assets such as gate, fruit trees, as well as private land ownership. Exact size and characteristics of land acquisition and resettlement require further survey such as socio-economic survey, census, inventory of loss, etc. to develop resettlement action plan (RAP) in following phases such as F/S.

(14) Poverty

[Pre-Construction and Construction Stage]

Based on statistical situation elaborated in the part of baseline data, there might be poverty groups in the project sites. Some households including informal settlers family (ISF) may become direct project affected household (PAH) and some may be affected their secondary properties such as crops and/or their livelihood. On the other hand, they will have opportunities to obtain new income through construction activities. Exact size and characteristics of impact on poverty requires further survey such as socio-economic survey, census, inventory of loss, etc. to develop resettlement action plan (RAP) and EIA/EIS in following phases such as F/S.

(15) Ethnic Minority and Indigenous People

There are no approved or on-going application for Certificate of Ancestral Domain Title (CADT)s near project area, as of December 2019

[Pre-Construction and Construction, Construction, and Operation Stage]

Even there is not observed exact existing of ethnic minority and indigenous people along the project site, there are possibility of their communities and/or living.

To confirm current status and the actual boundary of ancestral domain area, communication with relevant authorities and further field surveys such as RAP related surveys and literature examination are required in following phases such as F/S.

In case that the possibility of impact (e.g. involuntary resettlement, direct land acquisition of ancestral domain, communication disturbance, damage of livelihood, etc.) on the IPs is estimated, the impact and necessary mitigation measures shall be studied during F/S through the communication with NCIP in consideration of on-site ancestral domain condition.

(16) Local Economy such as Employment and Livelihood

[Construction Stage]

Employment opportunity can be created by construction activities and local economy will be improved temporarily. On the other hand, overall construction activities and traffic restriction would affect local economy activities including vendors and shop owner to some extent temporary inconvenience due to disturbance in smooth operation of commercial/public transportation. Resettlement also may cause lost or degradation of local economy through changes of their livelihood and employment situation.

(17) Land Use and Usage of Local Resources

Current land use along the proposed alignment is mostly used as cultivated land and/or bare land.

[Construction Stage]

Outline of land use along the project alignment is shown in **Table 16.9-13**. The proposed project alignment will generally traverse urbanized area and portions of pasture area and forest area. The residential areas are found along the adage of urbanized area (Barangays of Lagtang, Quiot Pardo, Busay, and Talamban). The topology near project site contains very significant variations in elevation with hills and valleys. The existing community roads have an extreme slope.

Table 16.9-13 Land Use along the Project Site

Land use classification	Distribution Rate
Cultivated area/ Farm/ Bare area (including pasture area)	30.0%
Forest/Trees/Palm	46.4%
Residence / Infrastructures	20.7%
River	0.3%

Source: JICA Study Team

[Operation Stage]

As secondary impact of the project, development along the project area may cause adverse impact on land use and local resources such as forestry and water.

(18) Water Usage

The present water supply of the Metro Cebu area mainly comes from groundwater.

[Construction and Operation Stage]

Construction areas of tunnels have potential impact on water usage. It is difficult to forecast location, timing and amount of change of water resources due to the construction of tunnels. However, generally tunnel structure may change water regimes especially underground water and construction method itself can also influence water resources including streams, wells, and springs around the construction sites.

(19) Existing Social Infrastructure and Services

[Pre-Construction and Construction Stage]

CCR requires existing social infrastructures in the rural areas such as roads, telecommunication lines, electricity networks, and water supply networks. These existing infrastructures are target of relocation during pre-construction and construction stages. Both private and public owners of these infrastructures will be affected and some services may be degraded due to construction.

[Operation Stage]

There is a possibility of physical community diversion in case a new road traverses in a community.

(20) Social Institutions such as Socially Related Capital and Decision-Making Organizations

The proposed alignment will cross many existing community roads and rivers.

The Project components include bridges, underpass/over pass roads and box culvert to avoid intercepting the existing transportation

[Construction Stage]

Construction may cause division of communities along the road temporarily. Therefore, there are some potential of impact on social institutions in terms of accessibility.

(21) Local Conflicts of Interest

[Operation Stage]

New alignment of road may hinder existing access between residents and social services in case that no measures are considered to solve these issues. It may cause a kind of conflict among local communities.

(22) Landscape

Current land use along the proposed alignment is mostly used as cultivated land and/or bare land. The Project will include soil excavation and land filling activities and construction of bridges and tunnels.

[Construction Stage]

Cut and fill works may cause change of landscape. However, it is difficult to determine location and degree of changes without further designs. So, continuous discussion and assessment is required in following phases such as F/S.

(23) Gender

[Construction Stage]

Women as commuter or daily working for their families may be affected by the construction activities. On the other hand, project can provide opportunities of works and commercial in the area and it may bring positive impact on gender balance. However, there might be gaps on working conditions such as wage between men and women when local employment is considered.

(24) Children's Right

[Construction Stage]

There are possibilities of child labor in construction yard and related activities.

(25) Infectious Diseases such as HIV/AIDS

[Construction Stage]

Construction workers coming from outside the community / island may cause HIV/AIDS cases during construction time.

(26) Labor Environment Including Safety

[Construction Stage]

Accident and inappropriate occupational condition during the construction may cause negative impact on labor environment and occupational safety as well as health.

(27) Accident

[Construction Stage]

Traffic accident due to construction vehicles may occur without appropriate measures and education.

[Operation Stage]

Traffic accident due to increased traffic may occur along the road and vicinity connecting to the project section.

(28) Transboundary Impact and Climate Change

[Construction Stage]

Greenhouse effect gas is increase by operation of machineries and vehicles in the construction sites.

[Operation Stage]

Increased traffic based on newly created demands may produce much greenhouse effect gas.

16.9.7 Impact Assessment

(1) Preliminary Impact Assessment

The result of potential negative environmental and social impact assessment at pre-F/S is shown in the following table. In consideration of survey results, the impacts were evaluated qualitatively in each of the three stages separately, namely: pre-construction stage [PCS], construction stage [CS], and operation stage [OS]. The impacts of pollution, natural environment, and social environment were classified as A to D in accordance with the following criteria, assuming no specific measures toward the impacts are taken:

- | | |
|--|---------------------------------|
| A: Significant Negative Impact | A+: Significant Positive Impact |
| B: Some Negative Impact | B+: Some Positive Impact |
| C: Impacts are not clear, need more investigation | |
| D: No impacts or impacts are negligible, no further study required | |

Table 16.9-14 Result of ESIA at pre-F/S

No	Item	Assessment at Scoping		Assessment Result based on surveys		Reasons for Assessment
		PCS /CS	OS	PCS/CS	OS	
1	Air Quality	✓	✓	B-	B-	<p>[CS] In consideration of current residential land use, temporary negative impacts are expected on air quality due to exhaust gas and dust generated from construction activities. The exhaust gas such as NO_x, SO_x, CO TSP, PM₁₀, PM_{2.5} will be generated from construction machines, equipment and traffic congestion around the construction yard due to the temporary traffic restriction. And dust will be generated by earth work including foundation excavation for piers, transporting of earth-and-sand, etc.</p> <p>[OS] Ambient air quality along existing road is already impacted by current traffic exhaust gas. Since it is expected that traffic flow will be smoother by shifting vehicles from existing road to new highway, air quality along the road will be improved. On the other hand, there is a possibility of increasing of vehicles. In that case, air quality along the road might get worse than the current condition.</p>
2	Water Quality	✓	✓	B-	D	<p>[CS] The project area is located in the area of water bodies for domestic defined as the ECA, since the Project will traverse about 6 water bodies. Turbid water may be generated from excavation areas due to surface run-off. Improper stockpiling of construction materials in low -lying areas could affect the water quality of nearby bodies of water bodies. Furthermore, there is a possibility of inadequate treatment and/or mishandling of wastewater, suspended matter, waste oil, and other chemicals, in the all earthwork area including the main road area and borrowing pit, etc. Additionally, domestic wastewater may be discharged from the labor camp.</p> <p>[OS] No serious impacts are expected, because there is no plan of service / parking area.</p>
3	Waste	✓		B-	N/A	<p>[CS] Construction waste including waste soil, muck waste from tunnels, asphalt mass and cutting trees are expected at the construction site. Additionally, domestic waste (garbage) may be generated from the labor camp, if any.</p>
4	Soil Contamination	✓		B-	N/A	<p>[CS] There is a possibility of soil contaminant by wastewater from tunneling work/piling construction/excavation process, if wastewater is discharged without adequate treatment and/or miss handing. Dumping soil and muck also can cause soil contamination if they have specific chemicals. Furthermore, there is a possibility of soil contamination due to the unexpected leakage/ mishandling of oil and other chemicals, in the all earthwork area including the main road area and borrowing pit, etc. Dumping soil and muck also can cause soil contamination if they have specific chemicals.</p>
5	Noise and Vibration	✓	✓	B-	B-	<p>[CS] In consideration of current land use temporary negative impacts are expected on ambient noise due to higher noise generated from construction machines and equipment.</p> <p>[OS] Ambient noise and vibration along existing road is already impacted by current vehicle traveling. Though it is expected that traffic flow is smooth by shifting from existing road to new highway, noise and vibration level might increase because of the increase in traffic and travelling speed of vehicles.</p>
6	Ground Subsidence	✓	✓	B-	B-	<p>[CS/OS] The extent of impact is unknown, because there is no detail amount of ground water and geographical test data, and no decided proposed ROW and tunnel excavation methodology at this moment. In case of large amount of discharge water and/or worse ground foundation than expectations, there is a possibility of ground subsidence in the</p>

No	Item	Assessment at Scoping		Assessment Result based on surveys		Reasons for Assessment
		PCS /CS	OS	PCS/CS	OS	
						mountain area, due to the tunnel construction. To clarify the baseline condition of geographic mechanism including ground water level and geological test shall be conducted along the proposed alignment during the feasibility study.
7	Offensive Odor	✓		B-	N/A	[CS] There are no direct project-related activities that can generate offensive odor due to the general road construction, however impact of construction basecamp operations may have temporary impact.
8	Bottom Sediment	✓		B-	N/A	[CS] There is a possibility of impact on the river bottom sediment by flown soil caused by earthwork in the river, depending on the construction methodology. In case that crossing river bottom sediment had already polluted, dumping soils in the riverbed also have possibility of soil contamination when they are dumped other places.
9	Protected Area	✓	✓	B-	B-	[CS/OS] Protected area within the nearest project area, CCPL-Parcel B, is approximately 0.4 km far from the project area. Construction activities may have negative impacts on the natural environment of protected areas near the project alignment. Besides, during the operational stage, traffic activities also may have negative impacts on it due to pollution and roadkill. Further information and field surveys on conditions of CCPL's boundary and buffer areas shall be confirmed and discussed with DENR during F/S.
10	Ecosystem	✓	✓	B-	B-	[CS] Construction activities and existence of road structures may have some impact (such as damage of trees and vegetation, loss of nest/feeding area/breeding area, and migration inhibition, division of the habitation area, road killing, noise/vibration due to the new traffic flow, etc.) on surrounding ecosystem along the project alignment. Though there is no reserved forest within the project area, most of existing trees within ROW will be cut down or replanted depending on the final design and construction process. Coral reefs along the costal sea should be studied further in order to evaluate possible impact by turbid water during construction. [OS] Operation of the road may cause impacts such as road-kill, air pollution and lighting on wild life and its habitat, especially CCPL. Impact on coral reefs duet to the project during the operational phase is not expected.
11	Hydrology	✓	✓	B-	B-	[CS/OS] There is a possibility of unexpected discharge of ground water due to the tunnel excavation. To clarify the baseline condition of geographic mechanism including groundwater level and flow, geological tests shall be conducted along the proposed alignment during the feasibility study. The amount of water use and source during construction, construction methodology and road structures shall be clarified during the feasibility study. And also, there is a possibility of disturbance of water flow by construction of bridge pier in the river and preventing /changing water flow by concrete structures.
12	Topography and Geology	✓		B-	N/A	[CS] The project area is located in the area of high susceptibility to landslide and critical slope area defined as the ECA. Topography might change by land cutting in the valley and tunnel construction. There is a possibility of topsoil erosion in the construction site during rainy season (May-October).
13	Land Acquisition and Resettlement	✓		A-	N/A	[PCS] It is expected that about 1900 existing structures including houses are affected due to the implementation of the Project, in accordance with the satellite image interpretation. To clear the project affected people, their assets and compensation, identification of landowner, socio-economic survey, inventory survey and market value survey for preparation of the Resettlement Action Plan shall be conducted during the feasibility survey.

No	Item	Assessment at Scoping		Assessment Result based on surveys		Reasons for Assessment
		PCS/CS	OS	PCS/CS	OS	
14	Poverty	✓		B+/-	N/A	[PCS/CS] The project may bring positive impact on local economy through construction activities and rural development. Some poor groups may be negatively affected by the project if their properties are acquired and/or their livelihood is lost by the project.
15	Ethnic Minority and Indigenous People	✓	✓	B-	B-	There might be ethnic minority and/or indigenous people in and around the project site and they might be affected by the project. The location and relation between CADTs and the Project site shall be verified through the feasibility study.
16	Local Economy such as Employment and Livelihood	✓		B+/-	N/A	[CS] Employment opportunity can be created due to the project construction. On the other hand, overall construction activities and traffic restriction would affect local economy activities including vendors and shop owner to some extent temporary inconvenience due to disturbance in smooth operation of commercial/public transportation. Employment and livelihood of project affected households are also affected by resettlement activities.
17	Land Use and Usage of Local Resources	✓	✓	B-	B+/-	[CS] Loss of farmland and forests for new roads are expected and land use may be changed along the road. Land and local resources such as trees of project affected households are also affected by resettlement activities. [OS] Effective use of lands and local resources due to high accessibility are expected. At the same time, project-induced development may affect local resources adversely.
18	Water Usage	✓	✓	B-	B-	[CS/OS] There is a possibility of unexpected discharge of ground water due to the tunnel excavation. To clarify the baseline condition of underground water use around the project area, inventory survey for wells shall be conducted during the feasibility study. Though water source during construction is not decided at this moment, water use permission in line with regulation shall be approved from relevant agencies prior to the construction to avoid conflict with water users. The amount of water use and source during construction shall be clear during the feasibility study. Water usage of project affected households are also affected by resettlement activities.
19	Existing Social Infrastructure and Services	✓		B-	B-	[PCS/CS] There are many existing utilities (transmission lines, telecom lines, water lines, etc.) along the existing road. These infrastructures shall be protected and/or diverted before construction work. Inconvenient access to services due to traffic congestion by work vehicles. [OS] There is a possibility of physical community diversion in case a new road traverses in a community.
20	Social Institutions such as Socially Related Capital and Decision-making Organizations	✓		B-	N/A	[CS] There is a possibility of the temporary physical community division by construction yard during construction.

No	Item	Assessment at Scoping		Assessment Result based on surveys		Reasons for Assessment
		PCS /CS	OS	PCS/CS	OS	
21	Local Conflicts of Interest		✓	N/A	B-	[OS] New alignment may separate access of existing communities and their interest may cause local conflicts without any measures.
22	Landscape	✓		B-	N/A	[CS] There is a possibility of disturbance of landscape by the road structures especially tunnels and bridges.
23	Gender	✓		B+/ B-	N/A	[CS]: Temporary inconvenience to residents, commuters, and pedestrians because of construction activities is expected. On the one hand, the Project can provide additional employment opportunities during this phase, which women can take advantage of. However, there might be gaps on working conditions such as wage between men and women when local employment is considered.
24	Children's Right	✓		B-	N/A	[CS] There is a possibility of occurrence of child labor
25	Infectious Diseases such as HIV/AIDS	✓		B-	N/A	[CS] Infectious diseases such as HIV/AIDS are possible to be spread due to inflow of construction workers. Furthermore, alteration to the ground by cutting, soil excavation and land filling may lead to the creation of habitats for mosquitos that possibly transmit dengue fever.
26	Labor Environment including Safety	✓		B-	N/A	[CS] Accident and harm to health for workers in the construction area for bridge section; however, it will be secured in accordance with the domestic laws and regulations during construction.
27	Accident	✓	✓	B-	B-	[CS] Traffic accident related to construction vehicles and accident in construction sites are expected. [OS] Traffic accident may increase due to increased traffic volume.
28	Transboundary Impact and Climate Change	✓	✓	B-	B-	[CS] Significant deforestation is not expected on this project and construction period is limited. [OS] Increase of Greenhouse Effect Gas is anticipated but the level is still unknown

Note:

Project stage: PCS: Pre-construction stage, CS: Construction stage, OS: Operation stage

Impact:

A+/-: Significant positive/negative impact is expected.

B+/-: Positive/negative impact is expected to some extent.

D: No impact is expected.

N/A: Impact assessment isn't conducted because the items was not checked ✓ in scoping phase.

Source: JICA Study Team

16.9.8 Mitigation Measures

Items rated as A- and B- in the table of impact assessment are the target of mitigation measures. Mitigation measures should be feasible and practical. **Table 16.9-15** shows mitigation measures for CCR classified into construction and operation phases.

Table 16.9-15 Mitigation Measures

No.	Items (Impacts)	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost (Php)
Construction Stage					
1	Air Quality	<ul style="list-style-type: none"> - Water sprinkling to reduce particulate matter - Routine / periodic maintenance and washing of construction machineries and vehicles to minimize air pollutants -Announcement of construction work to surround resident - In the event of complaint from resident, review the additional mitigation measures including the construction schedule or location of heavy vehicles through the communication with local people 	Contractor	DPWH	TBD
2	Water Quality	<ul style="list-style-type: none"> - Installing sedimentation tank to reduce discharged turbid water - Cover exposed earth especially before heavy rains are expected.- Installing septic tanks for origin of polluted water such as camp yard - Appropriate wastewater treatment such as connecting drainage system to existing sewage systems 	Contractor	DPWH	TBD
3	Waste	<ul style="list-style-type: none"> -Prepare detailed waste management program in consideration with LGU's waste management system - Education on waste treatment for workers - Separation of hazardous waste and bring out to appropriate treatment facilities - 3Rs promotion to reduce waste 	Contractor	DPWH	TBD
4	Soil Contamination	<ul style="list-style-type: none"> - Necessary laboratory test to identify contaminated soil and mock for special cares - Find feasible treatment facilities or filling area in earlier stage of the project such as F/S 	Contractor	DPWH	TBD
5	Noise and Vibration	<ul style="list-style-type: none"> - To avoid disturbance of daily life, construction time shall be set within day time, especially residential areas. - Apply low-noise and vibration machineries as much as possible nearby -Provide the temporary noise barrier and/or fence around the construction yard near residential area, if necessary -Announcement of construction work to surround resident - In the event of complaint from resident, review the additional mitigation measures including the construction schedule or location of heavy vehicles through the communication with local people 	Contractor	DPWH	TBD
6	Ground Subsidence	<ul style="list-style-type: none"> - Avoid extraction of ground water for construction - Applying replacement methods for soft soil areas and prevention measures for liquefaction based on further studies and discussion in F/S. 	Contractor	DPWH	TBD

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No.	Items (Impacts)	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost (Php)
		- Monitoring to identify early symptoms of subsidence			
7	Offensive Odor	- Education and instruction of rules in camp yards to keep good hygiene	Contractor	DPWH	TBD
8	Bottom Sediment	- Installing sedimentation tank to reduce discharged turbid water	Contractor	DPWH	TBD
9	Protected Area	- Avoid tree cutting to reduce impact on habitat -Relocation/replant of trees - Consider construction season and time if specific rare species' breeding points / nests / important feeding ground are confirmed in the affected areas. -Conduct awareness campaign to all relevant construction workers about the careful consideration for protected areas -Adoption of lower noise and vibration construction method and machines - Adoption of adequate pass route, based on the field survey, estimated impact and advices from biological expert, if necessary	Contractor	DPWH	TBD
10	Ecosystem	- Avoid tree cutting to reduce impact on habitat -Relocation/replant of trees - Consider construction season and time if specific rare species' breeding points / nests / important feeding ground are confirmed in the affected areas. -Conduct awareness campaign to all relevant construction workers about the careful consideration for ecosystem -Adoption of lower noise and vibration construction method and machines - Adoption of adequate pass route, based on the field survey, estimated impact and advices from biological expert, if necessary - Introduce measures to reduce turbid water during construction	Contractor	DPWH / DENR	TBD
11	Hydrology	- Avoid large amount of extraction of ground water	Contractor	DPWH	TBD
12	Topography and Geology	- Slope protection is required after cutting slopes especially in the period of rainy season	Contractor	DPWH	TBD
13	Land Acquisition and Resettlement	- Alignment discussion should be carefully done during F/S study to avoid and minimize resettlement - Appropriate RAP must be prepared consistent with domestic and development partner's policies.	Consultant, Contractor, DPWH, LGUs, NHA	DPWH	TBD
14	Poverty	- Appropriate RAP must be prepared consistent with domestic and development partner's policies.	Consultant, Contractor, DPWH, LGUs, NHA	DPWH	TBD
15	Ethnic Minority and Indigenous People	- Appropriate RAP must be prepared consistent with domestic and development partner's policies. - If there are indigenous people in and around the project areas, Indigenous People Plan (IPP) must be prepared with cares	Consultant, Contractor, DPWH, LGUs, NHA	DPWH	TBD
16	Local Economy such as Employment and Livelihood	- Appropriate RAP must be prepared consistent with domestic and development partner's policies with assistance for business disturbances.	Consultant, Contractor, DPWH, LGUs, NHA	DPWH	TBD
17	Land Use and	- Appropriate RAP must be prepared consistent	LGUs	LGUs	TBD

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No.	Items (Impacts)	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost (Php)
	Usage of Local Resources	with domestic and development partner's policies.			
18	Water Usage	- Avoid large amount of extraction of ground water	Contractor	DPWH	TBD
19	Existing Social Infrastructure and Services	- Appropriate / agreed compensation for owners of infrastructures to recover, divert, and replace. - Road-crossing measures such as over path / under path should be considered for possible community diversion cases.	DPWH, LGUs	DPWH	TBD
20	Social Institutions such as Socially Related Capital and Decision-making Organizations	- Detour for securing reasonable accessibility to social institutions	Contractor	DPWH	TBD
21	Landscape	- Minimize cutting trees and slopes - Consider earth color for temporal works and fences - Installation of slope seeding / planting to recover construction areas	Contractor	DPWH	TBD
22	Gender	- Positive employment of women for light works in construction activities such as cleaning with fair salary and other conditions - Prepare toilet and dressing spaces for women workers - Education on gender equality for workers	Contractor	DPWH	TBD
23	Children's Right	- Restrict child labor (workers under 14 years old) in contract with punishment - Report list of workers with their age information	Contractor	DPWH	TBD
24	Infectious Diseases such as HIV/AIDS	- Education on infectious diseases for workers	Contractor	DPWH	TBD
25	Labor Environment including Safety	- Education on occupational safety for workers - Safety patrol - Sign boards	Contractor	DPWH	TBD
26	Accident	- Periodic maintenance of machineries and vehicles - Sign boards - Employ enough number of traffic guards	Contractor	DPWH	TBD
27	Transboundary Impact and Climate Change	- Periodic maintenance of machineries and vehicles - Recommendation of idling stop activities	Contractor	DPWH	TBD
Operational Stage					
1	Air Quality	- Strengthening of vehicle inspection	DPWH	DPWH	TBD
2	Noise and Vibration	- Noise barriers if the level significantly exceeds the standard - Restriction of maximum speed	DPWH	DPWH	TBD
3	Ground Subsidence	- Periodic observation of level changes	DPWH	DPWH	TBD
4	Protected Area	-Conduct awareness campaign to all relevant construction workers about the careful consideration for protected areas	DPWH	DPWH	TBD
5	Hydrology	- Avoid large amount of extraction of ground water - Periodic observation of water flow / level	DPWH	DPWH	TBD
6	Ethnic Minority and Indigenous	- If there are indigenous people in and around the project areas, Indigenous People Plan (IPP) must be	DPWH, LGUs	DPWH	TBD

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No.	Items (Impacts)	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost (Php)
	People	prepared with cares.			
7	Land Use and Usage of Local Resources	- Controlled rural development under legal framework and masterplans by LGUs	LGUs	LGUs	TBD
8	Water Usage	- Avoid large amount of extraction of ground water - Periodic observation of water flow / level	DPWH, LGUs	DPWH	TBD
9	Local Conflicts of Interest	- Design box culvert or any other crossing structure to secure accessibility	DPWH, LGUs	DPWH	TBD
10	Accident	- Sign boards - Traffic violation crackdown by police - Road safety education at schools and other appropriate facilities	DPWH, LGUs, Police	DPWH	TBD
11	Transboundary Impact and Climate Change	- Strengthening of vehicle inspection	DPWH	DPWH	TBD
Total Cost					TBD

Source: JICA Study Team

16.9.9 Monitoring Plan

(1) Proposed EMoP

Table 16.9-16 presents general/typical Environmental Monitoring Plan (EMoP) for mitigating the negative impact. EMoP shall be studied further during the Feasibility Study and EIA studies in the following phases.

Table 16.9-16 Monitoring Plan

No	Environmental Item	Items	Location	Frequency	Responsible agent	Supervisor	Cost (Php)
Construction Stage							
1	Air Quality	PM10, PM2.5, SO ₂ , CO, NO ₂	Construction sites, major access routes to the construction sites	Once a month	Contractor	DPWH	TBD
2	Water Quality	BOD5, COD, Oil and Grease, pH, Total Coliform, Total Nitrogen, Total Phosphorous, Total suspended solids, Turbidity, Arsenic, Iron, Sulphate	Rivers, drainages, camp yards, wells, springs	Once every three-month	Contractor	DPWH	TBD
3	Waste	Types and amount of waste	Temporal waste storage	Once every three-month	Contractor	DPWH	TBD
4	Soil Contamination	Soil quality test in accordance with the baseline survey and existing land use, Monitoring accident, maintenance record of machineries and vehicles, site observation	Construction sites and camp yards	Once a month	Contractor	DPWH	TBD
5	Noise and Vibration	Sound level and vibration.	Construction sites, major access routes	Once a month	Contractor	DPWH	TBD

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No	Environmental Item	Items	Location	Frequency	Responsible agent	Supervisor	Cost (Php)
			to the construction sites				
6	Ground Subsidence	Visible observation on markers and gauges	Surrounding structures of construction sites	Once a week	Contractor	DPWH	TBD
7	Offensive Odor	Types and amount of waste, other specific cases such as oil leakage	Temporal waste storage	Once every three-month	Contractor	DPWH	TBD
8	Bottom Sediment	Visible observation of rivers and drainage from construction sites	Construction sites and rivers	Once every three-month	Contractor	DPWH	TBD
9	Protected Area	Field confirmation by experts	Construction sites and surrounding areas	Once a year	Contractor	DPWH	TBD
10	Ecosystem	Field confirmation by experts	Construction sites and surrounding areas	Once a year	Contractor	DPWH	TBD
11	Hydrology	Visible observation, interview, measurement of water volume	River, spring, well, etc.	Once every three-month	Contractor	DPWH	TBD
12	Topography and Geology	Visible observation, reviewing of cut and fill plan, tree cutting plan with certification	Forest, hilly areas	Once every three-month	Contractor	DPWH	TBD
13	Land Acquisition and Resettlement	Internal / External monitoring report defined in RAP, grievance records	Project Areas	Following RAP	LGUs, NHA, other relevant bodies	DPWH	TBD
14	Poverty	Internal / External monitoring report defined in RAP, grievance records	Project Areas	Following RAP	LGUs, NHA, other relevant bodies	DPWH	TBD
15	Ethnic Minority and Indigenous People	Internal / External monitoring report defined in RAP, grievance records, IPP, if any	Project Areas	Following RAP and IPP	LGUs, NHA, other relevant bodies	DPWH	TBD
16	Local Economy such as Employment and Livelihood	Internal / External monitoring report defined in RAP, grievance records, income restoration program (IRP)	Project Areas	Following RAP, IRP	LGUs, NHA, other relevant bodies	DPWH	TBD
17	Land Use and Usage of Local Resources	Construction plan including lease land, grievance records	Project Areas	Once every three-month	Contractor	DPWH	TBD
18	Water Usage	Water volume, visible observation, interview, grievance records	Water usage areas	Once a month	Contractor	DPWH	TBD
19	Existing Social Infrastructure and Services	Visible observation, interview, grievance records	Project Areas	Once every three-month	Contractor	DPWH	TBD
20	Social Institutions such as Socially Related Capital and Decision-making	Visible observation, interview, grievance records	Project Areas	Once every three-month	Contractor	DPWH	TBD

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No	Environmental Item	Items	Location	Frequency	Responsible agent	Supervisor	Cost (Php)
	Organizations						
21	Landscape	Visible observation, interview, grievance records	Project Areas	Once every three-month	Contractor	DPWH	TBD
22	Gender	Visible observation, interview, grievance records, list of construction worker, record of education, number of facilities for women in construction site and camp yard	Project Areas	Once a month	Contractor	DPWH	TBD
23	Children's Right	Visible observation, interview, grievance records, list of construction worker, record of education	Construction sites	Once a month	Contractor	DPWH	TBD
24	Infectious Diseases such as HIV/AIDS	Visible observation, interview, grievance records, record of education	Construction sites	Once a month	Contractor	DPWH	TBD
25	Labor Environment including Safety	Visible observation, interview, grievance records, record of education, record of safety patrol, sign boards	Construction sites	Once a month	Contractor	DPWH	TBD
26	Accident	Record of accident, record of education, sign boards	Construction sites and surrounding areas	Once a month, on demand	Contractor	DPWH	TBD
27	Transboundary Impact and Climate Change	Record of maintenance of machinery and vehicles, sign boards	Construction sites	Once a year	Contractor	DPWH	TBD
Operational Stage							
1	Air Quality	PM10, PM2.5, SO ₂ , CO, NO ₂	Residential area, junctions, tunnels, etc.	Once a year	Regional Office (RO) - DPWH	DPWH	TBD
2	Noise and Vibration	Sound level and vibration.	Junctions, tunnels and residential areas	Once a year	RO	DPWH	TBD
3	Ground Subsidence	Visible observation on markers and gauges	Surrounding structures of construction sites	Once a year	RO	DPWH	TBD
4	Protected Area	Field confirmation by experts	Construction sites and surrounding areas	Once a year	RO	DPWH	TBD
5	Hydrology	Visible observation, interview, measurement of water volume	River, spring, well, etc.	Once a year	RO	DPWH	TBD
6	Ethnic Minority and Indigenous People	Interview, observation, socio-economic survey, if needed	Project Areas	Once a year	RO	DPWH	TBD
7	Land Use and Usage of Local Resources	Regional development plan, visible observation	Project Areas	Once a year	LGUs	DPWH	TBD
8	Water Usage	Water volume, visible observation, interview, grievance records	Water usage areas	Once a year	RO	DPWH	TBD

No	Environmental Item	Items	Location	Frequency	Responsible agent	Supervisor	Cost (Php)
9	Local Conflicts of Interest	Interview, observation	Project Areas	Once a year	LGUs	DPWH	TBD
10	Accident	Record of accident, record of education, sign boards	Project road and surrounding areas	Once a year	RO	DPWH	TBD
11	Transboundary Impact and Climate Change	Record of maintenance of machinery and vehicles, sign boards	Project road and surrounding areas	Once a year	RO	DPWH	TBD

Source: JICA Study Team

16.9.10 Implementation Structure

Implementation structure for CCR will be established based on the country's legal frameworks with reporting/discussion channels to investors/development partners. Based on existing project institutional plan such as Cebu-Mactan Bridge Construction Project under JICA's cooperation, Figure 16.9-7 and Figure 16.9-8 shows rough implementation structure of environmental and social considerations of the project.

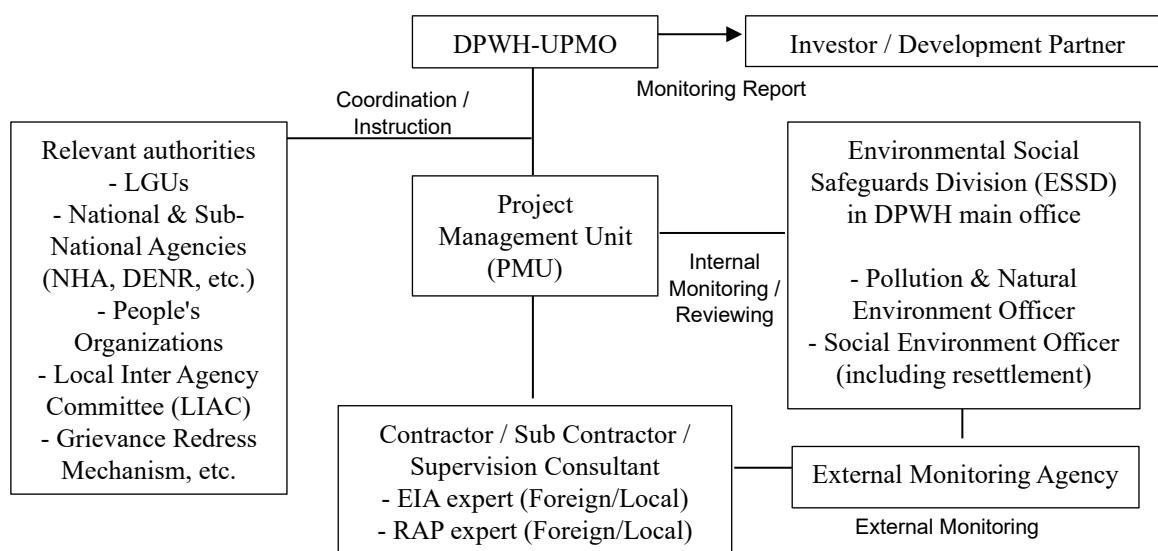


Figure 16.9-7 Implementation Structure of Environmental and Social Considerations During Construction Stage

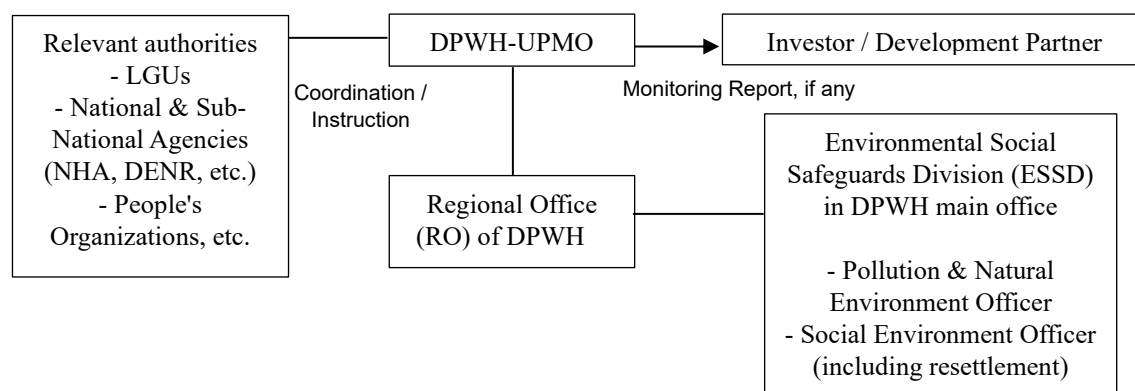


Figure 16.9-8 Implementation Structure of Environmental and Social Considerations During Operation Stage

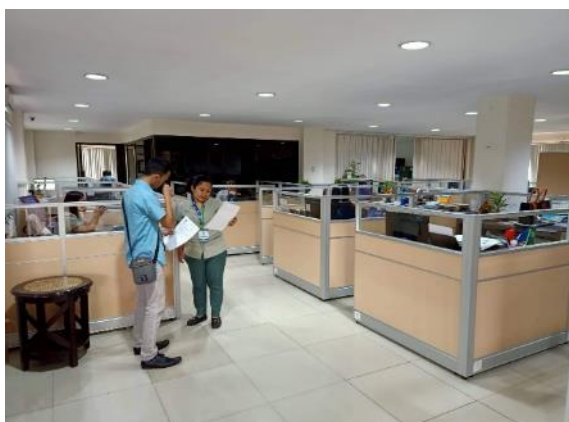
16.9.11 Stakeholder Meetings

(1) Key Informant Interview (KII)

Key Informant Interviews (KIIs) were conducted at the cities of Cebu, Mandaue and Municipality of Consolacion attended by participants from DENR Regional Office and NCIP Region 7 on 20 and 21 February 2020. The agenda is to brief the stakeholders about the project including its environmental and social aspects, as well as to ask their perception on the project. The team interviewed representatives from DENR and NCIP Region 7, Mayors and Engineers of each LGUs.

Based on the KII results, the following were the concerns and key pointers of the people about the proposed project:

- The mayors expressed their support over the project since it will decongest the traffic going around Metro Cebu;
- According to the participants of Cebu City, the land may be compatible with the proposed project area because the uphill area of the City is also built-up area. In fact, there are a number of high-end subdivisions or village located there. Their only concern is that the terrain there is steep.
- The proposed project alignment will traverse access roads or secondary roads
- NCIP Region 7 stated that there is no present IPs that may be affected by the project and there is no currently ancestral domain claim over the area
- DENR Region 7 mentioned that the project area is still within the areas of the Metro Cebu. However, affected trees may be subject to permit applications or any related clearances.



KII with DENR Region 7



KII with Cebu City Engineer



KII with NCIP Region 7

(2) Focus Group Discussion (FGD)

The summary of FGD for the Project is shown in **Table 16.9-17**. Focus Group Discussion (FGD) activities were conducted in Consolacion, Cebu and in the Cities of Cebu and Mandaue with the aim of eliciting the issues and concerns of the people (**Table 16.9-18**) regarding the proposed Cebu Circumferential Road. Participants made answers and showed concerns to specific fields such as gender, social and environmental aspects given at the FGD. Project side replied that their comment and concerns are to be reflected into on-going survey and the succeeding F/S. The activities cover issues on environment, social aspect, economy, and gender sensitivity.

The participants were asked about their positive and negative perceptions regarding the proposed Project. After the FGD, all Cities concerned expressed their acceptance to the project despite the outcome of their perception. They perceived that the project will have a set of positive and beneficial effects to their communities. Ultimately, the project will boost Metro Cebu’s economic development.

Table 16.9-17 Summary of FGDs

Items	Mandaue City	Consolacion, Cebu	Cebu City
Venue	Conference Room, Mandaue City Hall	Conference Room, Consolacion City Hall	Conference Room, Cebu City Hall
Time & Date	Time 2:00 PM Date 19 February 2020	Time 1:00 PM Date 20 February 2020	Time 2:00 PM Date 21 February 2020
Participants	15 persons (11 Male and 4 Female) • City Mayor • City Engineering Office • City Planning Development Office • City Assessors Office • City Agriculture Office • City Disaster Risk Reduction Management Office • City Councilor • Department of Interior Local Government (Region 7) • Women's Federation	11 persons (7 Male and 4 Female) • Vice Mayor • DENR Region 7 • City Assessors • City Engineering Office • City Planning Development Office • City Agriculture Office • City Disaster Risk Reduction and Management Office	15 persons (11 Male and 5 Female) • Mayor's Office • NCIP Region 7 • City Assessors • City Engineering Office • City Planning Development Office • City Disaster Risk Reduction and Management Office
Agenda	1. Presentation of the project outline 2. Presentation of the general impact of Project 3. Group Discussion 4. Presentation by group 5. Question and Answer session		

Source: JICA Study Team

Table 16.9-18 Issues and Concerns

Given Fields	Issues / Concerns from Participants
<ul style="list-style-type: none"> • Economic 	<ul style="list-style-type: none"> • The Project would provide financial assistance and job opportunities to the residents of the areas that the initial alignment would traverse, most especially to the affected displaced residents. • There would be acquisition of right-of-way. • It would lessen the travel time and help decongest the traffic with the provision of farm-to-market roads, and allow entry of investors from different areas. This would also provide a quicker response time on accidents and provide an efficient flow of goods and services. • The problems mentioned were the maintenance of the structure and the possibility of providing a negative impact to the commerce within the area. • It may bring about more investments and an opportunity to see different panoramic views. • It may also generate jobs and increase the revenue of the LGU through the increase in economic activities. • It may also lessen the travel time and decongest the traffic in their existing roads. • It would also save fuel cost, and reduce the post-harvest losses of their perishable crops, therefore, reduce the cost of farm production. • It was also commented that the lesser travel time may bring more quality time to families but on the other hand, it may increase the crime rate in the area.
<ul style="list-style-type: none"> • Gender 	<ul style="list-style-type: none"> • It would generate more employment for males.
<ul style="list-style-type: none"> • Social 	<ul style="list-style-type: none"> • This would displace residents affected by the initial alignment, to which they added that a housing project would be needed for the displaced. • The project would also provide an increase in business activity. • Warnings signs should be placed for the safety of the residents around the site. • It would affect a Taoist temple. • Assessment of affected lot areas and compensation had to be conducted during the pre-construction phase. • The project would provide more accessibility. • It may also cause the migration and the displacement of settlements, as well as the surge in the cost of land and decrease in travel time.
<ul style="list-style-type: none"> • Environmental 	<ul style="list-style-type: none"> • The initial alignment may pose health hazards if it would pass through a watershed. • It may also cause some disturbance of the existing ecosystem, and also cause flooding. • It may also produce negative effects such as increase in greenhouse gas emission, and bring about pollution, although these would subside after the construction of the Project. • It may also affect the landslide prone areas. • The Project may bring damage to wildlife habitats and their extinction, and pollute the air, and generate noise pollution. • It may also produce more garbage in its construction phase.



LGU Representative Giving her Perception on the Project Impacts



Participants of FGD in Mandaue City



LGU Representative in Consolacion City Giving her Perception on Project Impacts



Participants of FGD in Consolacion City

(3) Stakeholders Meeting (SHM)

Stakeholders meeting (SHM) was carried out on 26 February 2021. The SHM was held by online platform due to COVID-19. For those who were not able to access to the internet, the venues on the sites where people could participate to the Zoom meeting were arranged.

A total of 191 participants (male 79 and female 112) for morning session and a total of 85 participants (male 34 and female 51) for afternoon session attended. These include affected barangay people (resident, barangay caption) and representatives of Central/Regional/Local Government officers. The agenda was to present the project description of Pre-F/S including the proposed alignment, alternatives, outline of legal framework regarding environmental and social considerations, and potential environmental and social impact due to the project implementation. The detailed program of SHM is described in **Section 13.8.4. Table 16.9-19** shows the summary of comments, questions and suggestions raised in the open forum. Some of the reactions of the residents are positive for their local economy and reducing traffic congestion in the city, and they are looking forward to this Project. The major concerns of participants were the implementation schedule of the Project, the consideration of flood prone area, and the relocation of people to be affected. DPWH and the JICA study team replied that their comment and concerns are to be reflected into the study and the succeeding F/S. Regarding the resettlement issues, DPWH explained the policy about the resettlement action plan (ROW Action Plan of DPWH) and relayed to the those in the meeting that a more detailed study will be conducted during the F/S.

Table 16.9-19 Opinions and Answers at the Open Forum of SHM

No.	Comment, Questions and Suggestion	Answers
1	<p>Question We want to know when the start of the survey works be so that the people who will be affected will be informed.</p> <p>Comment We are excited for the survey works of this project because the project will help to alleviate the traffic condition in Cebu and may increase the economic status of our province. We are looking forward to the implementation of the project. (Brgy. Captain of Barangay Quiot/Male)</p>	<p>This is just a Preliminary Feasibility Study, so the proposed HSH alignment is not yet final. The study of the project is still ongoing and that the timeline of the study depends on DPWH.</p> <p>During this stage, we are just initially informing the people that might be affected by the project and gather their concerns and opinions to be considered in planning the design of the project.</p> <p>There is no definite date when the project will start. The project requires series of coordination before it will be implemented. All the local government units and barangays will be coordinated and informed for the next activities that will be conducted.</p> <p>The project has different stages (Masterplan, Pre-F/S, F/S, Detailed Design and Construction) and requires series of consultations. Communication and coordination with the affected barangays will continue.</p> <p>The project needs your understanding and various support from the affected people. (DPWH-ESSD/JICA Study Team)</p>
2	<p>Questions Would it be possible to provide a copy of the map for all the barangays affected because people want to know the area to be affected by the project? (Brgy. Captain of Barangay Buhisan/Male)</p>	<p>The project alignment is not yet final. Even though there is an initial alignment, it cannot be shared yet to avoid confusion. Once finalized and approved, the DPWH will give a copy of the alignment to the barangays to be able to identify the possible properties that might be affected. (JICA Study Team)</p>
3	<p>Questions Who will fund the project, and what is the length of the road? (Brgy. Captain of Barangay Quiot/Male)</p>	<p>Funding is not yet decided. The proposed alignment by the JICA Study Team has a length of 12km, it is from the Municipality of Minglanilla to Mandaue City. However, the proposal of DPWH is from Naga to Danao. (JICA Study Team)</p>
4	<p>Questions We would like to ask if there is a relocation site or financial assistance for the affected families. (Brgy. Captain of Barangay Maghaway/Female)</p>	<p>The relocation site and compensation for the affected families will be part of the ROW Action Plan* during the Feasibility Study. As of now, there are no identified relocation site yet for the affected families. It will be coordinated first by the Local Government Unit of Cebu. (DPWH-ESSD)</p>
5	<p>Question Would it be possible to have a copy of the Masterplan map? (Brgy. Councilor of Barangay Busay/Male)</p>	<p>The Masterplan map can't be provided yet because the alignment is not yet final. The DPWH will give a copy of the map once the alignment is approved and the project will push through to the next step. (DPWH)</p>
6	<p>Question When will the project start? (Brgy. Councilor of Barangay Busay/Male)</p>	<p>There is no definite schedule yet when the project will start. A series of consultations will be conducted before the implementation consisting of public consultation, survey and tagging of structures to be affected by the project are yet to be done. Letter of invitation including the timeline of the project and the activities to be conducted will be provided by DPWH to the affected barangays</p>

No.	Comment, Questions and Suggestion	Answers
		before the activity starts. (DPWH-ESSD)
7	Question (To all participant) We would like to ask if there are any protected areas in the barangays that needs to be considered in the design of the study. (DPWH)	I am not aware if there is any protected area near the proposed alignment. DENR should be invited to visit the area to check whether there is a protected area to be affected by the project. (Brgy. Captain of Barangay Quiot/Male)
8	Question Why is there no attendees from the Local Government Units of the City? (Brgy. Captain of Barangay Quiot/Male)	The prior coordination with the office of the Mayors had been conducted. (JICA Study Team)
9	Comment and Question The people support the project as it will minimize the traffic condition in the area. However, we would like to ask if the people that will be impacted will be properly compensated and relocated. (Local people from Barangay Lagtang/Female)	The alignment is not finalized yet. The number of structures and lots to be affected will be identified during the Feasibility Study by conducting a socio-economic survey and parcellary survey. (DPWH-ESSD)
10	Question Would it be possible to provide us with a drainage plan because Brgy. Poblacion Pardo is a flood prone area? (Brgy. Captain of Barangay Quiot/Male)	We can't give you drainage plan as early as now but definitely it will be considered. (JICA Study Team)
11	Suggestion All barangays in Cebu are flood-prone, especially the low-lying barangays. The proper consideration of addressing the flooding in the low-lying barangays is required. (Brgy. Captain of Barangay Quiot/Male)	It is duly noted, and that drainage System will be considered in the design stage of the project. (JICA Study Team)
12	Comment and Question (The speaker shared his appreciation of the consultation being conducted in Cebu. He added that he finds the project ambitious but is hopeful that it is doable.) (1) Considering the project involves different Local Government Units (LGUs) in Cebu, Mandaue and others, what is the implication in terms of planning like if this is a National Project is that means that the LGUs are forced to agree? If this happens which interest should be followed? (2) What are the implications in the road widening? Where does the budget come from? (3) In the case that the disconnection between the national plan and it is not supported / agreeable to the LGUs, who will govern the project? (University Professor/Male)	The authority of the project has not yet been decided. The impact of the refusal of the people will cause delay in the implementation of the project. As much as possible DPWH have to gather the support and agreement of the LGU so that a complete data and good plan can be provided. The project will prepare a Right of Way Action Plan* wherein the actual number of people to be affected will be determined. The Right of Way Action Plan* aims to mitigate the number of people to be affected and maintain the status of living before the implementation of the project. This includes the compensation for the people that might be affected. With regards to the law, the basis will be the RA10752 or Right of Way Act. The funding of this project is not yet decided. The National government would want to implement the project, but it will be a challenge how the project will be implemented if the LGU refused. The refusal of the people or LGUs will cause delay of the implementation of the project. The good benefit of the project may not be experienced. (DPWH-ESSD/ JICA Study Team)
13	Question What will happen to the people living near the road that might be affected?	The parcellary survey will be conducted in the Feasibility Study. If they will be affected, it will be included in the Right of Way Action Plan. But for

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No.	Comment, Questions and Suggestion	Answers
	(Brgy. Captain of Barangay Tolotolo/Male)	<p>now, DPWH can't answer if they will receive a compensation or resettlement because the alignment is not yet finalized. The public consultation for the identified affected people will be conducted. There will be discussion about the law, resettlement and compensation. The team will also conduct a socio-economic survey and tagging of structures.</p> <p>The process of acquiring the affected properties and lots are based on the law. DPWH will ensure that all affected will be properly compensated. (DPWH- ESSD/JICA Study team)</p>
14	<p>Questions (To all participants) Do you have any suggestions regarding the landscape and environmental considerations because the project will be constructed in the hillside? (JICA Study Team)</p>	<p>We do not know which specific landscape will be affected. We will forward the Comprehensive Land Use Plan (CLUP) of Mandaue to check if there will be affected land scape in their City. (A local person/Female)</p> <p>The City Planning and Development Office (CPDO) will support the project as long as it is aligned in the CLUP of the City. (JICA Study Team)</p>
15	<p>Question I would like to ask if the road widening for the existing highways instead of making alternate routes (mountain highway) has/had been studied. There is an expressway in Cebu City to Balamban that's unable to solve the traffic congestions in the city. I wonder if a study be possibly made like expressways in Metro Manila. (Local person from Barangay Pulpoan/Male)</p>	<p>The proposal is actually a High Standard Highway and the team is proposing an Expressway similar to NLEX and SLEX found in Metro Manila. Road widening is almost impossible because Cebu is very congested. There are various people that will be displaced. There is a proposal for a road widening in some areas but not in the High Standard Highways as they will address different problem. (JICA Study Team)</p>

Note*: During the meeting, "Right-of-Way Action Plan" under the DPWH ROW Acquisition Manual (2017) is presented as the same meaning of "Resettlement Action Plan (RAP) " under the JICA guidelines for environmental and social considerations (2010).

Source: JICA Study Team

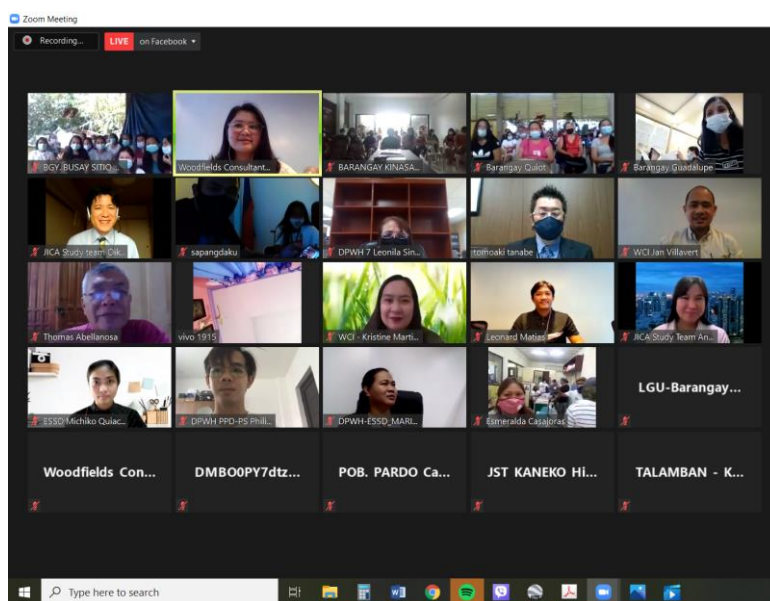


Figure 16.9-9 On-line Zoom Meeting



Barangay Poblacion Pardo, Cebu City



Barangay Kinasang-an, Cebu City



Barangay Quiot Pardo, Cebu City



Barangay Busay, Cebu City

Figure 16.9-10 Participants from Local Venue

16.10 Land Acquisition and Resettlement

The actual conditions during this Pre-F/S cannot determine the project's actual impact on land acquisition and resettlement. Therefore, discussions in this chapter is based on rough estimation and have to be studied further during the F/S.

16.10.1 Requirement of Land Acquisition and Resettlement

CCR is a bypass road that passes through the congested Cebu Urban Area. Proposed project outline based on the survey with a map of the target area is elaborated in **Section 16.1**. Project component which will cause adverse impact is found as road construction, interchanges, tunnels and bridges as shown in **Section 16.4**. In addition, **Section 16.9.1** elaborates further information.

Based on above-mentioned project outlines, CCR requires land acquisition and resettlement to construct roads and related facilities including bridges and tunnels.

16.10.2 Legal Frameworks on Land Acquisition and Resettlement

Laws and Regulations related to environmental and social issues in the Philippines are summarized in the **Chapter 13**. The said chapter also includes JICA's policy and gap analysis.

16.10.2.1 JICA's Policy on Resettlement

The following is the JICA's policy on resettlement (as a reference).

The key principle of JICA policies on involuntary resettlement is summarized below.

- I. Involuntary resettlement and loss of means of livelihood are to be avoided when feasible by exploring all viable alternatives.
- II. When, after such an examination, 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.
- III. People who must be resettled involuntarily and people whose means of livelihood will be hindered or lost must be sufficiently compensated and supported, so that they can improve or at least restore their standard of living, income opportunities and production levels to pre-project levels.
- IV. Compensation must be based on the full replacement cost¹ as much as possible.
- V. Compensation and other kinds of assistance must be provided prior to displacement.
- VI. For projects that entail large-scale involuntary resettlement, resettlement action plans must be prepared and made available to the public. It is desirable that the resettlement action plan include elements laid out in the World Bank Safeguard Policy, OP 4.12, Annex A.
- VII. 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. When consultations are held, explanations must be given in a form, manner, and language that are understandable to the affected people.
- VIII. Appropriate participation of affected people must be promoted in planning, implementation, and monitoring of resettlement action plans.
- IX. Appropriate and accessible grievance mechanisms must be established for the affected people and their communities.

Above principles are complemented by World Bank OP 4.12, since it is stated in JICA Guideline that “JICA confirms that projects do not deviate significantly from the World Bank’s Safeguard Policies”. Additional key principle based on World Bank OP 4.12 is as follows.

- X. Affected people are to be identified and recorded as early as possible in order to establish their eligibility through an initial baseline survey (including population census that serves as an eligibility cut-off date, asset inventory, and socioeconomic survey), preferably at the project identification stage, to prevent a subsequent influx of encroachers of others who wish to take advance of such benefits.
- XI. Eligibility of Benefits include, the PAPs who have formal legal rights to land (including customary and traditional land rights recognized under law), the PAPs who don't have formal legal rights to land at the time of census but have a claim to such land or assets and the PAPs who have no recognizable legal right to the land they are occupying.
- XII. Preference should be given to land-based resettlement strategies for displaced persons whose livelihoods are land-based.
- XIII. Provide support for the transition period (between displacement and livelihood restoration).
- XIV. Particular attention must be paid to the needs of the vulnerable groups among those displaced, especially those below the poverty line, landless, elderly, women and children, ethnic minorities etc.
- XV. For projects that entail land acquisition or involuntary resettlement of fewer than 200 people, abbreviated resettlement plan is to be prepared.

In addition to the above core principles on the JICA policy, it also laid emphasis on a detailed resettlement policy inclusive of all the above points; project specific resettlement plan; institutional framework for implementation; monitoring and evaluation mechanism; time schedule for implementation; and, detailed Financial Plan etc.

¹ Description of “replacement cost” is as follows.

Land	Agricultural Land	The pre-project or pre-displacement, whichever is higher, market value of land of equal productive potential or use located in the vicinity of the affected land, plus the cost of preparing the land to levels similar to those of the affected land, plus the cost of any registration and transfer taxes.
	Land in Urban Areas	The pre-displacement market value of land of equal size and use, with similar or improved public infrastructure facilities and services and located in the vicinity of the affected land, plus the cost of any registration and transfer taxes.
Structure	Houses and Other Structures	The market cost of the materials to build a replacement structure with an area and quality similar or better than those of the affected structure, or to repair a partially affected structure, plus the cost of transporting building materials to the construction site, plus the cost of any labor and contractors’ fees, plus the cost of any registration and transfer taxes.

16.10.2.2 Policy for Land Acquisition and Resettlement of the Project

The following is a draft policy on land acquisition and resettlement of the project.

- I. The Government of Philippines will use the Project Resettlement Policy (the Project Policy) for the Cebu Circumferential Road Project (Temporal) specifically because existing national laws and regulations have not been designed to address involuntary resettlement according to international practice, including JICA's policy. The Project Policy is aimed at filling-in any gaps in what local laws and regulations cannot provide in order to help ensure that PAPs are able to rehabilitate themselves to at least their pre-project condition. This section discusses the principles of the Project Policy and the entitlements of the PAPs based on the type and degree of their losses. Where there are gaps between the Philippines legal framework for resettlement and JICA's Policy on Involuntary Resettlement, practicable mutually agreeable approaches will be designed consistent with Government practices and JICA's Policy.
- II. Land acquisition and involuntary resettlement will be avoided where feasible, or minimized, by identifying possible alternative project designs that have the least adverse impact on the communities in the project area.
- III. Where displacement of households is unavoidable, all PAPs (including communities) losing assets, livelihoods or resources will be fully compensated and assisted so that they can improve, or at least restore, their former economic and social conditions.
- IV. Compensation and rehabilitation support will be provided to any PAPs, that is, any person or household or business which on account of project implementation would have his, her or their:
 - Standard of living adversely affected;
 - Right, title or interest in any house, interest in, or right to use, any land (including premises, agricultural and grazing land, commercial properties, tenancy, or right in annual or perennial crops and trees or any other fixed or moveable assets, acquired or possessed, temporarily or permanently;
 - Income earning opportunities, business, occupation, work or place of residence or habitat adversely affected temporarily or permanently; or
 - Social and cultural activities and relationships affected or any other losses that may be identified during the process of resettlement planning.
- V. All affected people will be eligible for compensation and rehabilitation assistance, irrespective of tenure status, social or economic standing and any such factors that may discriminate against achievement of the objectives outlined above. Lack of legal rights to the assets lost or adversely affected tenure status and social or economic status will not bar the PAPs from entitlements to such compensation and rehabilitation measures or resettlement objectives. All PAPs residing, working, doing business and/or cultivating land within the project impacted areas as of the date of the latest census and inventory of lost assets(IOL), are entitled to compensation for their lost assets (land and/or non-land assets), at replacement cost, if available and restoration of incomes and businesses, and will be provided with rehabilitation measures sufficient to assist them to improve or at least maintain their pre-project living standards, income-earning capacity and production levels.
- VI. PAPs that lose only part of their physical assets will not be left with a portion that will be inadequate to sustain their current standard of living. The minimum size of remaining land and structures will be agreed during the resettlement planning process.
- VII. People temporarily affected are to be considered PAPs and resettlement plans address the issue of temporary acquisition.
- VIII. Where a host community is affected by the development of a resettlement site in that community, the host community shall be involved in any resettlement planning and decision-making. All attempts shall be made to minimize the adverse impacts of resettlement upon host communities.
- IX. The resettlement plans will be designed in accordance with Philippines' Domestic Resettlement Policies and JICA's Policy on Involuntary Resettlement.
- X. The Resettlement Plan will be translated into local languages and disclosed for the reference of PAPs as well as other interested groups.
- XI. Payment for land and/or non-land assets will be based on the principle of replacement cost.

- XII. Compensation for PAPs dependent on agricultural activities will be land-based wherever possible. Land-based strategies may include provision of replacement land, ensuring greater security of tenure, and upgrading livelihoods of people without legal land titles. If replacement land is not available, other strategies may be built around opportunities for re-training, skill development, wage employment, or self-employment, including access to credit. Solely cash compensation will be avoided as an option if possible, as this may not address losses that are not easily quantified, such as access to services and traditional rights, and may eventually lead to those populations being worse off than without the project.
- XIII. Replacement lands, if the preferred option of PAPs, should be within the immediate vicinity of the affected lands wherever possible and be of comparable productive capacity and potential. As a second option, sites should be identified that minimize the social disruption of those affected; such lands should also have access to services and facilities similar to those available in the lands affected.
- XIV. Resettlement assistance will be provided not only for immediate loss, but also for a transition period needed to restore livelihood and standards of living of PAPs. Such support could take the form of short-term jobs, subsistence support, salary maintenance, or similar arrangements.
- XV. The resettlement plan must consider the needs of those most vulnerable to the adverse impacts of resettlement (including the poor, those without legal title to land, ethnic minorities, women, children, elderly and disabled) and ensure they are considered in resettlement planning and mitigation measures identified. Assistance should be provided to help them improve their socio-economic status.
- XVI. PAPs will be involved in the process of developing and implementing resettlement plans.
- XVII. PAPs and their communities will be consulted about the project, the rights and options available to them, and proposed mitigation measures for adverse effects, and to the extent possible be involved in the decisions that are made concerning their resettlement.
- XVIII. Adequate budgetary support will be fully committed and made available to cover the costs of land acquisition (including compensation and income restoration measures) within the agreed implementation period. The funds for all resettlement activities will come from the Government.
- XIX. Displacement does not occur before provision of compensation and of other assistance required for relocation. Sufficient civic infrastructure must be provided in resettlement site prior to relocation. Acquisition of assets, payment of compensation, and the resettlement and start of the livelihood rehabilitation activities of PAPs, will be completed prior to any construction activities, except when a court of law orders so in expropriation cases. (Livelihood restoration measures must also be in place but not necessarily completed prior to construction activities, as these may be ongoing activities.)
- XX. Organization and administrative arrangements for the effective preparation and implementation of the resettlement plan will be identified and in place prior to the commencement of the process; this will include the provision of adequate human resources for supervision, consultation, and monitoring of land acquisition and rehabilitation activities.
- XXI. Appropriate reporting (including auditing and redress functions), monitoring and evaluation mechanisms, will be identified and set in place as part of the resettlement management system. An external monitoring group will be hired by the project and will evaluate the resettlement process and final outcome. Such groups may include qualified NGOs, research institutions or universities.

Cut-off-date of Eligibility

The cut-off-date of eligibility refers to the date prior to which the occupation or use of the project area makes residents/users of the same eligible to be categorized as PAPs and be eligible to Project entitlements. In the Project, Cut-off-date will be declared during F/S phase.

Principle of Replacement Cost

All compensation for land and non-land assets owned by households/shop owners who meet the cut-off-date will be based on the principle of replacement cost. Replacement cost is the amount calculated before displacement which is needed to replace an affected asset without depreciation and without deduction for taxes and/or costs of transaction. Further discussion will be implemented during resettlement action plan (RAP) development.

16.10.3 Size and Areas of Land Acquisition and Resettlement

CCR requires land acquisition and resettlement for construction of approximately 7 km road sections (embankment and high-cut), approximately 10 km tunnels (16 tube tunnels), and approximately 7.5 km bridges (20 bridges) as well as 5 interchanges as shown in **Figure 16.4-4**, **Table 16.4-4** and **Table 16.4-5**. Rough estimation of necessary land acquisition areas and roughly counted affected structures are shown in **Table 16.10-1**.

Table 16.10-1 Rough Estimation of Land Acquisition and Resettlement of CCR

Component	Approx. Length	Number	Land acquisition	Affected Structures	Remarks
1. Road Sections	7 km	-	42 ha	1,200	Estimation with fixed width of 60m
2. Tunnel	10 km	16	Small amount		Limited around portals and surface lights, if needed
3. Bridge	7.5 km	20	Small amount		Limited within abutment areas
4. Interchange	-	5	25 ha	700	Estimation with fixed area of 5 ha per one interchange
Total	-	-	67 ha	1,900	

16.10.4 Policies of Compensation and Assistance

Entitlement matrix as a policy of compensation and assistance for land acquisition and resettlement should be further discussed and elaborated in the RAP report which will be developed in the F/S. This pre-feasibility study assumes possible form of impacts with practical mitigation measures. **Table 16.10-2** shows initial entitlement matrix of the project.

Table 16.10-2 Temporal Entitlement Matrix

Type of Loss	Application	Entitled Persons	Entitlement
1. Land			
Classified as Agricultural, Residential, Commercial, or Institutional	Severely Affected	PAFs with Original Certificate of Title (OCT), Transfer Certificate of the Title (TCT) or Tax Declaration (TD) showing 30 or more years of continuous possession (Tax Declaration may be legalized to full title)	<ul style="list-style-type: none"> • Cash Compensation for loss of entire land based on the current market value free of taxes. • Transaction costs (e.g. administrative charges and registration or title fees) . • If feasible, land for land will be provided in terms of a new parcel of land of equivalent value or productivity, at a location acceptable to PAFs • Rehabilitation Assistance in the form of Skills Training equivalent to PhP 15,000 per family, if the present means of livelihood is no longer viable and the affected family will have to engage in a new income activity.
		Holders of Certificates of Land Ownership Award (CLOA) Granted under the Comprehensive Agrarian Reform Act	<ul style="list-style-type: none"> • Cash Compensation for loss of entire land at the current market value free of taxes. • Transaction costs (e.g. administrative charges and registration or title fees) • If feasible, land for land will be provided in terms of a new parcel of land of equivalent value or productivity, at a location acceptable to PAF's. • Rehabilitation Assistance in the form of Skills Training equivalent to Php. 15,000 per family, if the present means of livelihood is no longer viable and the affected family will have to engage in a new income activity.
		Holders of Free or Homesteads Patents and CLOA under CA 141	No compensation for land up to 20 m width if patent was granted prior to 1975 or up to 60 m width for patents granted thereafter, but compensation on land improvement only. For area in excess of government lien, same as PAPs with OCT
		PAP's without OCT, TCT or Tax Declaration	• Compensation on land improvement only
		Holders of Free or Homesteads Patents and CLOA under Public Land's Act	<ul style="list-style-type: none"> • Compensation on land improvements only • Disturbance compensation equivalent to five times the average of the gross harvest for the past 5 years but not less than PhP 15,000
		Lessees of Agricultural Land	• Disturbance compensation equivalent to 5 times the average gross harvest during the last 5 years contrary to the statement of only 3 years but not less than PhP 15,000
	Agricultural Tenant/Settlers/ Occupants	• Financial assistance equivalent to the average gross harvest for the last 3 years but not less than PhP 15,000 per hectare	
	Marginally Affected	PAF with TCT or TD (Tax declaration may be legalized to full title)	Holders of CLOA

Type of Loss	Application	Entitled Persons	Entitlement
		granted under the Comprehensive Agrarian Reform Act	
		Holders of Free or Homesteads Patents CLOA under CA 141 Public Lands Act	<ul style="list-style-type: none"> • Compensation on land improvements only
2. Structure			
(1) Residential	Severely Affected	Owners with or without TCT or TD (Tax Declaration may be legalized to full title)	<ul style="list-style-type: none"> • Cash compensation for the entire structure at 100 % Replacement Cost (compliant with RA 10752) including transaction costs without deduction for depreciation or salvaged materials. • Inconvenience Allowance in the amount of Php 10,000 for relocation and new construction • Transportation Assistance
		Homeless, landless, underprivileged, informal occupants of public land, except professional squatters and squatting Syndicates) as defined in RA 7279	<ul style="list-style-type: none"> • If qualified, apply for housing in LGU or NHA Resettlement sites • Transportation Assistance to transfer to Resettlement Site or return to original province
	Marginally Affected	Owners with or without TCT or TD (Tax Declaration may be legalized to full title)	<ul style="list-style-type: none"> • Cash compensation for affected portion of the structure at 100 % replacement cost
	Severely Affected	Renters and Rent-Free Occupants of Dwelling Structures	<ul style="list-style-type: none"> • Provide sufficient time (i.e. at least 3 months) for moving • If renters or rent-free occupants of dwelling structures do not own any real property whether in the urban or rural areas as defined in RA 7279, may apply for housing in LGU or NHA Resettlement Sites only if they are qualified.
(2) Commercial	Severely Affected	Owners with or without TCT or TD (Tax Declaration may be legalized to full title)	<ul style="list-style-type: none"> • Cash compensation for the entire structure at 100 % Replacement Cost compliant with RA 10752) including transaction costs without deduction for depreciation or salvaged materials. • Transportation Assistance
	Marginally Affected	Owners with or without TCT or TD (Tax Declaration may be legalized to full title)	<ul style="list-style-type: none"> • Cash compensation for affected portion of the structure at 100 % Replacement Cost
(3) Industrial	Severely affected	Owners with or without TCT or TD (Tax Declaration may be legalized to full title)	<ul style="list-style-type: none"> • Cash compensation for the entire structure at 100% Replacement Cost compliant with RA 10752) including transaction costs without deduction for depreciation or salvaged materials. • Transportation Assistance
	Marginally affected	Owners with or without TCT or TD	<ul style="list-style-type: none"> • Cash compensation for affected portion of the structure at 100% Replacement Cost

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Type of Loss	Application	Entitled Persons	Entitlement
		(Tax Declaration may be legalized to full title)	
3. Commercial Activity			
(1) Business	Severely Affected	Business Owner	<ul style="list-style-type: none"> • Rehabilitation assistance in the form of livelihood and skills training • Administrative support to apply capital for small business in cooperation with concerned LGUs • Income Rehabilitation Assistance for the period to the stoppage of business according to business/ income level based on tax record, income statement and/or business permit for small scale business commercial establishments only if business owners continue their business at the remaining area or another area. Appropriateness of the period of business stoppage shall be validated with concerned parties.
	Marginally Affected	Business owners	<ul style="list-style-type: none"> • Income Rehabilitation Assistance for the period to the stoppage of business according to business/ income level based on tax record, income statement and/or business permit for small scale business commercial establishments only if business owners continue their business at the remaining area or another area. Appropriateness of the period of business stoppage shall be validated with concerned parties.
		Employees in displaced establishments and lose jobs for reasons of reasonably attributable to the damages caused by the project	<ul style="list-style-type: none"> • Rehabilitation assistance in the form of livelihood and skills training • One month or longer prior notice to the establishments • Priority in employment during construction and operation stage of projects • Rehabilitation assistance in the form of skill trainings and other development activities
4. Improvements			
(1) Other Non-Dwelling Structures	Severely or Marginally Affected	PAFs with or without TCT or TD	<ul style="list-style-type: none"> • Cash Compensation for the affected improvements at 100% Replacement Cost
5. Crops, Trees, Perennials			
	Severely or Marginally Affected	Owners of crops, trees, perennials	<ul style="list-style-type: none"> • Cash Compensation for crops, trees, and perennials in full replacement cost¹
6. Graves			
		Owners of graves	<ul style="list-style-type: none"> • Compensate for the transfer/relocation cost of graves in coordination with LGUs and relevant Government Agencies. • Ensure observance of practices/beliefs.
7. Vulnerable Households			
(1) Additional Support to Nos. 1 to 6 above		Households with poor, solo households, households headed by	<ul style="list-style-type: none"> • Cash allowance if it is justified as necessary • Administrative support for applying respective governmental social welfare

Type of Loss	Application	Entitled Persons	Entitlement
		elderly (over 60 years old) or a disabled person	program based on household conditions in cooperation with concerned LGUs <ul style="list-style-type: none"> • Provide priority for jobs related to the project based on capability of PAFs • Rehabilitation assistance in the form of skill trainings and other development activities
		Homeless, landless, underprivileged, informal occupants of public land, except professional squatters and squatting Syndicates) as defined in RA 7279	<ul style="list-style-type: none"> • If qualified, apply for housing in LGU or NHA Resettlement sites • Transportation Assistance to transfer to Resettlement Site or return to original province
8. Loss of Community or Public Structures			
	Severely or marginally affected	Community or public structure owners/ administrators	<ul style="list-style-type: none"> • Cash Compensation for entire or affected portion of the structure at 100% Replacement Cost.

1. According to World Bank OP 4.12, the replacement cost for fruit and trees are defined below:

For fruit: Where markets exist, the value of a tree of a specified age and use can be used to determine compensation rates. Where markets do not exist, surrogate values must be determined. For timber trees, the value of a tree equals that of the lumber. For fruit or fodder trees, the value is equal to the cumulative value of the fruit crop for its productive life (and any timber value). If replacement trees are provided, good practice indicates that compensation be based on the value of the harvests lost until the replacement trees come into full production (typically, 7-10 years). In the case of immature trees, a less costly alternative may be to directly supply seedlings as a replacement and provide compensation for the resulting delay in reaching fruit-bearing capacity.

For crops: When arrangements cannot be made to allow for harvest, the market value for lost cash crops is paid. In some countries the value of the harvest is determined by the average market value of crops for the previous three years. Whatever the multiplier, if food supplies are sold in the area enough cash compensation is paid to purchase equivalent supplies, taking into account the possibility of price increases caused by heightened demand from DPs. In areas of predominantly subsistence production, good practice recommends that in-kind compensation be made for subsistence crops.

Source: JICA Study Team

16.10.5 Grievance Redress Mechanism

Grievance Redress Mechanism (GRM) is an indispensable part of RAP and defined in LARRIPP (2017). Usually, a responsible body called Grievance Redress Committee is organized to manage GRM appropriately. Generally, Resettlement Implementation Committee (RIC) and LIAC (Local Inter-Agency Committee) that consist of LGUs and other relevant authorities play a role of GRC in Philippines. Also, ESSD of the DPWH functions as internal monitoring agency to monitor and follow up GRM. GRM for CCR shall be discussed further in following phases such as F/S when RAP is developed.

As a reference, outlines of GRM in the case of "RAP from Cebu-Mactan Bridge Project (2019)" is summarized as follows.

- RIC's responsibilities is to receive and record the voices, complaints opinions and suggestions provided by the PAPs, except complaints and grievances that specifically pertain to the valuation of affected assets since such will be decided upon by the proper courts, and to address them as the first stage of the decision-making body.

- If the response to the complaint is deemed inadequate in the view of the PAPs, they may elevate their grievance to the ROW Task Force that consists of higher-level officials of DPWH Central Office before resorting the case finally to the court. Under this project, grievances from the PAPs would be handled in the following manner.

- Grievance shall be filed by the PAP with the RIC who will act within 15 days upon receipt, except complaints and grievances that specifically pertain to the valuation of affected assets, since such will be decided upon by the proper courts.
- If no understanding or amicable solution can be reached, or if the PAP does not receive a response from the RIC within 15 days of registry of the complaint, he or she can appeal to the ROW Task Force, which should act on the complaint or grievance within 15 days from the day of its filing
- If the PAP is not satisfied with the decision made by the ROW Task Force, he/she, as a last resort, can submit the complaint to any court of law PAPs shall be exempted from all administrative and legal fees incurred pursuant to the grievance redress procedures as is guaranteed under LARRIPP (2007). All complaints received in writing (or written when received verbally) from the PAPs will be documented and shall be acted upon immediately

16.10.6 Implementation Structures

Implementation structure for CCR will be established based on domestic legal frameworks with reporting/discussion channels to investors/development partners. Based on existing project institutional plan such as Cebu-Mactan Bridge Construction Project under JICA's cooperation, **Figure 16.10-1** and **Figure 16.10-2** shows rough implementation structure of environmental and social considerations of the project.

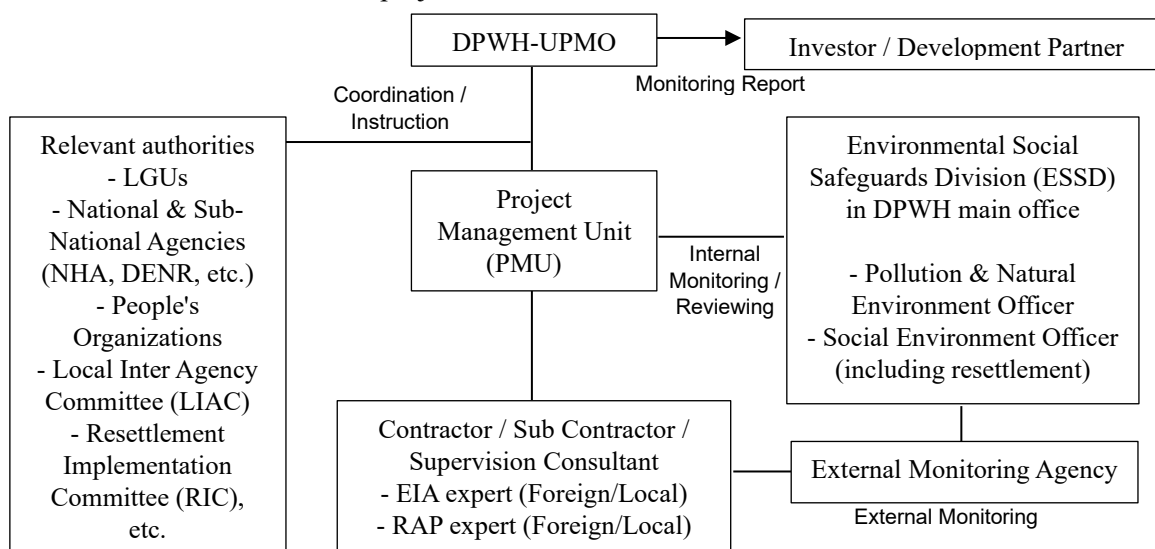


Figure 16.10-1 Implementation Structure of Environmental and Social Considerations During Construction Stage

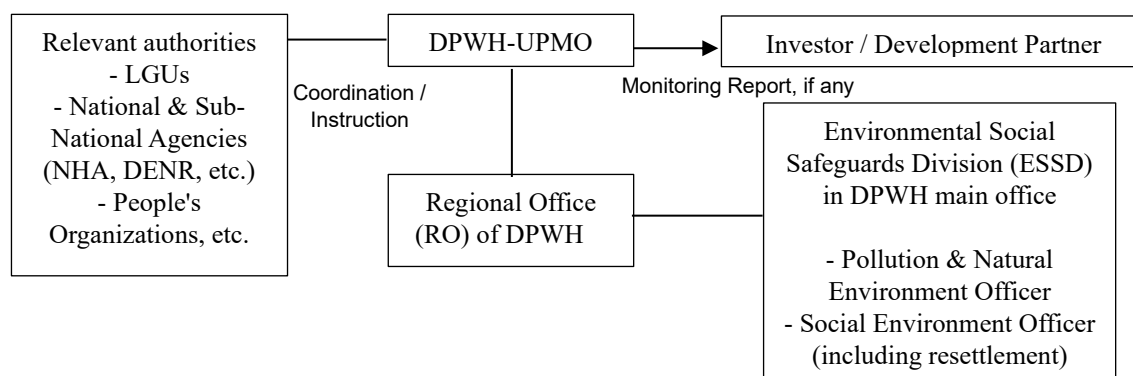


Figure 16.10-2 Implementation Structure of Environmental and Social Considerations During Operation Stage

16.10.7 Implementation Schedule

Implementation schedule cannot be firmed up during this pre-F/S stage. However, it is roughly estimated that land clearance requires at least two years after RAP is authorized. During that time, final parcellary survey with census are required to determine eligible PAPs and other preparation and processes such as negotiation, payment, preparation of relocation sites, among others. These processes will be discussed in the RAP based on the size of impact.

16.10.8 Cost and Budget

Cost and budget for land acquisition and resettlement shall be calculated based on the results of RAP related field surveys such as census survey, parcellary survey, replacement cost survey, and so on in following study phases such as F/S. If roughly estimate such cost for 67 ha of land and 1900 households with unit price of 100 USD (equal to 5,000 Php) per sqm and 5,000 USD (equal to 250,000 Php) per structure, total cost is estimated approx. 67,000,000 USD for land acquisition and 9,500,000 USD for structures (Totally around 77 million USD). This rough calculation is not accurate because of uncertain unit price, areas including public land, and other assumptions.

16.10.9 Monitoring by Implementing Agency and Monitoring Forms

Contents of internal and external monitoring shall be discussed during RAP development and that will provide monitoring forms.

16.10.10 Public Consultations

Public consultations for actual project affected persons (PAPs) will be implemented the F/S where the RAP report will be prepared.

16.11 Economic Evaluation of the Project

16.11.1 General Methodology of Economic Evaluation

Economic validity of the project was evaluated by economic benefits and costs “With” and “Without” the projects. EIRR are calculated by using economic benefits and economic costs. Economic benefits are estimated by calculating unit VOC, TTC and the demand forecast in **Section 16.3**. Assumptions of economic evaluation is shown in **Table 16.11-1**.

Table 16.11-1 Assumptions of Economic Evaluation

Items	Assumptions	Remarks
Social Discount Rate	10%	
Project Period	2022-2057	2022-2027: Detailed Design (D/D), Right of Way (ROW) Acquisition, and Civil Work 2028-2057: Operation (30 years)
Price Level Year	2020	Inflation is not considered.
Physical Contingency	10%	1) 10% of Construction Cost 2) 10% of Consulting Service Cost

Source: Department of Finance and National Economic and Development Authority (NEDA) (2016) “Revisions on ICC Guidelines and Procedures Updated Social Discount Rate for the Philippines” for discount rate, NEDA (2004) “ICC PROJECT EVALUATION PROCEDURES AND GUIDELINES” for physical contingency.

16.11.2 Economic Cost for the Project

Economic cost includes construction cost, ROW cost, consulting service cost and administration cost of the projects. VAT (12%) was deducted from financial cost of the project. Since this is an approximate cost, it needs to be discussed in detail in the F/S.

- ROW cost: unit cost of land (Residence and Agriculture) and total ROW area. For the tunnel section, the compensation cost was set at 20% of the ROW cost
- Consulting service cost: 8% of construction cost (DED: 3%, CS:5%)
- Administration cost: 3% of construction cost

16.11.2.1 Financial Cost to Economic Cost

Financial cost and converted economic cost are shown in **Table 16.11-2** and **Table 16.11-3**.

Table 16.11-2 Financial Cost

Unit: million PHP

Construction cost	ROW Cost	Consulting Service (D/D)	Consulting Service (C/S)	Administration Cost	Total
46,618	4,896	1,399	2,331	1,815	57,059

Source: JICA Study Team

Table 16.11-3 Converted to Economic Cost

Unit: million PHP

Construction cost	ROW Cost	Consulting Service (D/D)	Consulting Service (C/S)	Administration Cost	Total
41,624	4,555	1,249	2,081	1,620	51,129

Source: JICA Study Team

16.11.2.2 O&M Cost

O&M costs are estimated at 358.3 million pesos/year.

16.11.3 Economic Benefit of the Project

Economic benefits were calculated by measuring “Saving of TTC and VOC” since they are measurable in monetary value. JICA study team estimated Unit TTC and VOC in 2019, which are explained in **Section 12.4**. The economic benefit of the projects is shown in **Table 16.11-4**.

(Analysis Case)

Case-1: Development of Segment-1 (Project Road) and Segment-3 (Naga City - Cebu City)

Case-2: Development of All Segments (Segment-1, 2 (Cebu City - Danao City), 3)

Table 16.11-4 Economic Benefit of the Projects

Unit: million PHP/Year

Economic Benefit (TTC+VOC Saving)		
Cases	2028	2040
Case-1	9,252	12,571
Case-2	11,286	15,335

Source: JICA Study Team

16.11.4 Results of Economic Evaluation

16.11.4.1 Results of Base Case

The following economic indicators: EIRR, CBR and ENPV of the project were calculated. Calculation formula and remarks of them are explained in **Section 12.4**. Results of economic evaluation are shown in **Table 16.11-5**.

Table 16.11-5 Results of Economic Evaluation

Indicators of Economic Analysis			
Cases	EIRR (%)	CBR	ENPV (million PHP)
Case-1	14.6%	1.56	20,010
Case-2	17.0%	1.90	32,257

Source: JICA Study Team

16.11.4.2 Sensitivity Analysis

Sensitivity analysis of EIRR regarding the economic cost and the economic benefit is conducted. Results of sensitivity analysis of economic evaluation are shown in **Table 16.11-6**. If the benefit is minus 10% with the base case and plus 10% of the cost and the benefit is base case with plus 10% of cost, EIRR is higher than 10%. Therefore, the project is feasible in all cases.

Table 16.11-6 Sensitivity Analysis of EIRR for Case-1

EIRR		Cost		
		-10%	Base Case	+10%
Benefit	-10%	14.4%	13.4%	12.6%
	Base Case	15.6%	14.6%	13.7%
	+10%	16.8%	15.7%	14.8%

Source: JICA Study Team

Table 16.11-7 Sensitivity Analysis of EIRR for Case-2

EIRR		Cost		
		-10%	Base Case	+10%
Benefit	-10%	16.8%	15.7%	14.8%
	Base Case	18.1%	17.0%	16.0%
	+10%	19.4%	18.3%	17.2%

Source: JICA Study Team

16.12 Financial Analysis of the Project

16.12.1 General Methodology of Financial Analysis

The Project Internal Rate of Return (PIRR) is calculated to determine the balance between expenditure and revenue of the proposed project. Workflow and financial viability indicator are shown in **Section 12.5**, and assumptions for parameters of financial analysis is shown in **Table 16.12-1**. Although future traffic volume was estimated by Case-1 and Case-2 in **Section 16.3**, PIRR will be analyzed by Case-2 which was developed in all segments.

Table 16.12-1 Assumptions for Parameters of Financial Analysis

Item	Description	Detail	Term/Amount
I. Implementation Schedule			
1	Preparation Stage	Detailed Design	2 years (2022 - 2023)
		ROW Acquisition	2 years (2022 - 2023)
2	Construction Stage	Same period of proposed highway	3.4 years (2024-2027)
3	Operation Stage	Operation and Maintenance	30 years (2028-2057)
II. Revenue			
4	Revenue	-	As given in Section 16.12.2
III. Expenditure			
5	Inflation Rate	Estimated by PSA	2.6%/year
6	Physical Contingency	For Construction Cost and Consultancy Service Cost	10%
7	Construction Cost	Including VAT and Physical Contingency	51,280 Million Pesos
8	Consultancy Service Cost	Detailed Design (Construction Cost*3%)	1,399 Million Pesos
		Construction Supervision (Construction Cost *5%)	2,331 Million Pesos
9	Administrative Cost	Project Cost*3.0%	1,399 Million Pesos
10	O&M Cost	-	384.2 Million Pesos/year

Source: JICA Study Team

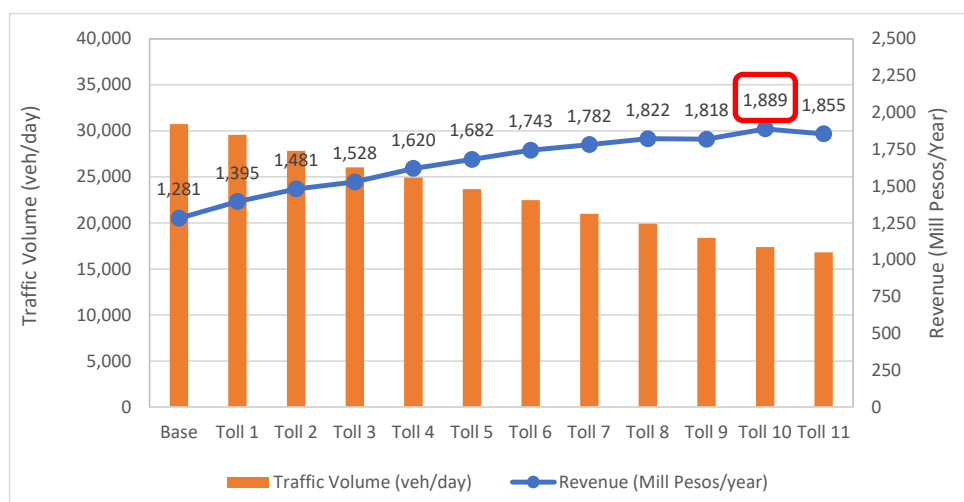
16.12.2 Estimated Revenue

Toll fee of base case is set as 3.5 pesos/km for Class-1, 8.7 pesos/km for Class-2 and 10.5 pesos/km for Class-3 based on Master Plan stage (see **Section 12.5.1**). Consideration for obtaining the maximum revenue by setting the toll fee, revenue will be obtained at 1,889 Million Pesos in 2040 by toll fee setting as 8.7 pesos/km for Class-1, 21.8 pesos/km for Class-2 and 26.1 pesos/km for Class-3 (see **Table 16.12-2** and **Figure 16.12-1**). Financial analysis will be carried out the 2 cases (Base Case and Maximum Revenue Case) in the next section.

Table 16.12-2 Sensitivity Analysis for Toll Fee vs. Revenue in 2040

Case	Toll Fee			Revenue (Mill Pesos/Year)	Ave. Traffic Volume (veh/day)	Remark
	Class-1	Class-2	Class-3			
Base	3.5	8.7	10.5	1,281	30,745	
Toll Fee-1	4.0	10.0	12.0	1,395	29,577	
Toll Fee-2	4.5	11.3	13.5	1,481	27,844	
Toll Fee-3	5.0	12.5	15.0	1,528	26,034	
Toll Fee-4	5.5	13.8	16.5	1,620	24,922	
Toll Fee-5	6.0	15.0	18.0	1,682	23,667	
Toll Fee-6	6.5	16.3	19.5	1,743	22,469	
Toll Fee-7	7.0	17.5	21.0	1,782	21,002	
Toll Fee-8	7.5	18.8	22.5	1,822	19,909	
Toll Fee-9	8.0	20.0	24.0	1,818	18,369	
Toll Fee-10	8.7	21.8	26.1	1,889	17,389	Max. Revenue
Toll Fee-11	9.0	22.5	27.0	1,855	16,804	

Source: JICA Study Team



Source: JICA Study Team

Figure 16.12-1 Toll Fee vs. Revenue with Traffic Volume

16.12.3 Result of Financial Analysis

(1) Project IRR

Based on assumptions for parameters of financial analysis and estimated revenue, PIRR was estimated as shown in **Table 16.12-3**.

The result of PIRR in Base Case was estimated less than 0%. The project seems that it is not acceptable in terms of financial feasibility. On the other hand, result of PIRR in Max. Revenue Case was estimated at 1.6%. However, this case also difficult to be so profitable.

Table 16.12-3 Result of Project IRR for Base Case and Maximum Revenue Case

No.	Classification	Base Case	Max. Revenue Case
1	Base (CAPEX (Capital Expenditure): ±0%, Net Profit: ±0%)	-0.7%	1.6%
2	CAPEX: +20%	-3.1%	-0.5%
3	Net Profit: -20%	-3.4%	-0.8%
4	CAPEX: +20% & Net Profit: -20%	-4.7%	-2.0%

Source: JICA Study Team

(2) Consideration of the Possibility of the Joining SPC (Special Purpose Company)

The possibility of joining this project by SPC was considered in this section. Sensitivity analysis for PIRR was estimated in two types which are PIRR for SPC and PIRR for SPC with Subsidy. Weighted average cost of capital (WACC) in this project was set at 7% based on NAI Expressway. The condition of these two types is shown in below.

PIRR for SPC	CAPEX is only Construction Cost and O&M Cost. Profit is same condition of “(1) Project IRR”, no revenue share with Government.
PIRR for SPC with Subsidy	CAPEX is same at PIRR for SPC. Subsidy from Government was set 50% ² of CAPEX.

² Max. Subsidy is limited to 50% of the project cost in accordance with BOT Law

The result of PIRR for SPC and PIRR for SPC with Subsidy (50%) are estimated 1.7% and 4.7%, respectively. Even if 50% of subsidy is added to the project, PIRR will not exceed 7% (WACC). Therefore, it is difficult to join this project by the private sector. It is desirable to apply a scheme in which the government pays CAPEX and the O&M will be carried out by the private sector, such as Hybrid PPP.

Table 16.12-4 PIRR for SPC with Subsidy

No.	Classification	PIRR for SPC	PIRR for SPC with Subsidy (50%)
1	Base (CAPEX: ±0%, Net Profit: ±0%)	1.7%	4.7%
2	CAPEX: +20%	0.4%	3.3%
3	Net Profit: -20%	0.2%	3.0%
4	CAPEX: +20% & Net Profit: -20%	-1.1%	1.6%

Source: JICA Study Team

16.13 Conclusion and Recommendation

This Pre-F/S is limited to the outline study based on available free satellite images and topographic map data. Likewise, the planned site visits by experts, especially the tunnel engineer and geotechnical engineer were not realized due to the travel restrictions brought about by the COVID-19 pandemic.

In particular, the observation of the geological conditions along the proposed tunnel section which is essential for the planning of this project was not undertaken. Depending on the results of the topographic survey, geological survey and other surveys, a significant fluctuation risk of the project cost may occur. Therefore, a highly accurate geological survey using elastic wave exploration, survey of landslide topography are important surveys to be conducted during the F/S stage. At the same time, environmental measures should be sought to minimize negative impact by tunnel construction such as water pollution and groundwater change.

In addition, the project is located in a high-end residential area. It is necessary to consider this aspect in selecting the optimal route or planning of a compact-type interchange such as diamond-type interchange instead of a trumpet-type interchange during the F/S stage.

The project is expected to have significant impact on traffic decongestion of Cebu City with a projected through traffic shift of 30,000 vehicles/day in 2040. However, the estimated project cost is expensive as it necessitates a number of bridges and tunnels to achieve a high standard geometric design. Similarly, the proposed alignment will pass through an urbanized area. The estimated economic internal rate of return (EIRR) is not that high at 14.6-17.0% only.

16.13.1 Alignment Study

In the alignment study described in Section 16.4.2, Alignment B was recommended for the Project and road alignment is designed based on the Alignment B. Since the pre-feasibility study was based on a limited available data and Alignment A (dash) was better than Alignment B regarding environmental and social consideration, it is recommended to undertake carefully alternative study during F/S stage to select the best alignment. This is particularly important since the Central Cebu Protected Landscape (CCPL) is located near the alignment as illustrated in Figure 16.9-1. Alternative study should carefully consider the influence of CCPL during F/S stage.

In order to implement the project smoothly, the following surveys will be necessary during the F/S:

16.13.2 Road/Bridge

Preliminary design was carried out based on secondary data (free satellite map and contour map), therefore, it is recommended to carry out the following surveys during the feasibility study.

- Topographic Survey
- Boring Survey at Bridge Pier

Based on the actual survey data, it is recommended to improve the design and estimated construction cost.

16.13.3 Tunnel

a) Topographic and Geological Survey

Tunnel planning in the Pre-feasibility study was also carried out based on secondary data and existing geological literature. Therefore, it is recommended to carry out the following surveys during the feasibility study and detailed design to review the location of tunnel portal, geological profile, tunnel structure, etc.:

- Topographic Survey around Tunnel Portals and Low Overburden Area
- Vertical/Horizontal Boring
- Elastic Wave Exploration
- Electric Exploration
- Rock Test (Uniaxial Compressive Strength Test, etc.)

b) Considerations for Tunnel Design and Construction in Limestone Areas

The most important issue in the design and construction of tunnels in the limestone area is to accurately grasp the distribution of cavities. Here are some general considerations for the distribution of these cavities:

(1) Geophysical Survey

The distribution of cavities is irregular, and it is difficult to accurately predict their location by field investigation. However, the location of a large-scale cavity can be predicted as the location of low velocity zones or low electrical resistivity zones measured by physical surveys such as seismic wave surveys and electrical surveys. For small cavities, it may be possible to estimate the continuity based on the distribution of the Doline landforms confirmed by site investigations. It is recommended to carry out those studies during the feasibility study and the detailed design.

(2) Advanced Drilling

In tunnel construction, advanced drilling can reduce the overall cost by exploring the geology and the distribution of cavities ahead of the face. Before construction, the distribution of large-scale cavities can be estimated based on the geological survey results, but it is difficult to estimate the distribution of relatively small-scale cavities. For this reason, it is recommended to plan the advanced drilling during the feasibility study and the detailed design.

(3) Spring Water during Excavation

In many cases, clay is accumulated in the cavities, and when the cavities are encountered, it is possible that the clay will flow out into the tunnel with sudden spring water (groundwater). Since the groundwater in the cavities is often continuous with the surface water, the water pressure is almost equal to the height to the ground surface. Therefore, it is recommended to plan the drainage drilling from excavation face or ground surface at the feasibility study and the detailed design depending on the distribution of cavities.

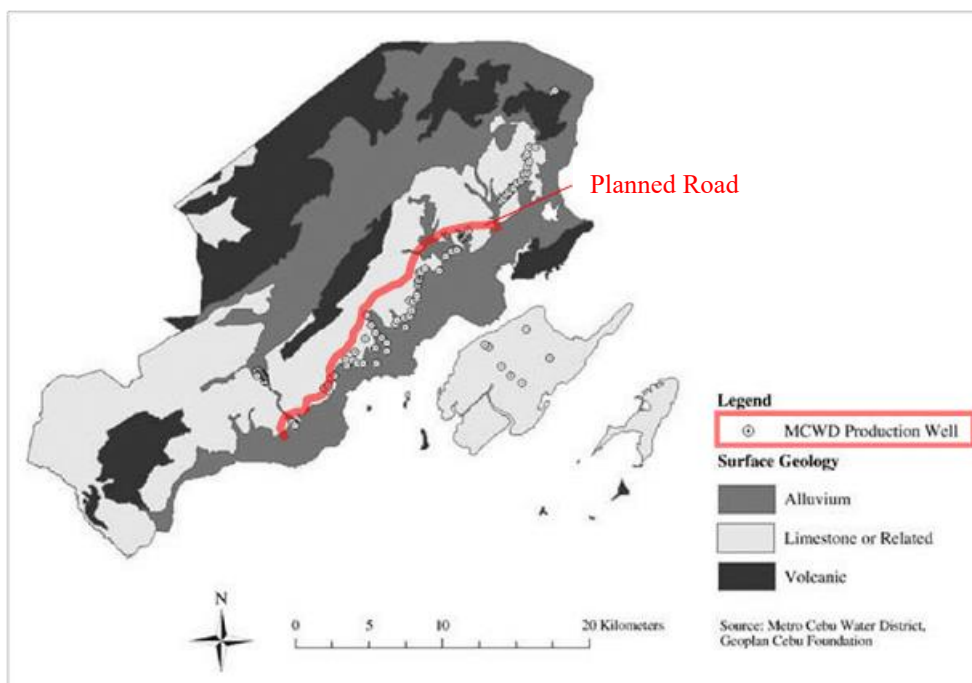
(4) Lack of Bearing Capacity

Cavities may appear under the tunnel, resulting in insufficient bearing capacity for the tunnel portal (concrete wall). It is recommended to investigate the geological characteristics of the limestone by geological survey during the feasibility study and the detailed design, and design the necessary countermeasures such as concrete foundation for tunnel portal.

(5) Water Source Wells around the Tunnel Area

Wells of a water supply company (MCWD: Metropolitan Cebu Water District) are distributed around the planned road (see **Figure 16.13-1**). Since these wells are located near the boundary between the hilly areas and the plains, they are likely to be shallow wells and may be affected by the road construction work.

Since these are water source wells of Cebu City, it is necessary to consider reducing the impact of road construction projects on the wells as much as possible. For that purpose, it is necessary to confirm the location of wells and the structure of wells, examine and evaluate the impact of road construction on wells, and plan the monitoring of wells for road construction.



Source: *Does Clean Water Make You Dirty? Water Supply and Sanitation in the Philippines* (2012)

Figure 16.13-1 Geology of Cebu Island and Location of MCWD Water Source Wells

(6) Construction Plan

It is necessary to rationalize the tunnel construction plan in consideration with the location of the temporary yard, environmental impact around the site, the tunnel length, etc. In addition, since the tunnels are planned as two-tube tunnel, it is important to consider the simultaneous construction of both tunnels depending on the geological conditions. Construction plan for tunnel shall be studied further during feasibility study. The construction schedule is planned on the assumption that all tunnels sections will be constructed in parallel. At the F/S stage, it is desirable to review construction period taking construction process, contractor's capacity and constraint of tunnel construction equipment into consideration.

16.13.4 Environmental and Social Consideration

During the following F/S stage, a detailed survey and analysis of environmental and social considerations should be carried out with more accurate project design to understand the following impacts:

(1) General Issues

- Confirmation of construction methodology and necessary machinery and vehicles.
- Confirmation of soil borrow pit, quarry, waste dumping site, etc.
- Necessary budget for mitigation and monitoring.
- Confirmation of specific role and responsibility for mitigation, monitoring, and resettlement implementation.
- Stakeholder Meetings and Public Consultations as F/S level.
- F/S and RAP shall refer issues and concerns from FGDs and SHMs in **Table 16.9-18** and **Table 16.9-19** to develop their contents.

(2) Pollution Control

- Measurement of necessary items of air, water, noise and vibration, etc. as baseline data, at appropriate locations in appropriate seasons (e.g., dry and wet season) are necessary.
- Survey for soil quality (possible contamination) and geological conditions based on boring survey, soft soil survey, and relevant surveys for tunnel sections for determining risks of subsidence and liquefaction of ground.
- Quantitative forecasting and evaluation for the future impact should be discussed including numerical simulation.
- Further study for waste and waste water treatment status and possible impact is required.
- Further studies for possible impact due to tunnel construction such as groundwater pollution, groundwater level, river water volume and ecosystem are required.

(3) Natural Environment

- Field surveys for fauna and flora at appropriate locations in appropriate seasons (e.g., dry and wet season) .
- The CCPL Parcel B, which covers Buhisan Watershed Forest Reserve, is approximately 0.4 km away from the project area. Therefore, additional information on rare species such as IUCN listed species shall be studied in the F/S.
- Location of major habitat with specific location of nesting areas and feeding areas around the project area shall be confirmed.
- Impact due on coral reefs around the sea areas shall be confirmed further in following F/S, although direct impact may not be expected at this pre-F/S stage.
- Alternative discussion shall be done again to avoid protected areas (sensitive areas from development impact based on JICA's Guidelines for Environmental and Social Considerations) as many as possible.

(4) Social Environment

- RAP-related surveys including Census, Socio-Economic Survey, Inventory of Loss, Replacement Cost Survey, and etc.
- Confirmation of status of vulnerable people including poor people and illegal resident around the project area.
- Confirmation of status of ethnic minority and/or indigenous people.
- Confirmation of public/social facilities around the project sites.
- Impact on the existing water resources and water usage by resident due to the interception/changing of groundwater flow caused by the construction of road structures including soft ground treatment or liquefaction measures.
- Surveys finding traffic-vulnerable people and relevant facilities including schools shall be implemented during F/S phase and road safety education might be considered as one of the mitigation measures of accidents.
- In case that livelihood of PAPs is likely to be affected based on socioeconomic survey and stakeholder meetings during F/S and/or monitoring processes during implementation,

appropriate compensation and livelihood restoration program to PAPs shall be provided based on RAP.

- Land price along the project sites may increase after the completion of each project area. Therefore, actual unit prices for compensation shall be determined based on replacement cost surveys which reflect transaction prices of PAP' s properties in and around the project areas so that PAPs can recover and keep their living environment.
- Further study of traffic volume, traffic characteristics, business along the existing road are required to determine indirect impacts including economic impact and necessity of mitigation measures due to bypass function by the new highway in F/S.
- Project-induced impact on business along existing road bypassed by the planned highway shall be discussed in the items of "Poverty" or "Local Economy such as Employment and Livelihood". In addition, appropriate mitigation measures shall be proposed if any such impact is expected based on the results from stakeholder meetings and any other surveys.
- JICA asks the project proponents to consider following conditions. In case that impact is expected on existing roads bypassed by the highway, relevant households and/or business bodies should be involved in public participation processes such as stakeholder meetings, and socioeconomic survey shall be implemented, if necessary.

CHAPTER 17

2ND SAN JUANICO BRIDGE

CHAPTER 17

2ND SAN JUANICO BRIDGE

17.1 Outline of the Project

17.1.1 Outline of San Juanico Strait

San Juanico Strait is a narrow strait in the Eastern Visayan region in the Philippines. It separates the islands of Samar and Leyte and connects the Carigara Bay (Samar Sea) to the San Pedro Bay (Leyte Gulf). It is about 38 km long. At its narrowest point, the strait is only 2 km wide.

The strait is crossed by the San Juanico Bridge. The HVDC (High-Voltage, Direct Current) Leyte–Luzon power line also crosses the strait through an overhead line, using a tower on an uninhabited island in the strait. The Tacloban City harbor, the main port of Eastern Visayas, is on San Pedro Bay at the southern entrance of the strait (see **Figure 17.1-1**).



Source: JICA Study Team

Figure 17.1-1 2nd San Juanico Bridge and Access Road

17.1.2 Outline of the Current San Juanico Bridge

The San Juanico Bridge, with a bridge length of 2,164 m was constructed with Japanese development assistance in 1972 and is a maritime bridge connecting Leyte Island and Samar Island. It is part of the Pan-Philippine Highway (Asian Highway 26 or AH26). A steel truss bridge (maximum span of 192 m) is formed in the center, and a steel I girder bridge (maximum span of 42.6 m) and a steel box girder bridge (maximum span of 43.7 m) in the front and rear approaches. The number of lanes is two and the width configuration is 10.62 m. In 2004, retrofitting work was carried out through yen loan.

While widely considered as the most beautiful bridge in the Philippines, frequent repainting and “shear delayed fracture” with S11T bolts have occurred, and bolts have been frequently replaced. As a result, large maintenance costs have been incurred.

In addition, the steel truss bridge is a middle road type, and widening to 4 lanes would be difficult.



Source: JICA Study Team

Figure 17.1-2 Existing San Juanico Bridge

17.1.3 Objective of this Preliminary Study

The objectives of this Preliminary Design are described below:

- 2nd San Juanico Bridge is planned crossing San Juanico Strait and connection with Maharlika Highway (NH26) in Samar Island and Leyte-Samar Road which connects Maharlika Highway at Tacloban City in Leyte Island.
- Preliminary Design consists of Bridge Design and Access Road Design.
- Use of 1/50,000 topographic maps and 1/30,000 nautical chart for bridge planning.
- Select an appropriate bridge location while taking into consideration the landscape with the existing San Juanico Bridge.
- It proposes a modern bridge that features advanced technology focusing on maintenance performance, as compared to the existing San Juanico Bridge.
- Make recommendations for further accuracy improvement with the use of the data to be collected in this study.

17.2 Justification of the Project

17.2.1 Necessity of 2nd San Juanico Bridge

Currently, land transportation between the islands of Samar and Leyte solely depends on the existing San Juanico Bridge, which features a 2-lane road built through a Japan aid project. However, the bridge features several problems as discussed below:

- Aging of bridge and high maintenance costs,
- Growth of traffic and lack of road capacity for future traffic volume,
- Promotion of regional development.

The 2nd San Juanico Bridge is a part of Samar-Leyte High Standard Highway Section 3, which is proposed as long-term project. The 2nd San Juanico Bridge was selected short term (the present to 2025) project in the implementation program for HSH Class-1 because the existing San Juanico bridge will necessitate slab reconstruction during the early stage and will be closed for traffic during the reconstruction. It is also necessary to apply advance technology for the construction of a long span bridge connecting the two islands.

17.2.2 Traffic Volume and Lack of Road Capacity

Traffic volume in 2019 was approximately 7,200 vehicles per day on the existing San Juanico Bridge. In 2040, it is forecasted that the traffic volume would reach up to 15,900 vehicles per day. In terms of traffic capacity, it is expected that road capacity would become subdued by 2030.

Table 17.2-1 Traffic Volume on Existing San Juanico Bridge

Year	2019	2030	2040	2040/2019
Traffic Volume (AADT)	7,170	10,900	15,900	2.2
Volume/Capacity	0.72	1.09	1.59	-

Unit: vehicle/day

*Road capacity of a 2-lane road is assumed to be 10,000 veh/day.

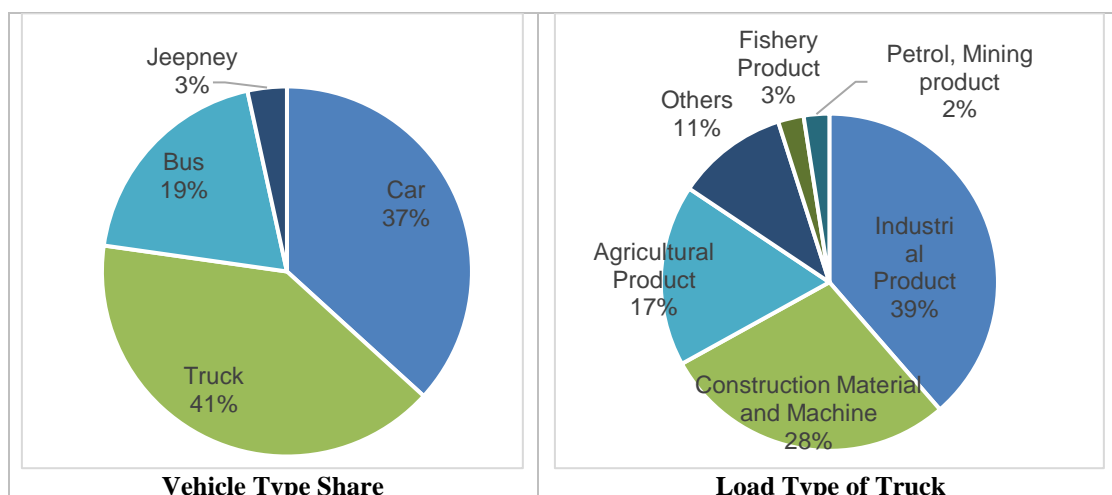
Source: JICA Study Team

17.2.3 Traffic Characteristics

Figure 17.2-1 shows the share of vehicle type and load type of truck based on the results of the survey conducted by the JICA Study Team along the existing San Juanico Bridge. The share of truck is over 40%, while the share of bus is around 20% (mainly comprised of intercity bus). Main transported goods are “Industrial Product” and “Construction Material and Machine”. The average weight of loaded goods was 5.1 tons.

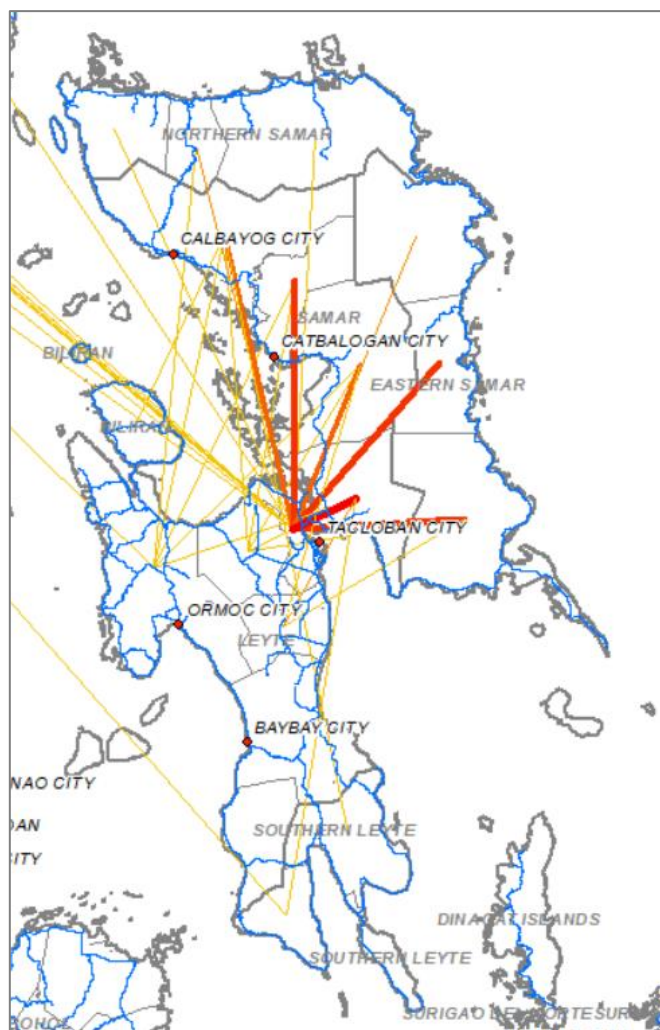
Regarding the trip pattern through the bridge, more than 80% of trips represents traffic between Tacloban City (which has main seaport in the region) and Samar Island. Half of the traffic is from central and northern Samar Island. Therefore, it is expected that significant traffic would shift to the 2nd San Juanico bridge in the future.

It is clear that constant functioning of the bridge between two islands is essential for smooth flow of logistics. It is also an important support to passenger movement.



Source: JICA Study Team

Figure 17.2-1 Traffic Data at the San Juanico Bridge (2019 Data)



Source: JICA Study Team

Figure 17.2-2 Trips Pattern of Traffic at the San Juanico Bridge (2019 Data)

17.2.4 Travel Speed

If no additional bridges are constructed, future travel speed will be significantly reduced. From the viewpoint of the service level, additional bridge development is essentially needed.

Table 17.2-2 Traffic Speed at the Existing San Juanico Bridge

Year	2019	2040
Travel Speed	36.7 km/hr	18.3 km/hr

*Travel speed in 2019 is the result of Travel Speed Survey in 2019 (AM Peak Hour, Towards Urban Area)

*Travel speed in 2040 is the estimated result of the traffic demand forecast.

Source: JICA Study Team

17.3 Traffic Demand Forecast

Future traffic demand is forecasted to decide the design daily traffic volume and obtain the basic information for economic analysis of the project. The basic idea of traffic demand forecasting is as follows:

Year of traffic demand forecast: 2040

Method of traffic demand forecast:

- ✓ Traffic assignment: User Equilibrium Assignment
- ✓ Link condition of 2nd San Juanico Bridge: 2-lane road, non-toll road
- ✓ OD table: 2040, 4-type vehicles (Car, Jeepney, Bus and Truck)

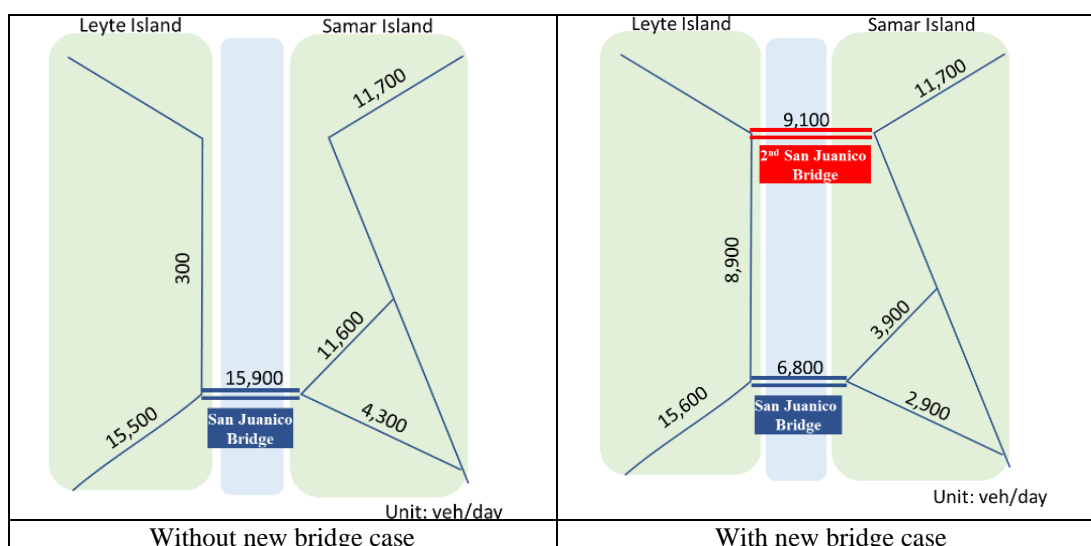
Based on the traffic demand forecast, the traffic volume between the two islands would be 15,900 vehicles per day in 2040 by 3.9% of annual growth rate. An additional bridge is required by 2030. From the result of the traffic assignment, the design traffic volume for 2nd San Juanico Bridge is around 9,100 vehicles per day, as shown in **Table 17.3-1**.

Table 17.3-1 Future Traffic Volume between Leyte and Samar Islands

Unit: Vehicle/day

Year	2 nd San Juanico Bridge	San Juanico Bridge (Existing)	Total
2019	-	7,200	7,200
2025	-	9,000	9,000
2030	4,700	6,200	10,900
2035	5,600	7,500	13,100
2040	9,100	6,800	15,900

Source: JICA Study Team



Source: JICA Study Team

Figure 17.3-1 Traffic Demand Forecast Result at the San Juanico Bridge in 2040

17.4 Preliminary Design

17.4.1 Design Standard

(1) Applicable Access Road Design Standards

The following are the applicable standards for the road design:

- a) DPWH Design Guidelines, Criteria and Standards, Volume 4 Highway Design, 2015 (DGCS)
- b) AASHTO A Policy on Geometric Design of Highways and Streets, 7th Edition 2018
- c) Japan's Road Structure Ordinance, 2015

(2) Applicable Bridge Standards

The following are the applicable codes, specifications, and references for the bridge design:

- a) DPWH Design Guidelines, Criteria and Standards Volume 5 Bridge Design, 2015 (DGCS)
- b) DPWH LRFD Bridge Seismic Design Specifications, 1st Edition, 2013 & Interim Revision 2019 (BSDS)
- c) AASHTO LRFD Bridge Design Specifications, 8th Edition, 2018
- d) AASHTO LRFD Bridge Construction Specifications, 3rd Edition, 2016
- e) Specifications for Highway Bridges, 2017, Japan Road Association

17.4.2 Structural Design Condition

(1) Topographic Maps and Geotechnical Data Used

The topographic and geotechnical data used in this study are shown below.

1) Topographic Data

At this stage, existing topographic data could not be obtained. For this reason, the topographic data uses contour maps converted from ASTER GDM v2 Worldwide Elevation Data.

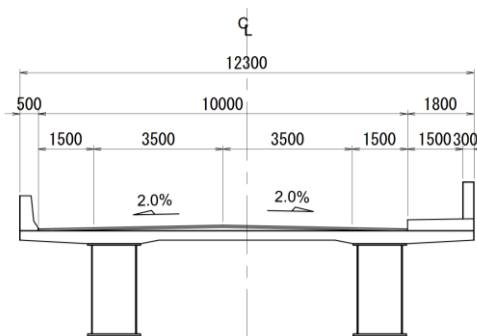
2) Nautical Chart

4464 San Juanico Strait and Janabatas Channel, Northean Entrance to San Juanico Strait, Scale 1:30,000, 1981, 7, NAMRIA.

3) Geotechnical Data

At this stage, existing geological data could not be obtained. Therefore, based on the existing San Juanico Bridge and the bridge position where the rock is exposed, it is assumed that the bearing layer is very shallow.

(2) Typical Cross Section for Bridge



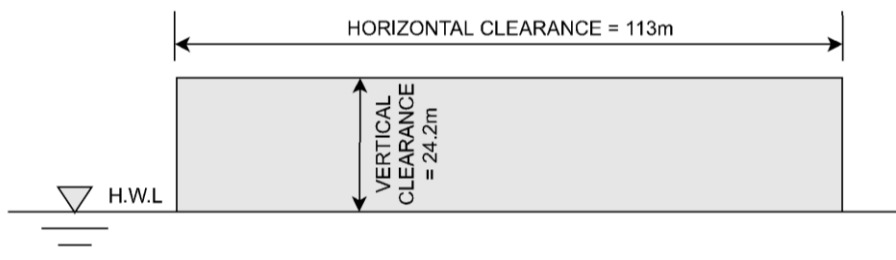
Source: JICA Study Team

Figure 17.4-1 Typical Cross section for 2nd San Juanico Bridge

(3) Clearances

1) Navigation

The navigation clearance is the same as the current San Juanico Bridge, as shown in **Figure 17.4-2**.

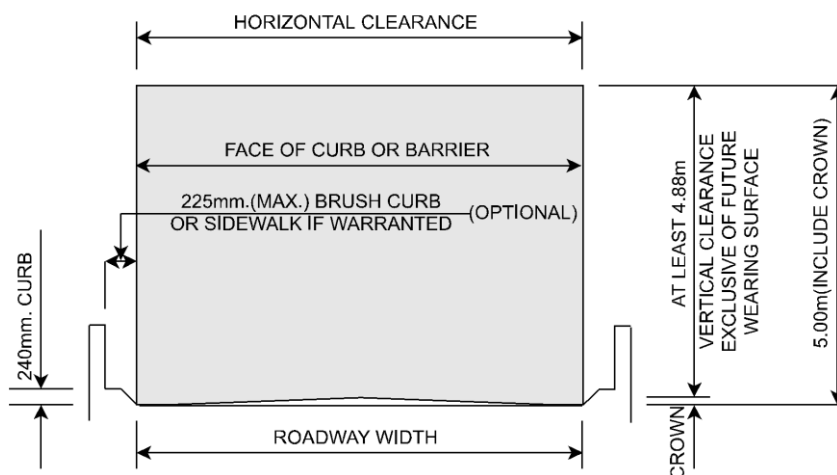


Source: Name Plate on San Juanico Bridge

Figure 17.4-2 Navigation Clearance

2) Highway

Based on the DGCS, the minimum clearance is 4.88 m, so the clearance for this project is determined to be 5.0 m.



Source: DGCS

Figure 17.4-3 Bridge Clearance

3) Overpass/ Underpass

The clearance of overpass/underpass that intersects the mainline is the same as in **Figure 17.4-3**.

(4) Coastal Data

1) Tidal Data

Mean Higher High Water: MHHW = 0.69 m

Mean Tide Level: MTL = 0.27 m

Mean Lower Low Water: MLLW = -0.44 m

(Tacloban, 4464 San Juanico Strait and Janabatas Channel, Northern Entrance to San Juanico Strait, Scale 1:30,000, 1981,7, NAMRIA)

2) Navigation Data

- Navigation Route

The location of navigation route, buoy, navigation light is shown in **Table 17.4-1**.

Table 17.4-1 Coordinates of Buoy on San Juanico Strait (from Geoportal PH)

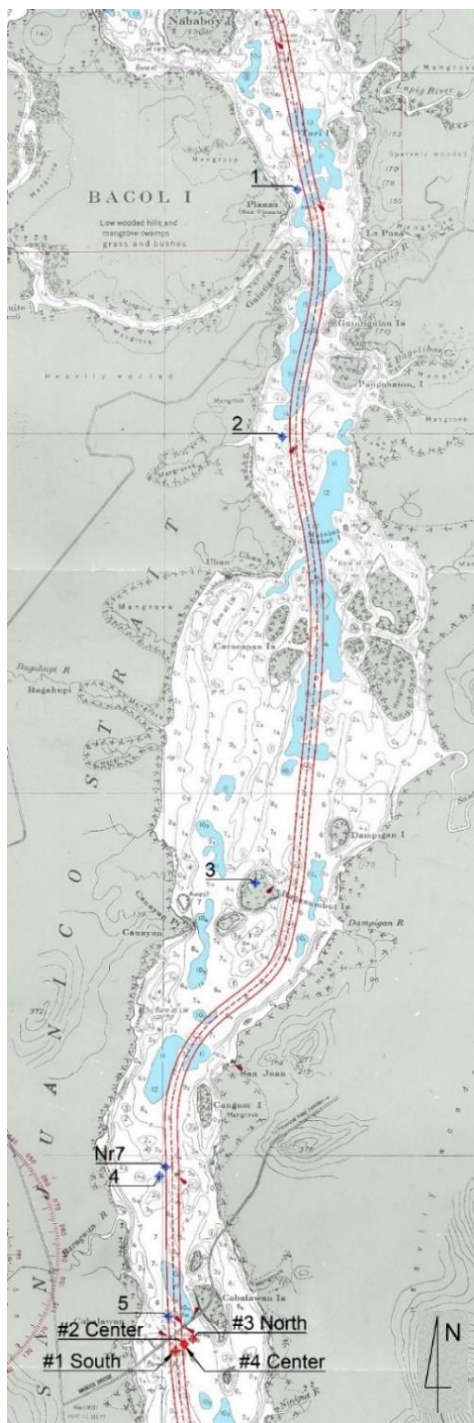
Name	X	Y	
1	13912771.8021701	1278035.44751859	
2	13912617.1917294	1275480.40861561	MATSING GUBAT ISLAND
3	13912338.8929856	1270875.53962232	
Nr7	13911411.2305354	1267942.64213501	Green
4	13911349.3864092	1267848.03692271	
5	13911442.1525461	1266397.45849424	

Source: Geoportal PH (<http://www.geoportal.gov.ph/>)

Table 17.4-2 Coordinates of Lighting on San Juanico Bridge (from Geoportal PH)

Name	X	Y	
#1 South (outer)	13911508.6605	1266041.61364	(N: 11.300278, E: 124.967778)
#2 Center (North)	13911601.4246	1266120.44355	(N: 11.300972, E: 124.968611)
#3 North (outer)	13911694.1894	1266167.74255	(N: 11.301389, E: 124.969444)
#4 Center (South)	13911601.4249	1266104.67798	(N: 11.300833, E: 124.968611)

Source: Geoportal PH (<http://www.geoportal.gov.ph/>)



Source: JICA Study Team

Figure 17.4-4 Location of Buoy on Strait and Lighting System on San Juanico Bridge

- Maximum Vessel size
Length: 350 ft. (107 m)
Draft: 18 ft. (5.5 m)

(Source: Sailing direction for the Philippine Islands Volume II, 1975, Published by the Defense Mapping Agency, Hydrographic Center)

The maximum value of navigable vessels estimated from the above is 3,000 gross ton class.

- The Existing and Future Marine Traffic using the San Juanico Strait

Regardless of whether there is an expansion plan for Tacloban Port, the navigable vessels are considered to be the same conditions in the future due to the topographical conditions of the San Juanico Strait.

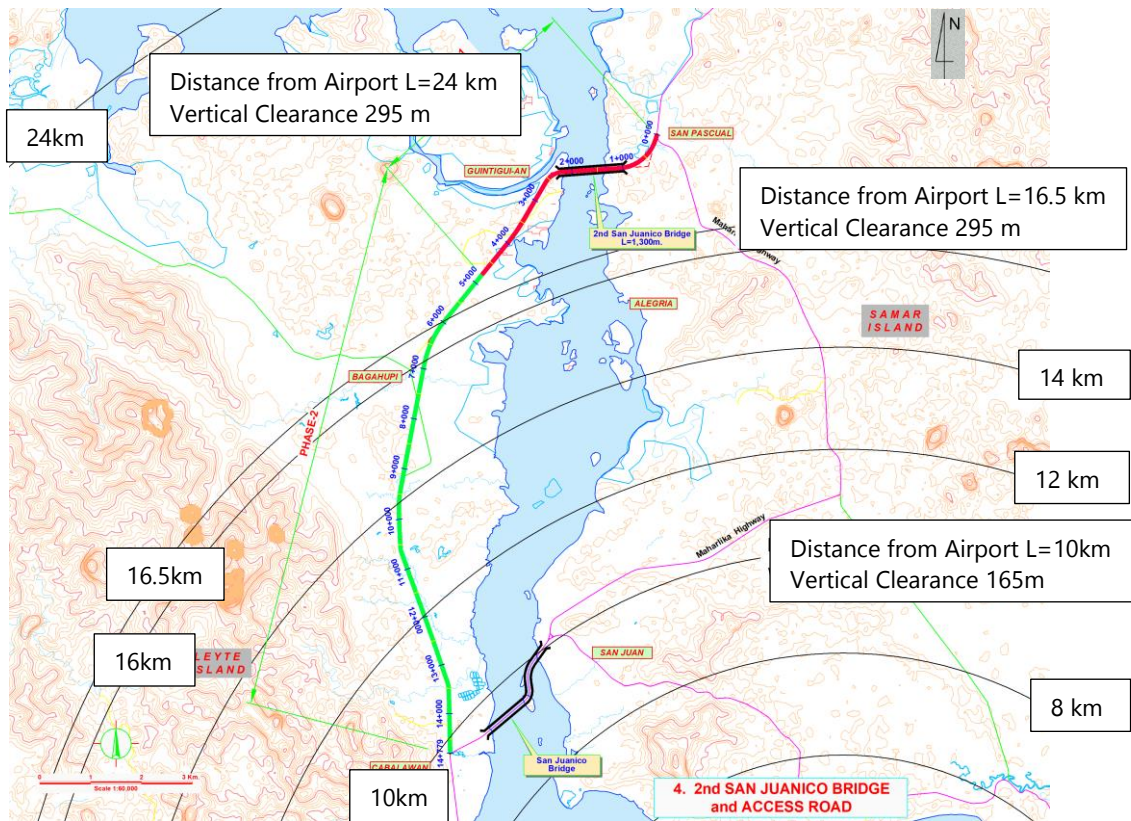
(5) Air Clearance

- Nearest Airport: Daniel Z. Romualdez Airport (Tacloban)
- Elevation of Airport: +1.0 m (assumed)
- Limitation of Elevation

Distance from Airport $L < 4,000$ m: 45 m

$4,000 < L < 16,500$ m: $45 \text{ m} + 0.02 * (16,500 - L)$

$16,500 < L < 24,000$ m: 295 m



Source: JICA Study Team

Figure 17.4-5 Distance from Airport to San Juanico Strait Bridges

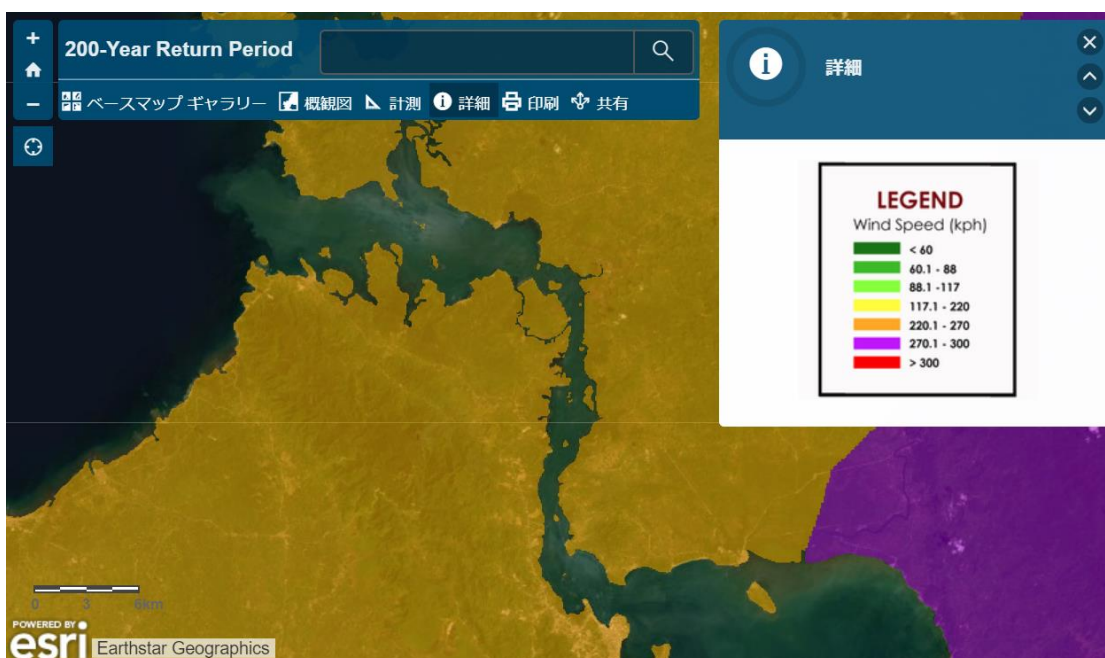
(6) Wind Condition

According to DGCS, V10 may be established from:

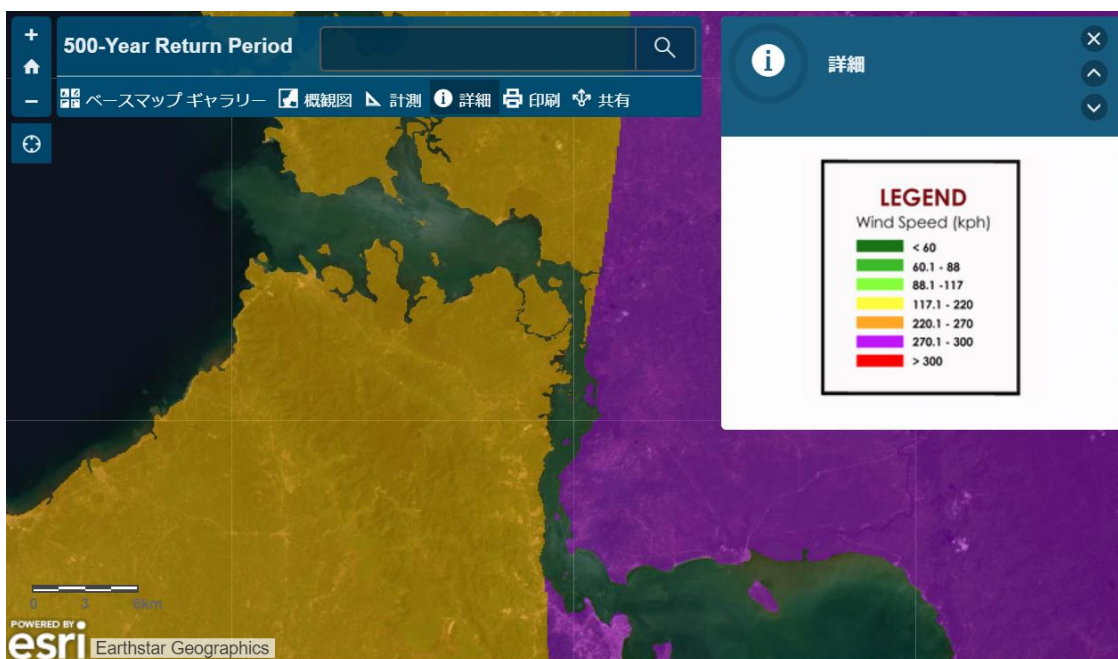
- Basic Wind Map from PAGASA specified in this DGCS.
- Site-specific wind surveys.
- In the absence of better criterion, the assumption that $V_{10} = V_s = 160$ km/h.

Figure 17.4-6 shows the Wind Map with a return period of 200 and 500-years, obtained from PAGASA. These maps represent the 3-second peak gust wind speed measured at 10-meter height (above ground) over open and flat terrain. This does not consider the local factors such as topography, terrain roughness and shielding from neighboring structures. V10 at the bridge location is estimated to be 220 to 270 kPh (61.1 to 75.0 m/s; gust wind speed [42.8 to 52.5m/s; 10 minutes sustained]).

Since the maximum wind speed (10 minutes sustained) of Typhoon Yolanda that passed near the bridge position was recorded at 65 m/s, V10 at the 2nd San Juanico Bridge is set to 52.5 m/s (10 minutes sustained) at maximum value from wind maps.



(1) Return Period of 200-years



(2) Return Period of 500-years

Regional Severe Wind Hazard Maps

Source: PAGASA (<http://bagong.pagasa.dost.gov.ph/products-and-services/severe-wind-maps>)

Figure 17.4-6 Wind Hazard Map on San Juanico Strait

(7) Seismic Condition

Bridge Operational Classification is based on the DPWH Guide Specifications LRFD Bridge Seismic Design Specifications (1st Edition, 2013).

Operational Classification: OC-I (Critical Bridges)

1) Preparation for acceleration spectrum

• **For Level-1**

PGA = 0.12 (BSDS, Figure 3A-12)

$S_s = 0.30$ (BSDS, Figure 3A-30)

$S_1 = 0.12$ (BSDS, Figure 3A-48)

F_{pga} ; 1.2 (GT-I), 1.56 (GT-II)

$A_s = F_{pga}PGA = 1.2 \times 0.12 = 0.144$ (GT-I)
 $= 1.56 \times 0.12 = 0.187$ (GT-II)

F_o ; 1.2 (GT-I), 1.56 (GT-II)

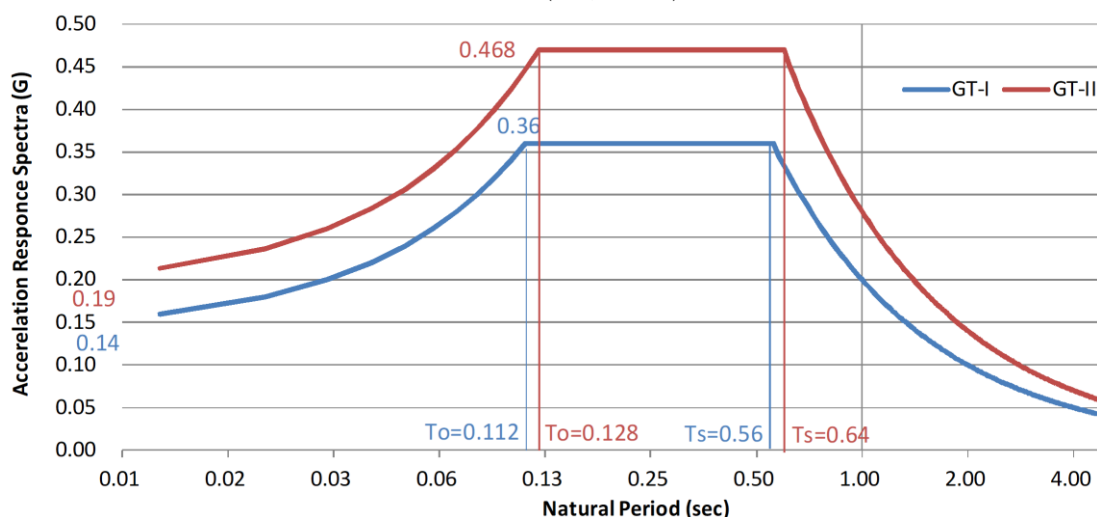
$S_{DS} = F_o S_s = 1.2 \times 0.30 = 0.360$ (GT-I)
 $= 1.56 \times 0.30 = 0.468$ (GT-II)

F_v ; 1.68 (GT-I), 2.32 (GT-II)

$S_{DI} = F_v S_1 = 1.68 \times 0.12 = 0.202$ (GT-I)
 $= 2.32 \times 0.12 = 0.278$ (GT-II)

$T_s = S_{DI} / S_{DS} = 0.202 / 0.36 = 0.561$ (sec, GT-I)
 $= 0.278 / 0.468 = 0.594$ (sec, GT-II)

$T_0 = 0.2T_s = 0.2 \times 0.561 = 0.112$ (sec, GT-I)
 $= 0.2 \times 0.594 = 0.119$ (sec, GT-II)



Source JICA Study Team

Figure 17.4-7 Elastic Seismic Response Coefficient Cs (Level-1)

• **For Level-2**

PGA = 0.5 (BSDS, Figure 3B-12)

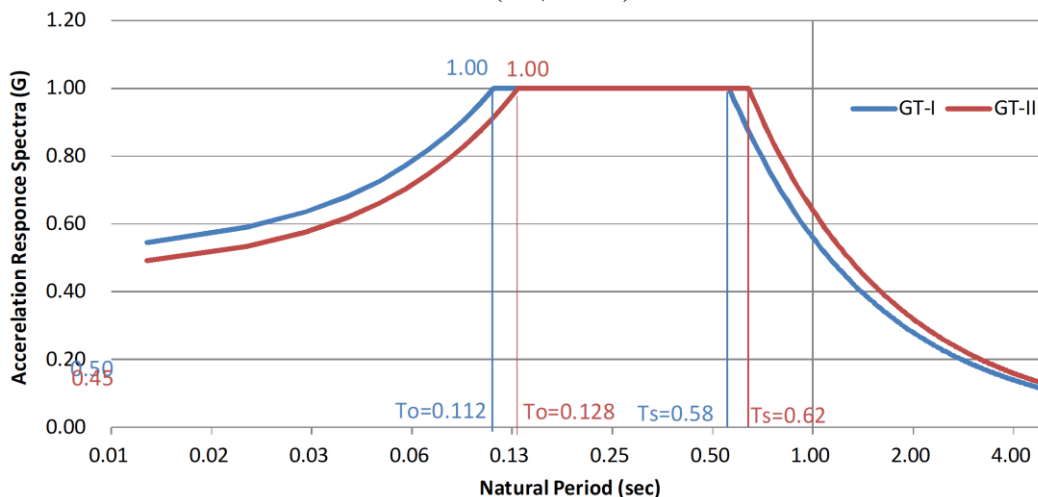
$S_s = 1.0$ (BSDS, Figure 3B-30)

$S_1 = 0.4$ (BSDS, Figure 3B-48)

F_{pga} ; 1.0 (GT-I), 0.9 (GT-II)

$A_s = F_{pga}PGA = 1.0 \times 0.5 = 0.50$ (GT-I)
 $= 0.9 \times 0.5 = 0.45$ (GT-II)

F_0 ; 1.0 (GT-I), 1.0 (GT-II)
 $S_{DS} = F_0 S_s = 1.0 \times 1.0 = 1.00$ (GT-I)
 $= 1.0 \times 1.0 = 1.00$ (GT-II)
 F_v ; 1.4 (GT-I), 1.6 (GT-II)
 $S_{DI} = F_v S_i = 1.4 \times 0.4 = 0.56$ (GT-I)
 $= 1.6 \times 0.4 = 0.64$ (GT-II)
 $T_s = S_{DI} / S_{DS} = 0.56 / 1.00 = 0.56$ (sec, GT-I)
 $= 0.64 / 1.00 = 0.64$ (sec, GT-II)
 $T_0 = 0.2 T_s = 0.2 \times 0.56 = 0.112$ (sec, GT-I)
 $= 0.2 \times 0.64 = 0.128$ (sec, GT-II)



Source: JICA Study Team

Figure 17.4-8 Elastic Seismic Response Coefficient Cs (Level-2)

2) Site Factors

Table 17.4-3 Values of Site Factor, Fpga at Zero-Period on Acceleration Spectrum

Ground Type	Peak Ground Acceleration Coefficient (PGA)					
	PGA=0.10	PGA=0.20	PGA=0.30	PGA=0.40	PGA=0.50	PGA>0.20
I	1.2	1.2	1.1	1.0	1.0	1.0
II	1.6	1.4	1.2	1.0	0.9	0.85
III	2.5	1.7	1.2	0.9	0.8	0.75

Source: BSDS, Table 3.5.3-1

Table 17.4-4 Values of Site Factor, Fo at Short-Period on Acceleration Spectrum

Ground Type	Spectral Acceleration Coefficient at Period 0.2 sec (Ss)					
	Ss=0.25	Ss=0.50	Ss=0.75	Ss=1.00	Ss=1.25	Ss>2.00
I	1.2	1.2	1.1	1.0	1.0	1.0
II	1.6	1.4	1.2	1.0	0.9	0.85
III	2.5	1.7	1.2	0.9	0.8	0.75

Source: BSDS, Table 3.5.3-2

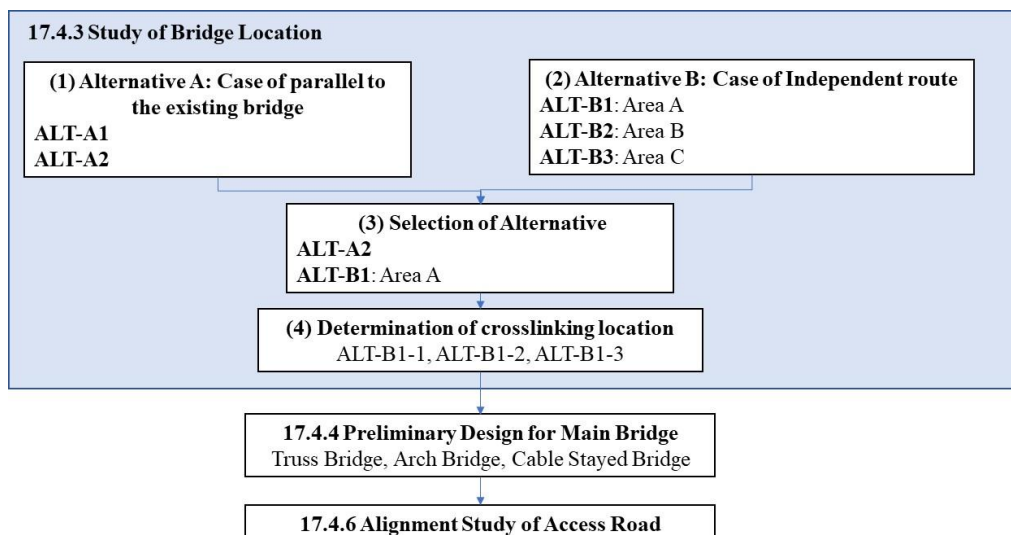
Table 17.4-5 Values of Site Factor, Fv at Long-Period on Acceleration Spectrum

Ground Type	Spectral Acceleration Coefficient at Period 1.0 sec (Si)					
	Si=0.10	Si=0.20	Si=0.30	Si=0.40	Si=0.50	Si>0.80
I	1.7	1.6	1.5	1.4	1.4	1.4
II	2.4	2.0	1.8	1.6	1.5	1.5
III	3.5	3.2	2.8	2.4	2.4	2.0

Source: BSDS, Table 3.5.3-3

17.4.3 Study of Bridge Location

In the preparatory study, the location of the new bridge across the San Juanico Strait will be examined. As the first preparatory study, a case of planning a bridge parallel to the existing San Juanico Bridge (**Alternative A**) was considered. The other is to consider the case of straddling a completely different strait location (**Alternative B**). **Figure 17.4-9** illustrated the procedure of alternative study.



Source: JICA Study Team

Figure 17.4-9 Alignment Procedure

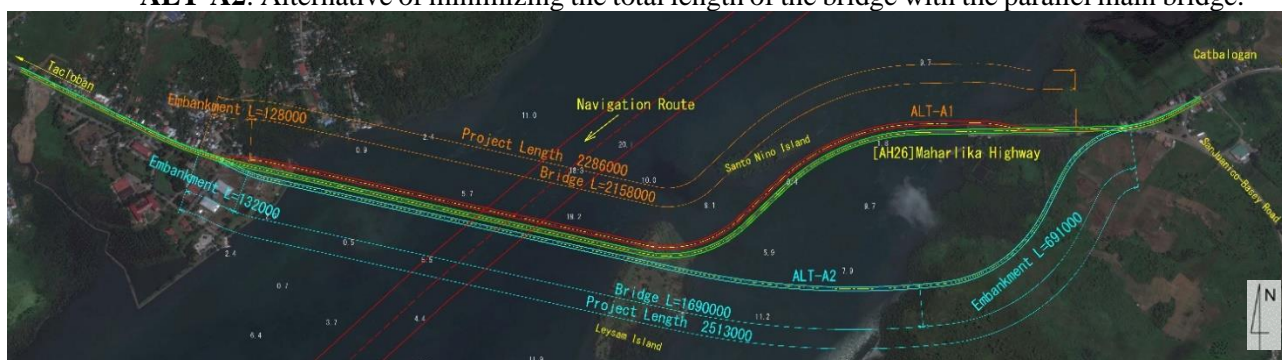
(1) Alternative A: Case of Parallel to the Existing Bridge

1) Alternative A1 and A2

As an alternative, two types of cross-linking plans are considered.

ALT-A1: Alternative of making the new bridge completely parallel.

ALT-A2: Alternative of minimizing the total length of the bridge with the parallel main bridge.



Alt-A1, Alt-A2, Existing

Source: JICA Study Team

Figure 17.4-10 Plan of Alternative-A

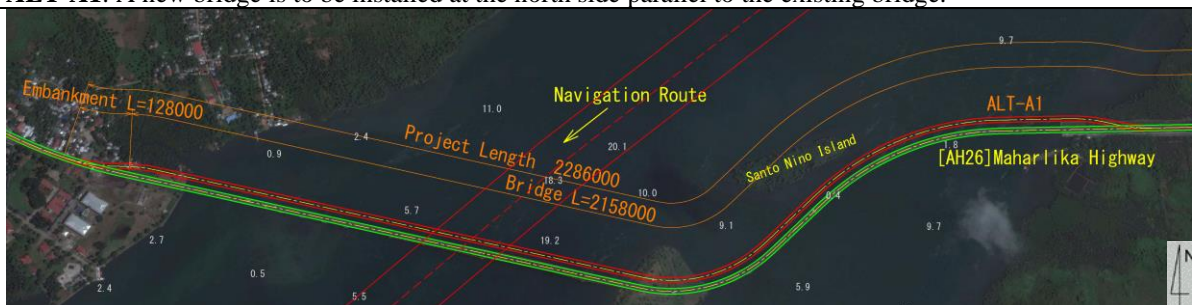
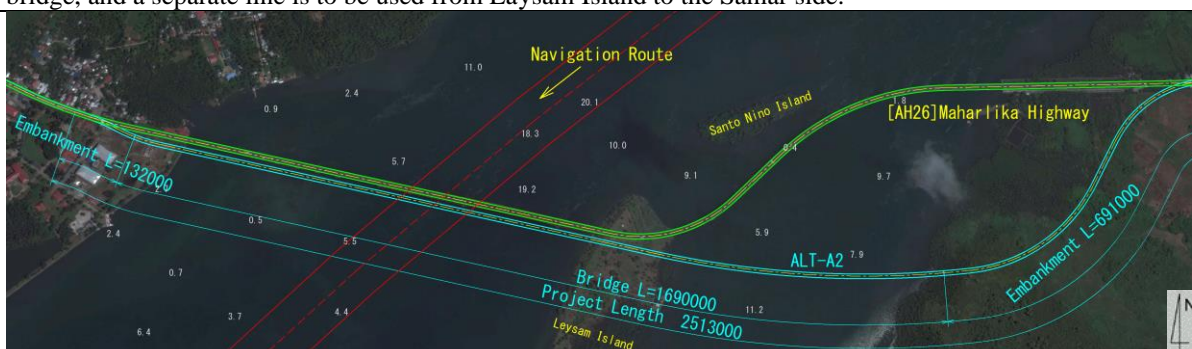
2) Study Policy

- In order to secure the navigation route and to harmonize the scenery with the existing bridge, the main bridge will be the same, including the bridge type and span arrangement.
- In the area close to the existing bridge, the pier position of the approach bridge is the same position as the existing bridge.

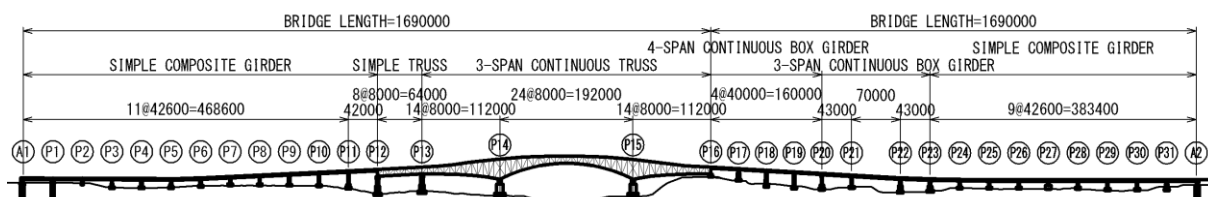
The foundation type is planned to be spread footing, same as the existing bridge.

3) Study Result

Table 17.4-6 Comparative Table for Alternative-A

<p>ALT-A1: A new bridge is to be installed at the north side parallel to the existing bridge.</p> 	
Structures (Leyte to Samar)	<p>Steel I-girder (L=510.6 m) Simple Steel Truss (L=64.0 m) Continues Steel Truss (L=416.0 m) Steel Box girder (L=316.0 m) Steel I-girder (L=851.4 m) Total Length, L=2,158 m</p>
Comment	<p>Since it is completely parallel to the existing bridge, the landscape is better than that of ALT-A2. However, the overall length is longer than ALT-A2, so it is less economical (1.15).</p>
Evaluation	---
<p>ALT-A2: A new bridge is to be installed at the south side of Laysam Island in parallel with the existing bridge, and a separate line is to be used from Laysam Island to the Samar side.</p> 	
Structures (Leyte to Samar)	<p>Steel I-girder (L=510.6 m) Simple Steel Truss (L=64.0 m) Continues Steel Truss (L=416.0 m) Steel Box girder (L=316.0 m) Steel I-girder (L=383.4 m) Total Length, L=1,690 m</p>
Comment	<p>The approach bridge on the Samar side is visually complicated and features inferior landscape compared to ALT-A. However, the overall bridge length is shorter, which is economical (1.00).</p>
Evaluation	Recommended

Source: JICA Study Team



Source: JICA Study Team

Figure 17.4-11 Plan of Alternative-A

(2) Alternative B: Case of Independent Route

1) Alternatives B1, B2 and B3

- As an alternative, two types of cross-linking plans are considered.

- ALT-B1**
- ALT-B2**
- ALT-B3**

Alt-B1

Location: About 10-13 km north of the existing bridge

Strait Width: 500 – 1,200 m

Area Features:

- This is the area where the strait width is the narrowest. However, the range where the water depth is deeper than 20m is wide. For this reason, the length of the bridge is determined within the possible substructure construction range.

Alt-B2

Location: About 6-9 km north of the existing bridge

Strait Width: 1,000 – 2,000 m

Area Features:

- The strait is divided by the small islands scattered at the center of the strait.
- If the divided strait is a crossing route, the width of the strait is 800 m, 400 m, 150 m.
- The range where the water depth is deeper than 20 m is wide.
- For this reason, the minimum span length can be a route restriction.

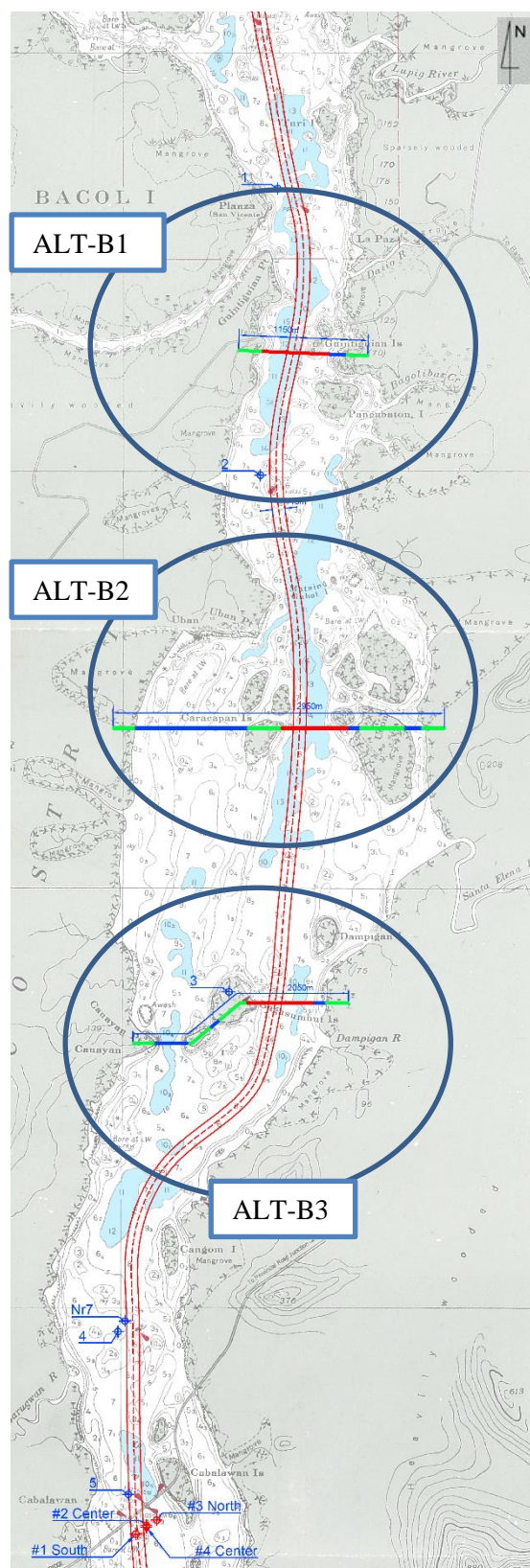
Alt-B3

Location: A strait about 3-6 km north of the existing bridge

Strait Width: 1,000 - 2,500 m

Area Features:

- The strait is divided by the small islands scattered at the center of the strait.
- If the divided strait is a crossing route, the width of the strait is 200 m and 600 m.
- Compared to other areas, the range where the water depth is deeper than 20 m is small.
- For this reason, the minimum span length of the main bridge can be a route restriction.

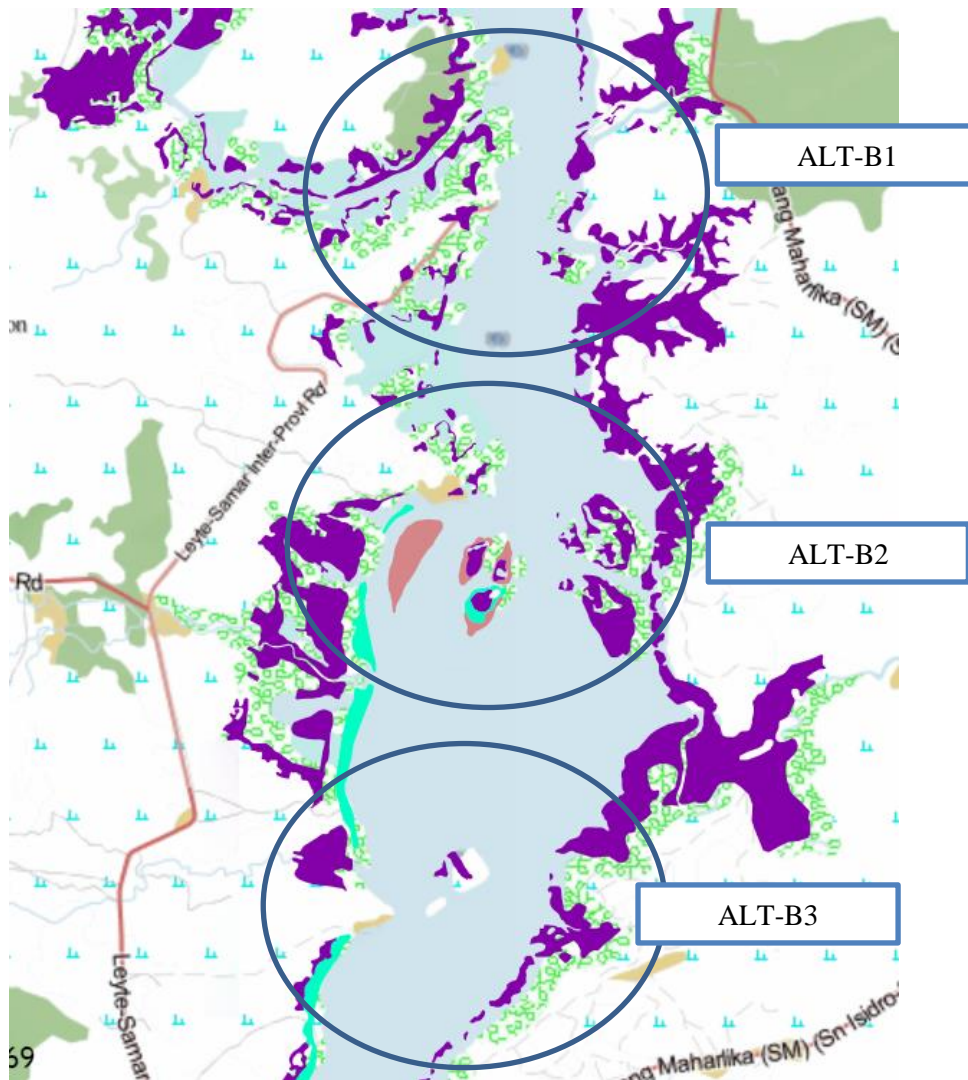


Source: JICA Study Team

Figure 17.4-12 Outline of Alternative-B

2) Study Policy

- In order to secure the navigation route and to harmonize the scenery with the existing bridge, the main bridge is the same, including the bridge type and span arrangement.
- Mangroves are inhabited on both shores at any point. For this reason, the environmental impact is assumed to be the same for all three plans.
- The foundation type is planned to be a spread footing, which is the same as the existing bridge.



Corals
Mangroves

Source: Geoportal PH (<http://www.geoportal.gov.ph/>)

Figure 17.4-13 Vegetation Status of Mangroves and Corals

3) Study Result

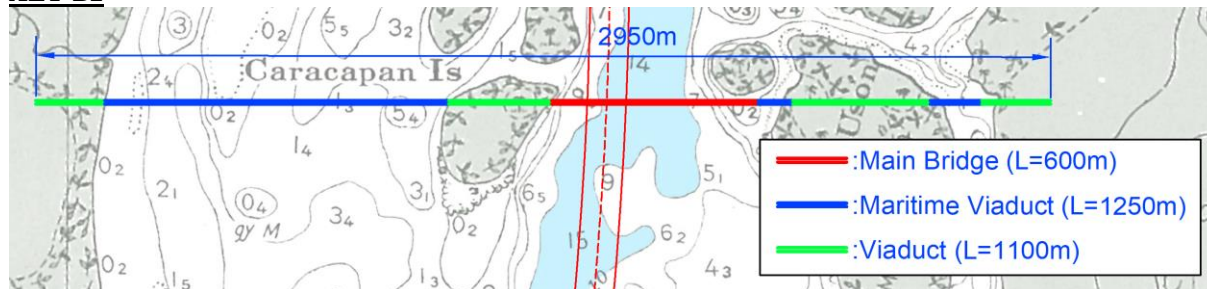
ALT-B1



Source JICA Study Team

Figure 17.4-14 Bridge Plan Arrangement at ALT-B1 (Area A)

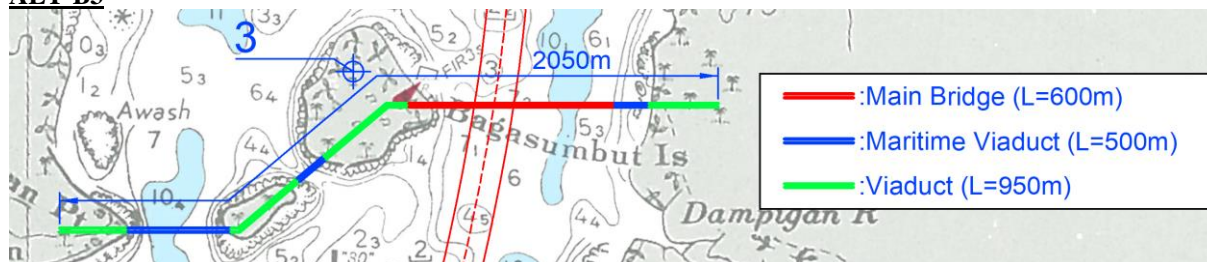
ALT-B2



Source JICA Study Team

Figure 17.4-15 Bridge Plan Arrangement at ALT-B2 (Area B)

ALT-B3



Source JICA Study Team

Figure 17.4-16 Bridge Plan Arrangement at ALT-B3 (Area C)

Table 17.4-7 Comparative table for Alternative-B

Item		ALT-B1	ALT-B2	ALT-B3
Structural Components	Length of Main Bridge	600 m	600 m	600 m
	Length of Maritime Viaduct	150 m	1,250 m	500 m
	Length of Viaduct	400 m	1,100 m	950 m
	Total Length	1,150 m	2,950 m	2,050 m
Ratio of Cost		1.00	1.65	1.30
Evaluation		Recommended		

Source JICA Study Team

The scale of the main bridge is the same at any point. The shortest approach bridge is the most economical. Therefore, Alternative B-1 is recommended.

(3) Selection of Alternatives

The recommended routes for alternatives A and B are compared to determine the best bridge location. This comparison does not determine the type of main bridge, but alternative A assumes a truss bridge as the same as existing bridge type. At the time of the comparison, in addition to economic efficiency, workability, maintenance, earthquake/wind resistance, and environmental impact are compared and a comprehensive evaluation is made.

Table 17.4-8 Comparison Table between Alternatives A and B

Item	ALT-A2	ALT-B1
Structural (Earthquake and Wind Resistance)	Excellent: It is composed of a structure with a high degree of static instability, it has excellent earthquake resistance and wind resistance.	Excellent: Since it is a structure with high static instability, it has excellent earthquake resistance and wind resistance.
Workability	Good: When constructing substructures and foundations, it is possible to secure a separation that does not affect the existing bridge. There is a possibility that the construction space will be narrowed during superstructure construction.	Good: It is necessary to ensure sufficient separation from the adjacent high-voltage line. Safety measures are required during construction.
Maintenance and Management	Poor: There are many members and many items to be maintained and managed. Therefore, the time, labor, and repair points are increased, and the maintenance cost is high.	Good: Maintenance costs can be reduced by reducing the number of members
Landscape	Normal: Harmony can be achieved by adopting the same structure as the existing bridge, but it gives a more complicated impression than when the existing bridge is used alone.	Good: There is no need to harmonize with the existing bridge, and it is possible to enhance landmark properties as a gateway by using a form that is rich in gate properties. In addition, it is possible to compare new and old technologies.
Environmental and Social Impact	Normal: There are relatively scattered mangrove species on the Samar Island side. Other major impact on environmental and social considerations are almost same level of ALT-B1 because affected areas environmental elements such as ecosystem, land use situation, affected size of communities are almost same.	Poor: There are communities of mangrove communities on both Leyte and Samar island sides and number of necessary cutting mangrove trees may be more than ALT-A2.
Construction Cost	Normal: 200 Mil. USD (1.10)	Excellent: 180 Mil. USD (1.00)
Evaluation	20 points	24 points Recommended The evaluation point of maintenance and management has much advantage in ALT-B1 in terms of engineering and life-cycle cost as well as the construction cost. In addition, impact on landscape is not as severe as ALT-A2 which may cause cumulative impact with existing bridge. On the other hand, impact on environment was evaluated as poor because of numbers of cutting mangrove trees may more than ALT-A2. However, as a result, both of these two options require certain numbers of cutting mangrove trees. Based on above comparison, general evaluation of ALT-B1 is higher than ALT-A2 and recommended as the selected option. Further alternative discussion shall be done in F/S phase with some pre-conditions such as geological data.

Excellent: 5, Good: 4, Normal: 3, Poor: 2, Bad: 1

Source: JICA Study Team

The construction cost is estimated assuming that the maximum span length of Alt-A2 is 150m and that of Alt-B1 is 300m. However, Alt-A2 is less economical because the total length of the bridge is long. Alt-B1 is inferior in structure and environmental impact, but it is possible to select a type of main bridge with excellent maintenance and landscape, and the construction cost is also excellent, so the Alt-B1 is recommended.

(4) Determination of Crosslinking Location

For the bridge area determined by the comparative study up to the previous section, a more detailed bridge position will be examined.

Table 17.4-9 Comparison Table for Crosslinking Location

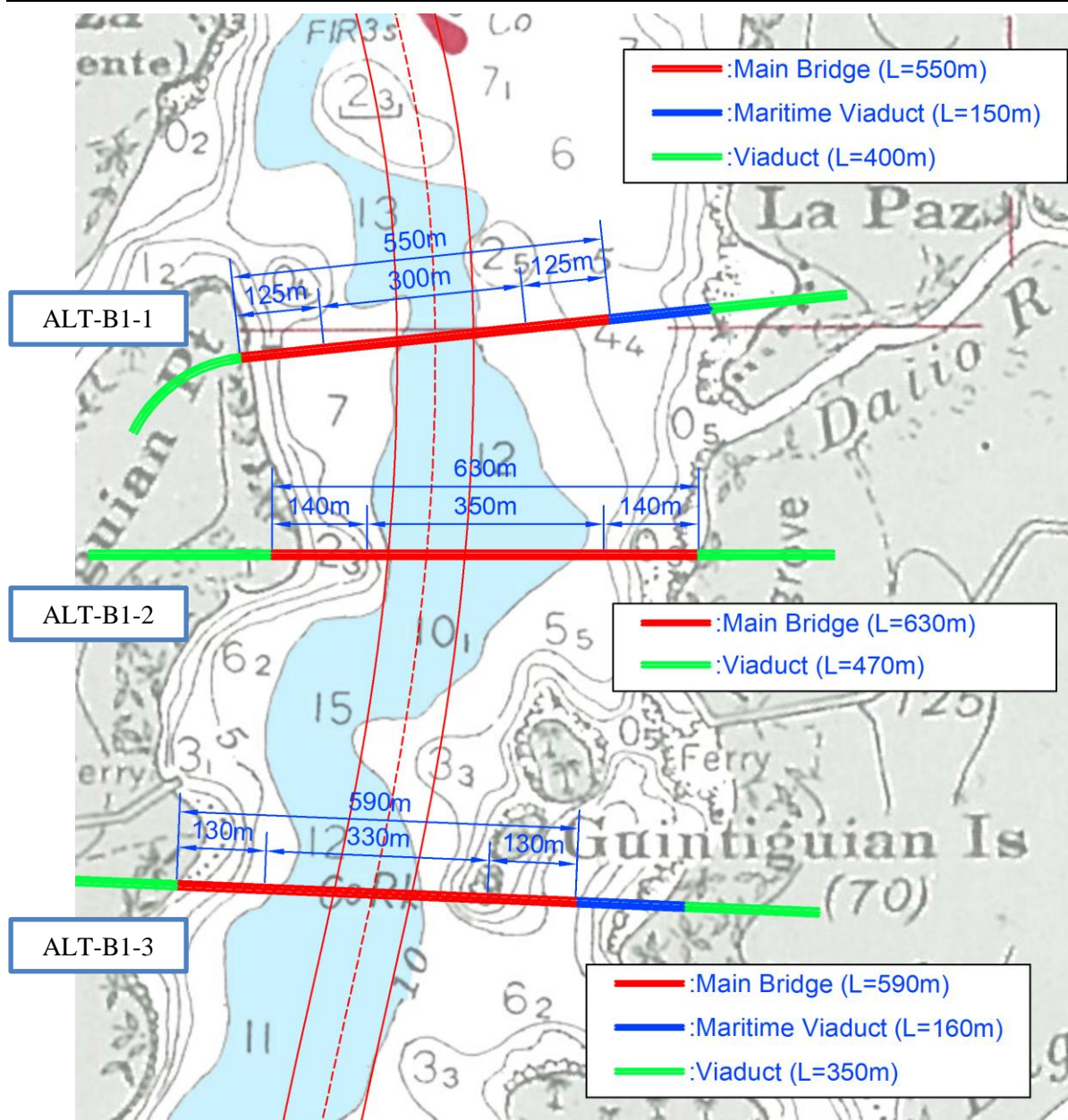
	ALT-B1-1	ALT-B1-2	ALT-B1-3
Strait Width	700 m	610 m	750 m
Range of Water depth 20m or more	120 m	300 m	200 m
Length of Main Bridge	550 m (125+300+125 m)	630 m (140+350+140 m)	590 m (130+330+130 m)
Length of Maritime Viaduct	150 m	0 m	160 m
Length of Viaduct	400 m	470 m	350 m
Ratio of Cost	1.00	1.08	1.05
Evaluation	Recommended		Recommended

Source: JICA Study Team

At this stage of documentary research that does not involve a field survey, there is no significant difference due to the location of the bridge. During the F/S stage, we propose to conduct a seabed survey in this area to determine the optimal bridge location.

The navigating vessels should avoid collision with the pier of the bridge as much as possible. The alternative of Alt-B1-3 allows the pier to be built on the small island and has high safety for navigating vessels.

Therefore, the proposed optimal bridge type is the ALT-B1-3 plan with an optimal route.



Source: JICA Study Team

Figure 17.4-17 Plan of Crosslinking Location

17.4.4 Preliminary Design of the Main Bridge

(1) Summary of Study Result

The bridge type is studied with **Alt-B1-3** as the bridge location. The table below shows the results of quantitative comparisons of the comparative study plans extracted in the next section with respect to structure, workability, maintainability, landscaping, and life cycle cost. “Arch Bridge” is recommended having the highest evaluation score.

Table 17.4-12 Evaluation Criteria

Evaluation Items		Score	Evaluation Point	★★★★★: x1.0	★★★★: x0.8	★★★: x0.6	★★: x0.4	★: x0.2
Structure (20 Points)	Wind Resistance	10	The less deformation in the lateral direction during a storm and no vibration occurrence are evaluated as high.	Less deformation and vibration	It is halfway between ★ 5 and ★ 1, but closer to ★ 5	The intermediate value between ★ 5 and ★ 1	It is halfway between ★ 5 and ★ 1	Deforms significantly in the lateral direction. Vibration is likely to occur
	Seismic Adequacy	6	High evaluation is given for the case where the inertia force acts at a low position and the case where it is difficult to resonate during an earthquake and has a long period	Low inertia force action position Long natural period				High inertia force action position Short natural period
	Redundancy	4	A type with high redundancy is highly evaluated. And if it has a critical member, the evaluation is low.	High redundancy No critical members				Low redundancy And there is a critical member whose damaged causes the bridge to collapse.
Constructability (15 Points)	Safety Risk	5	The type that the temporary structure is not at a high place, has excellent structural stability during construction, and has a small influence on the navigation route when the member falls is highly evaluated.	Temporary structures are not at high altitude. The structure is stable during construction. Small components and little effect on the navigation route				Temporary structure is at high altitude The structure becomes unstable during construction The components are large and the effect on the navigation route is large
	Construction Duration	7	High evaluation for a short construction period	Short construction period				Long construction period
	Construction Yard Required	3	High evaluation for a smaller requirement of construction yard and does not require concrete plant equipment.	Small construction yard No plant facilities required				Large construction yard Requires plant facilities
Maintainability (10 Points)	Work Volume	4	Highly rated if number of parts to be inspected: small Repainting area: small Inspection frequency: lesser	Number of parts to be inspected; Less Repaint area; Less Inspection frequency; Low				Number of parts to be inspected; many Repaint area; many Inspection frequency; many
	Workability	4	High evaluation if there is sufficient maintenance workspace and a short total length of the maintenance route.	The space for maintenance work is enough. The total length of the maintenance route is short				The space for maintenance work is narrow. The total length of the maintenance route is long
	Availability of Procurement for Maintenance Works	2	The type that can be maintained by general equipment is highly appreciated.	Can be maintained with common equipment				Requires special maintenance equipment
Landscaping (15 Points)	Harmony with the Bridge of the Existing Bridge and Surroundings		5	Excellent harmony with the existing bridge and the characteristics of the surrounding landscape (elements of the natural landscape) are highly evaluated.	Existing bridge; similar in shape Harmony with the surrounding landscape			Existing bridge; dissimilar in shape Harmony with the surrounding landscape; bad
	Architectural Features	Landmark	3	Symbolic and with unique landscape is highly evaluated.	Highly symbolic and constitutes a unique landscape			Due to the same type as the existing bridge the difficult to create a unique landscape
		Originality	3	The use of new technologies and new materials will be highly evaluated for originality that is worthy of attention worldwide can be expressed by design (shape) based on structural rationality.	Can be created advanced structures and types			It is difficult to express novelty because there is little room for new technology to be applied
		Technological progress	2	A type that has a visual sense of stability against horizontal force (a structural type with a feeling of stiffness and low visual center of gravity) is highly evaluated.	There is a sense of stability in the hem spread The low visual center of gravity			There is a no sense of stability in the hem spread The high visual center of gravity
	Environment Impact		2	High evaluation is given to a type that has few members that visually impaired when viewed from outside by a bridge user (passing vehicle, passerby).	A strong sense of open because there are few members that obstruct the view			A strong sense of obstruction because there are many members that obstruct the view
Cost (40 Points)	Life Cycle Cost	40	=40 - 40 x (ratio-1.0)	Life Cycle Cost = Initial Cost + Maintenance Cost (100 Years)				

Source: JICA Study Team

Table 17.4-13 Comparison Table for Bridge Type (1/2)

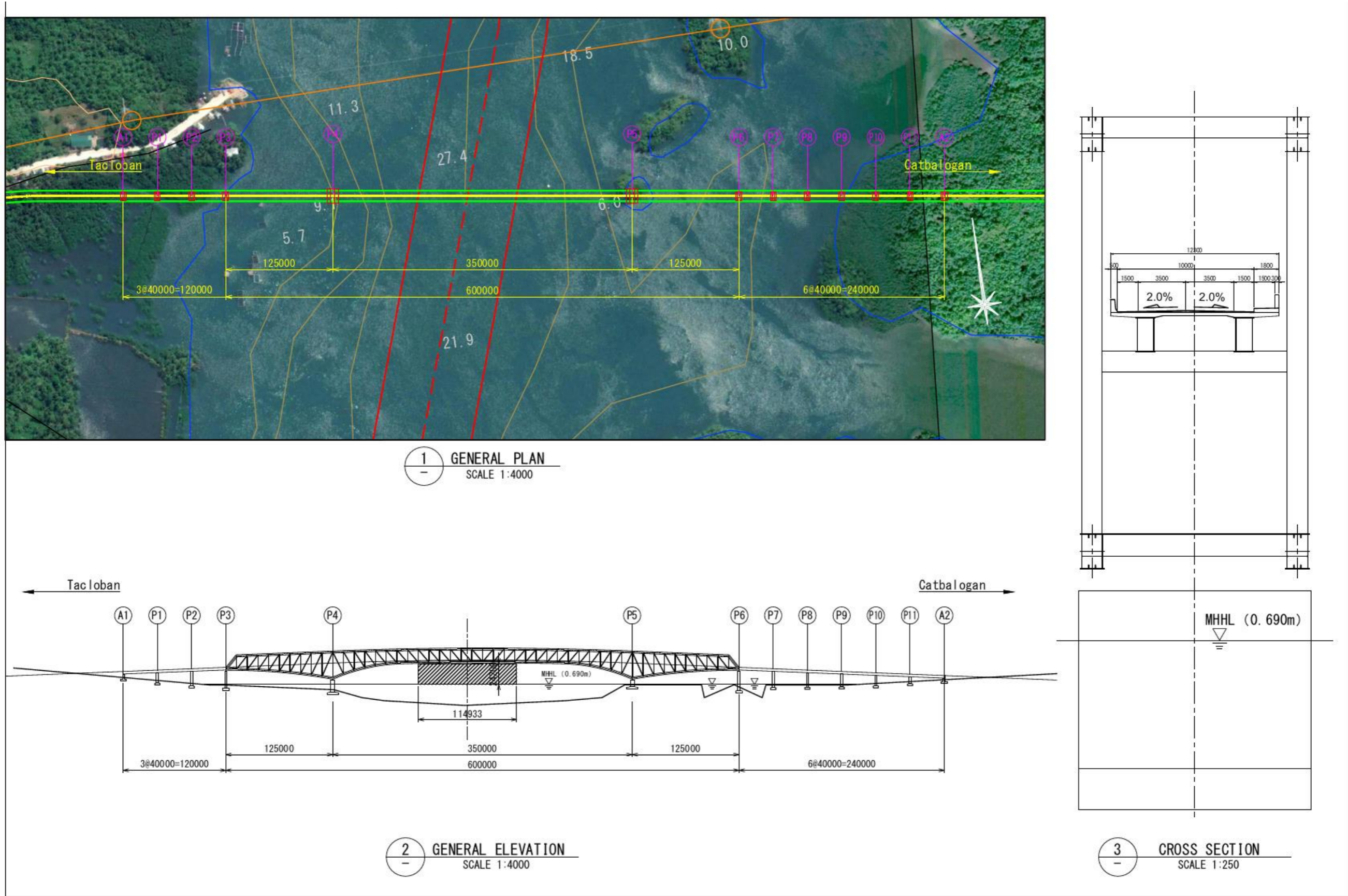
ITEM		SCORE	ALTERNATIVE 1		ALTERNATIVE 2		ALTERNATIVE 3	
BRIDGE TYPE			Truss Bridge		Arch Bridge		Cable-stayed Bridge	
(★★★★★: X1.0, ★★★★: X0.8, ★★★: X0.6, ★★: X0.4, ★: X0.2)								
EVALUATION ITEM								
STRUCTURE (20 POINTS)	Wind Resistance Stability	10	★★★ ★	10.00 Less deformation and vibration	★★ ★★	8.00 Both deformation and vibration are smaller than the cable-stayed bridge. Wind resistance measures are required for cables.	★★	4.00 Large deformation and vibration. Wind resistance is required for both cable and main girder.
	Seismic Adequacy	6	★★★ ★	4.80 The position where the inertial force acts is low, but the natural period is short and the design seismic intensity is high.	★★ ★★	4.80 It has intermediate properties between truss and cable-stayed bridge.	★★ ★★	4.80 Design seismic intensity is low due to long natural period, but the position of inertia force acting is high
	Redundancy	4	★★★ ★★	4.00 Have a high degree of redundancy.	★★ ★	2.40 Redundancy is second only to trusses. And it is necessary to take measures against cable breakage.	★★	1.60 Measures must be taken to prevent the main cable from breaking in order to prevent the bridge collapse.
CONSTRUCTABILITY (15 POINTS)	Safety Risk	5	★★★ ★	4.00 The safety risk increases only when the single-operation is installed, but otherwise, it is calm.	★★ ★★	4.00 The safety risk increases only when the single-operation is installed, but otherwise, it is calm.	★★ ★	3.00 Overhanging construction is possible over all sections.
	Construction Duration	7	★★★ ★	4.20 Longest construction period (4yrs)	★★ ★★	5.60 Medium construction period (3.5 years)	★★★ ★	7.00 Shortest construction period (3yrs)
	Construction Yard Required	3	★★★ ★	1.80 It requires a huge assembly yard for single-operation construction.	★★ ★	1.80 It requires a huge assembly yard for single-operation construction.	★★ ★★	2.40 A girder block yard is required. In addition, a plant facility is required for main tower construction.
MAINTAINABILITY (10 POINTS)	Work Volume	4	★★★ ★	1.60 There are many parts to be inspected. Large repainting area.	★★ ★	2.40 The number of parts to be inspected is medium. The repainting area is slightly larger.	★★ ★★	3.20 The number of parts to be inspected is medium. Repainting area is slightly less.
	Workability	4	★	0.80 Narrow range to maintenance space: Many (tilt truss) The total length of the maintenance route; Longest	★★ ★★	3.20 Narrow range to maintenance space: Small (Lateral beam) The total length of the maintenance route; Medium (Girder, Arch rib, Cable)	★★ ★★	3.20 Narrow range to maintenance space: Small (Lateral beam) The total length of the maintenance route; Medium (Girder, Pylon, Cable)
	Availability of Procurement for Maintenance Works	2	★★★ ★ ★	1.60 Can be maintained with common equipment.	★★ ★	1.20 Requires special maintenance equipment for cable.	★★ ★	1.20 Requires special maintenance equipment for cable.

Source: JICA Study Team

Table 17.4-14 Comparison Table for Bridge Type (2/2)

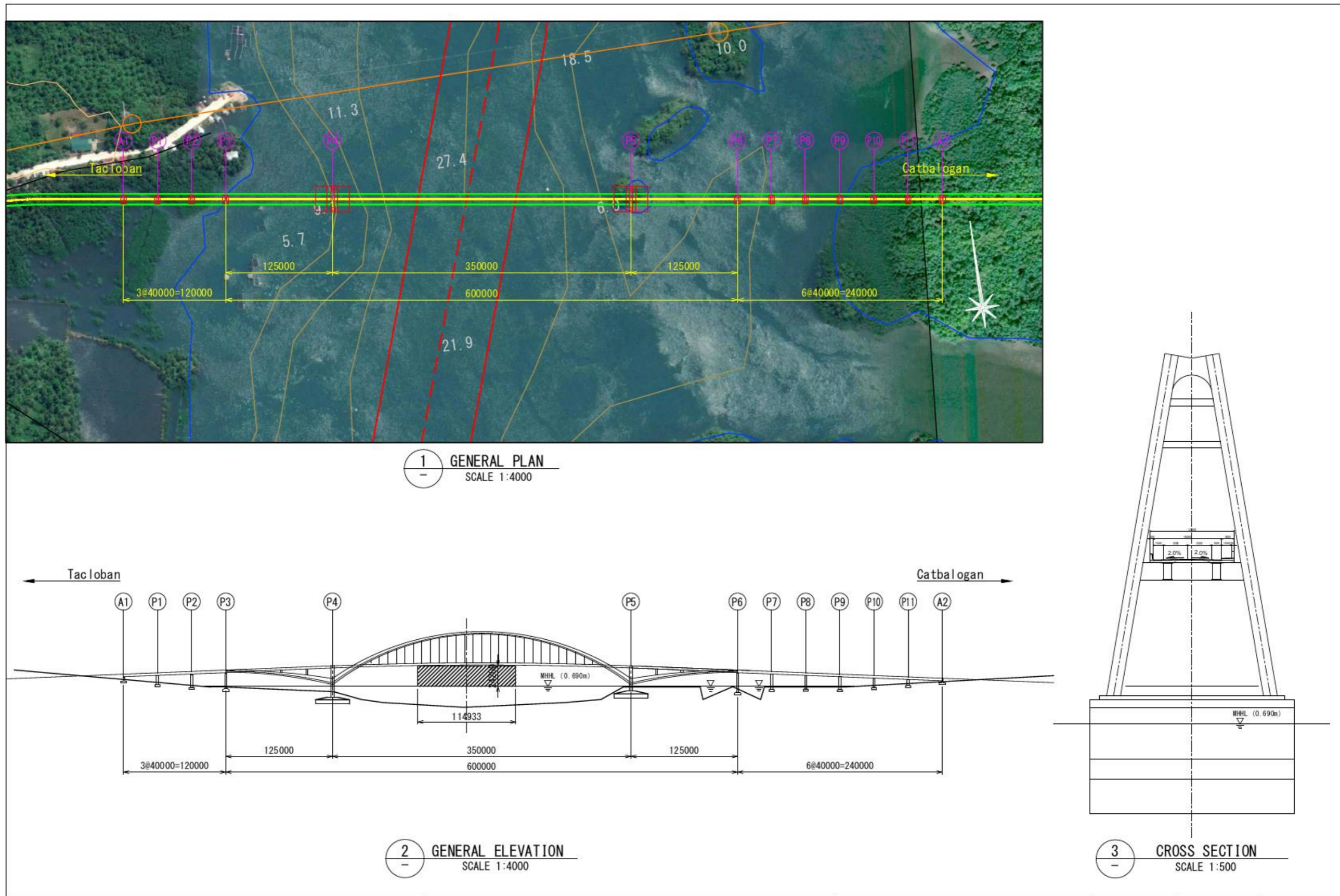
ITEM		SCORE	ALTERNATIVE 1		ALTERNATIVE 2		ALTERNATIVE 3		
BRIDGE TYPE			Truss Bridge		Arch Bridge		Cable-stayed Bridge		
LANDS CAPING (15 POINTS)	Harmony with the Existing Bridge of and Surrounding Areas	5	**	5.00	***	4.00	*	1.00	
			**	The truss structure is the same as the existing bridge and is in harmony.	*	The arch shape is similar to the existing bridge and is in harmony.		There is no similar element to the existing bridge. The linear shape of the pylon is compared to the surrounding landscape, and the degree of harmony is inferior	
	Architectural Features	Landmark	3	**	2.40	***	3.00	***	2.40
				**	It is unlikely to have a unique landscape because it is the same type as the existing bridge.	**	Demonstrating originality while respecting the existing bridge, it will be a unique landscape different from the current bridge.	*	It is a completely different type from the existing bridge and becomes a landmark unique to the area
		Originality	3	**	1.80	***	3.00	**	1.20
	Technological progress	2	*	*	0.40	**	2.00	**	1.60
					This is the same type, and no technological progress has been seen 50 years from now.	**	The silhouette can be combined with delicateness, showing the extensibility of technology.	*	Fifty years ago, the type was almost non-existent, and the technology was extensible, but poor in freshness as of now.
Environmental Impact	2	**	**	0.80	***	1.60	***	1.60	
			*	The view is blocked by truss members.	*	Few members obstruct the view.	*	Few members obstruct the view.	
COST (40 POINTS)	Life Cycle Cost	40		31.7		35.7		40.0	
	Initial Cost		Mil.	165.0		162.0		152.0	
	Maintenance Cost		USD	83.0		65.0		54.0	
	Total Cost			248.0		227.0		206.0	
	Ratio			1.21		1.11		1.00	
		100		74.87		82.75		78.20	

Source: JICA Study Team



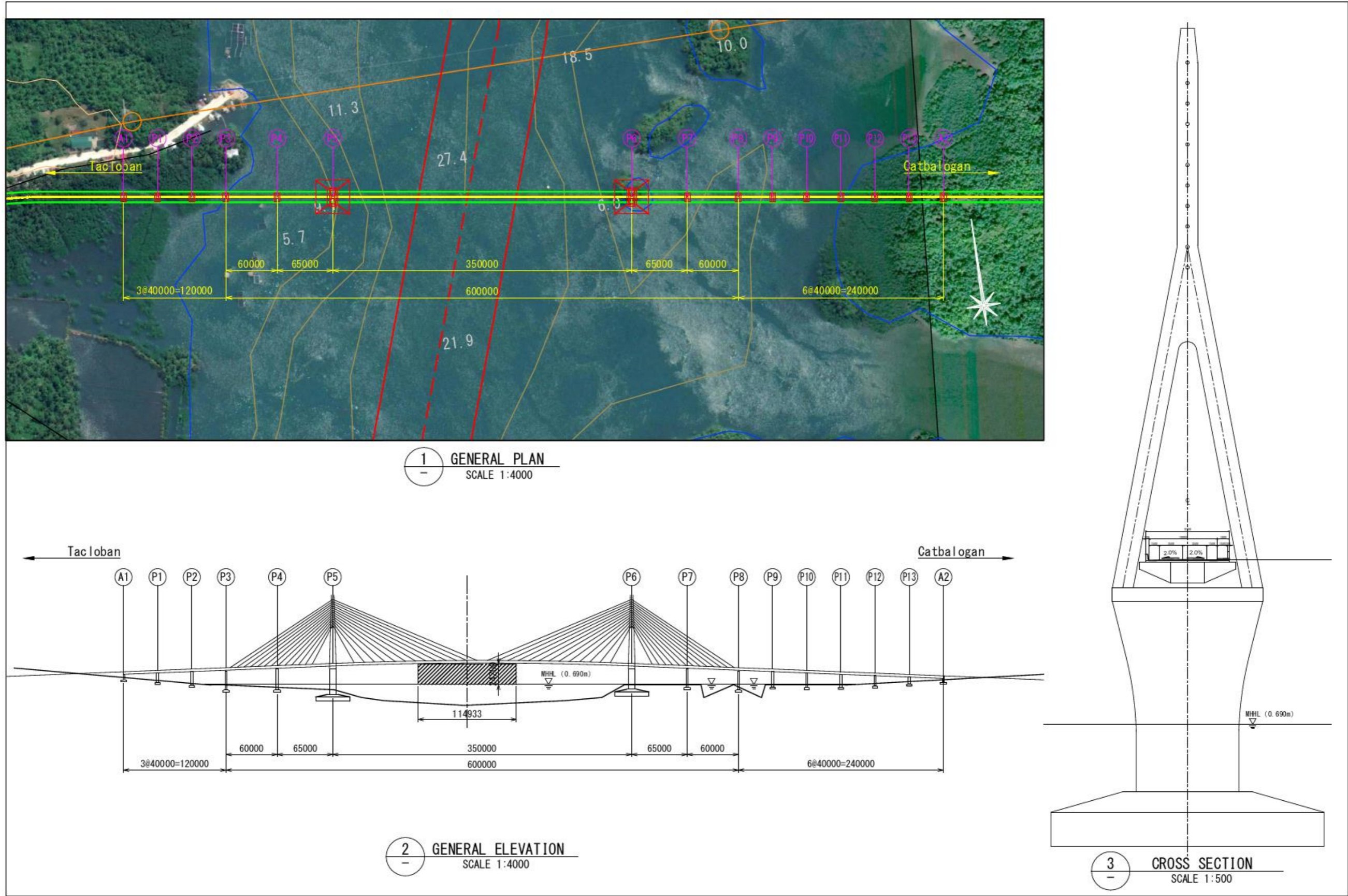
Source: JICA Study Team

Figure 17.4-18 General Drawing of Alternative-1 (Truss Bridge)



Source: JICA Study Team

Figure 17.4-19 General Drawing of Alternative-2 (Arch Bridge)



Source: JICA Study Team

Figure 17.4-20 General Drawing of Alternative-3 (Cable-Stayed Bridge)

17.4.5 Preliminary Design of the Approach Bridge

1) Extraction of the Alternative of the Superstructure

Since the main bridge covers almost the entire area of the strait, the approach bridge will be on land and shallow water. At the approach bridge part, there is no intersecting structure and the road alignment is almost straight, so the generally applied PSCG is adopted.

Table 17.4-15 Applicable Span for Each Bridge Type (For Approach Bridges)

Materials	Type of Bridge	Range	10	15	20	25	30	35	40	50	100	200	(m)
RC	Precaset Slab, Flat Slab	6- 12m											
	Concrete Deck Girder (RCDG)	13- 20m											
	Box Girder	22- 30m											
	Hollow Slab Bridge	10- 20m											
PC	Channel beams	11- 14m											
	Tee beams	15- 18m											
	I-beams	21- 30m											
	AASHTO girder (PSCG)	20- 40m											
	Box girders	30-200m											
	Hollow (voided) slab	15- 30m											
Steel	I-beams	15- 30m											
	Plate girder	20- 50m											
	Box girder	30-100m											
	Bailey bridge	9- 30m											
	Truss	40-130m											
	Arch	50-400m											

: Recommended bridge types and range for Overland Bridge
 : Recommended bridge types and range for Maritime Bridge
 : The Applicable range specified by DGCS

2) Substructure and Foundation Type

The substructure is a RC structure. As for the foundation, the spread footing in the same way as the existing bridge.

17.4.6 Road Design including Alternative Study

The location of 2nd San Juanico Bridge was determined in the previous sections. Therefore, the access road of 2nd San Juanico Bridge was studied to connect this bridge.

(1) Present Condition of Study Area

The study area is located at the 15 km north of the existing San Juanico Bridge. The study area covers Samar island side and Leyte island side.

Samar Island Side

- Maharlika Highway (AH26) which is a 2-lane road runs parallel to San Juanico Strait with the direction of north to south.
- Some buildings exist along Maharlika Highway.
- Power lines (HVDC) crosses the strait and extend to north.

- Some small hills exist between the strait and Maharlika Highway.
- Some small rivers flow to the strait.

Leyte Island Side

- Leyte-Samar Inter Province Road which is a 2-lane concrete paved road connecting Leyte-Samar Road reaches to Tacloban City. And Leyte-Samar Road extends to Tacloban City.
- Some buildings exist along Leyte-Samar Inter Province Road.
- Power lines (HVDC) crosses the strait and extend to south.
- Swamp where mangrove exists at the north of the bridge.
- Some small hills exist at the west side of Leyte-Samar Inter province Road.

(2) Alignment Design of Access Road

1) Geometric Design Standards

HSH Class-1 (4-lane, 80km/h) is adopted into the project road in the Master Plan. As initial phase, 2-lane (both direction) and without control access road is adopted. Geometric design standards for main elements are shown in **Table 17.4-16**.

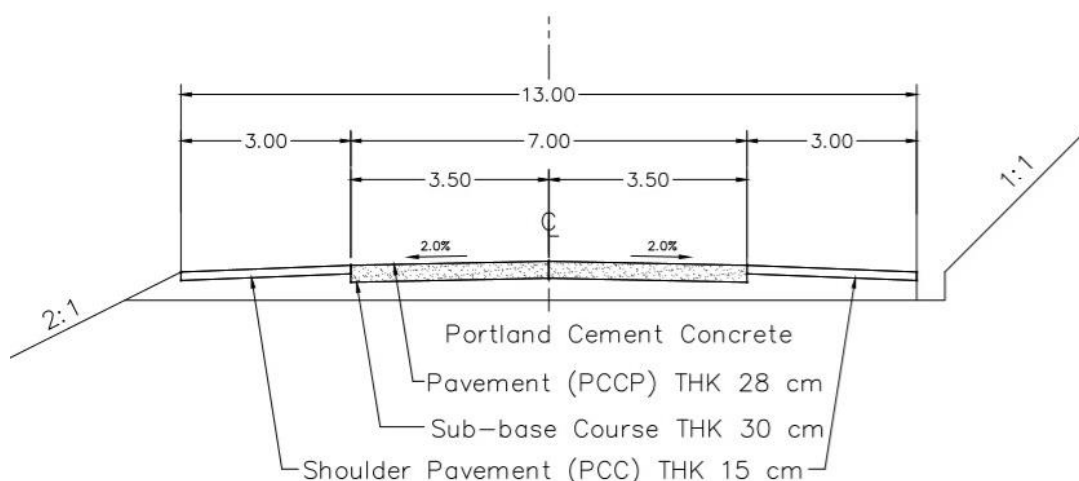
Table 17.4-16 Geometric Design Standards for Main Element

Item		Standard Value
Design Speed		80 km/h (Flat Terrain)
Number of Lane		2 lanes (4 lanes in the future)
Width	Lane	3.5 m
	Shoulder	1.5 m
	Earth Shoulder	1.0 m
Minimum Horizontal Curve Radius		400 m
Maximum Vertical Grade		4%

Source: JICA Study Team

2) Typical Road Cross Section

Typical cross section of an Access Road is shown in **Figure 17.4-21**.



Source: JICA Study Team

Figure 17.4-21 Typical Cross Section of Access Road

(3) Alternative Study for Access Road

Alternative Study was carried out for Samar Island side only, since Leyte island side has no alternative alignment.

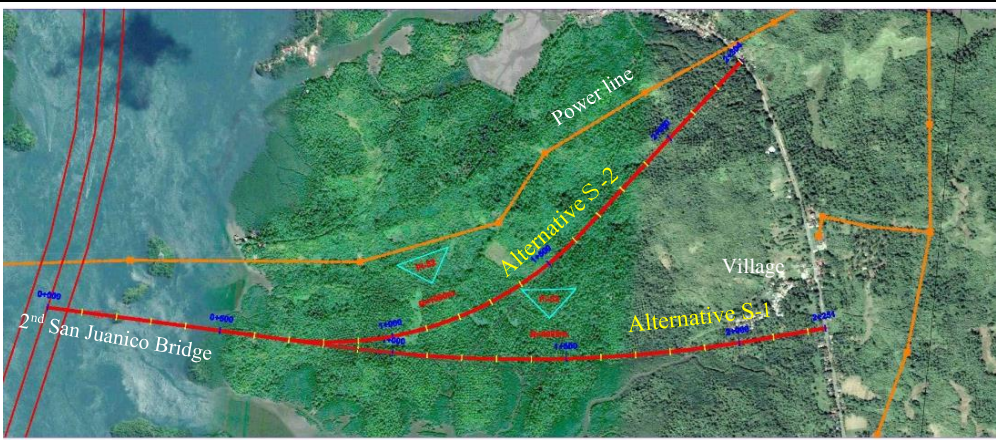
Samar Island Side: (Section from center of navigation route of 2nd San Juanico Strait to end point)

Alternative S-1 is planned with the alignment of connecting with the Maharlika Highway at the south of northern village.

Alternative S-2 is planned with the alignment of connecting with the Maharlika Highway at the south of southern village.

Location of Alternative S-1 and S-2 are shown in **Table 17.4-17**.

Table 17.4-17 Location of Alternative S-1 and S-2

	S-1	S-2
Out Line of Alternative	Connecting to Maharlika Highway at the south of Northern village	Connecting to Maharlika Highway at the south of Southern village
Plan		
Length	2.25 km	2.30 km
Horizontal Alignment	Minimum Curve Radius is 4,000 m	Minimum Curve Radius is 1,000 m
Vertical Alignment	Maximum grade is 1.96%	Maximum grade is 1.69%
Advantages	+Road length is shorter than S-2 +Horizontal alignment of intersection of Maharlika Highway is better than S-2	
Evaluation	Recommended	

Source: JICA Study Team

As for the optimal route, S-1 was selected.

(4) Preliminary Design of Selected Access Road

Preliminary Design was carried out for the selected route based on the secondary data of google satellite map and ASTER GDM v2 Worldwide Elevation Data.

1) Design Drawings

Preliminary drawing of the plan and profile are shown in **Appendix 17-1**.

Scale of the design drawing is as follows (including 2nd San Juanico Bridge).

Plan: S=1/5,000, Profile: H=1/5,000 V=1/1,000

2) Data for Calculation of Construction Cost (Project Scale)

Data for calculation of construction cost are shown in **Table 17.4-18**.

Table 17.4-18 Data for Calculation of Construction Cost (Project Scale)

Item		Quantities	
Project Road Length	Earth work section (Classified into flat terrain)	Embankment	1.908 km
		Cutting	1.730 km
		Sub-Total	3.638 km
	Bridge section (2 nd San Juanico Bridge)		1.240 km
	Total		4.878 km
Number of Intersection (at-grade)		4-legged Intersection	2 (Leyte Island)
		3-legged Intersection	1 (Samar Island)

Source: JICA Study Team

17.5 Construction Plan of the Project

17.5.1 Construction Plan

Based on the result of the Preliminary Design, the JICA Study Team has prepared the construction plan. The Project site is located on the sea and is susceptible to typhoons. The construction plan will consider such seasonal characteristics of the Project site.

17.5.2 Construction Casting Yard

Major construction activities for the 2nd San Juanico Bridge project are producing numbers of Steel Box Girders and Steel Arch Type Bridge within the construction yard and these manufactured steel box girder and Steel Arch Bridge will be transported to the project construction site timely according to implementation schedule mostly by barge. The selection of construction casting yard is nearby the construction site. Construction casting yard is a temporary activity but production activities are in large volume to prepare concrete materials by the concrete batch plant and assemble of Steel Box Girder. The contractor will select proper location for the construction site and its scale during tender procedure. Steel Arch Bridge will be using Super Barge.

17.5.3 Special Construction Method for Erection of Main Bridge (Advanced Construction Technology)

Super Barge will be secured from Japan and Assembling of Steel Arch Space will use Super Barge near the new bridge construction area. After assembling the center span of arch bridge, this will be transported to the construction site. Set up for position and lift up of Steel Arch Center Span has to use the special 3,000 ton class Jumbo Crane for large-scale one-time casting of Steel Arch Center Span. This Jumbo Crane will be brought from Japan due and propose to use due to its advantage of minimum disturbance of ship traffic. Size of Super Barge is as follows: L=110 m, W=32 m, Loading Capacity=14,500 ton. Jumbo Crane and Super Barge is shown in **Figure 17.5-1** and **Figure 17.5-2**.

Cable Erection System is very difficult to set up due to 320 m center span and 110 m wide of navigation under center span area.



Source: Yahoo Web Site

Figure 17.5-1 Bridge Erection using Jumbo Crane



Source: Yahoo Web Site

Figure 17.5-2 Casting Yard using Super Barge

17.5.4 Construction Site and Access Road

The construction site is the crossing of San Juanico Strait between Samar Island and Leyte Island and a new Approach Road on both sides. Access to the construction site is from the sea using barge and temporary staging from the land. Access from new Approach Road is also important. The existing road and new approach road will be used for delivery for construction materials to construction site. The construction site will serve for stockpiling materials as steel, formworks and scaffoldings for construction of piers and approach bridge.

17.5.5 Construction Schedule

The construction schedule did not take into consideration of ROW acquisition-related activities such as demolition and movement of houses and structures, which means that the construction schedule assumes that ROW acquisition for the Project has been completed and that each section has been cleaned up. Based on the above condition, total construction period for Construction of the 2nd San Juanico Bridge Project including Approach Road will be 30 months. Construction Schedule for 2nd San Juanico Bridge Project is shown in **Table 17.5-1**.

Table 17.5-1 Construction Schedule for 2nd San Juanico Bridge

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Site Preparation	Clearing and Grubbing																														
	Cut (L=1.73km) & Fill (L=1.908 km)																														
Approach Road L=3.638 km	Drainage																														
	Pavement (PCCP)																														
	Miscellaneous																														
	Intersection (3 Location)																														
Pier & Abutment Main Bridge (L=600 m) Approach Bridge (L=640 m)	A1																														
	P1-P3																														
	P4																														
	P5																														
	P6-P11																														
	A2																														
Steel Bridge	Material Preparation																														
	Fabrication																														
	Assembling																														
	Painting at Factory																														
	Packing and Domestic Transport																														
	Oversea Transport																														
	Assembling/Erection/Bolting																														
	Painting at Site																														
	Fabrication of Composite Deck Panel																														
	Installation of Composite Deck Panel																														
	Deck Slab																														
Pavement																															
Miscellaneous work																															

Source: JICA Study Team

17.5.6 Traffic Management and Safety during Construction

Traffic Management during construction for this project would be coordinated with LGU and Police to manage. Traffic control at the roads within the influence area of the project site and San Juanico Strait are important to be managed. Each LGU has Traffic control section and this project needs support from them.

17.6 Cost Estimates of the Project

17.6.1 General

Since this is a Pre-Feasibility Study, a rough cost estimate will be applied for the cost estimation.

17.6.2 Construction Unit Price

The cost of Arch Bridge was estimated based on the Japan's Unit Cost and others were estimated based on the Philippine's Unit Cost.

The reference data for the construction unit cost is shown in **Appendix 17-2**.

Table 17.6-1 Construction Unit Cost for Rough Cost Estimate

Structure Type	Unit Cost (Mil. Php/km)	Remarks
Earthwork - Embankment Section	142.48	2-lane, H=7 m
Earthwork - Cut Section	233.80	2-lane, H=7 m
Arch Bridge Super Structure	11,182.50	2-lane, Based on the Japan Unit Cost and Sea Transportation Cost
Arch Bridge Sub Structure	1,417.28	
Bridge - P/S Concrete Girder	828.92	2-lane, Span 35m, Single column H=8 m
Relocation of Power Transmission Line	20.00/location	Past other projects was 9 Million or 15 Million Php

Note: All items are including VAT

Source: JICA Study Team

17.6.3 Construction Cost for Each Section

Construction cost for each section was roughly estimated at Php 9,171 Million as shown in **Table 17.6-2**.

Table 17.6-2 Construction Cost

Item	Unit Cost (Mil. Php/km) (a)	Quantity (b)	Cost (Million Php) (a*b)
Earthwork - Embankment	142.48	2.35 km	335
Earthwork - Cut Section	233.80	1.37 km	320
Bridge Steel Arch -Super Structure	11,182.50	0.60 km	6,710
Bridge Steel Arch -Sub Structure	1,417.28	0.60 km	883
Bridge - P/S Concrete Girder (Super and Sub Structure)	828.92	1.09 km	904
Relocation of Power Transmission Line	20.00	1.00	20
Total			9,171

Source: JICA Study Team

17.7 Environmental and Social Considerations

As a result of the discussion on prioritized projects in masterplan, Second San Juanico Bridge Project (SSJB), one of the four proposed projects, was selected. Relevant studies on SSJB as a part of this masterplan is "pre-feasibility study level" without fixed conditions and further study and evaluation shall be implemented in following phase of Feasibility Study (F/S) in the future. Therefore, relevant studies in environmental and social considerations of this report are also pre-feasibility study level and shall be followed-up and updated by F/S.

17.7.1 Project Component and Impacts on Environment

The 2nd San Juanico Bridge is planned to cross the San Juanico Strait to NH 26 in Samar Island and Leyte Island. The proposed project outline based on the survey with a map of the target area is elaborated in **Section 17.1**. Project component which will cause adverse impact is found as construction of access roads and a main bridge as shown in **Section 17.4**.

This is a pre-feasibility study without fixed conditions such as associated projects by other proponents, relevant activities including soil borrow pits, quarry pits, construction roads, camp yards etc., and pre-acquired land for the project, therefore, further confirmation shall be implemented during next phase which is the feasibility study (F/S). As far as the Pre-F/S in this master plan is concerned, implementation timing is not decided, and other specific planned or reasonably defined developments are not found. Therefore, the survey focuses on direct impact caused by the project during Pre-F/S stage, and the possibility of cumulative impact will be considered during the F/S stage.

In order to conduct initial environmental and social impact assessment at Pre-F/S, LGUs in and around the proposed project area are selected as the study area. The Project will traverse one city and two municipalities. The Project will be divided into two phase sections depending on the commencement of the operation. The study area for secondary data collection of environmental and social baseline covers two sections (Phase 1 and Phase 2 section). The study area for site visit, public consultations and initial environmental and social impact assessment at Pre-F/S covers for Phase 1 section of the Project.

Table 17.7-1 LGUs in the Proposed Project Area

Island	Region	Province	Municipality/ City	Barangays	Project Phase	Length of the Project Alignment
Visayas	Region VIII: Eastern Visayas	Samar	Municipality of Santa Rita	Bagolibas	Phase 1 (JICA portion)	4.8km
		Leyte	Municipality of Babatngon	Guintigui-an Uban		
				Tacloban City	Gov. E. Jaro Cabalawan, New Kawayan, Suhi, Santo. Niño, Tagapuro	Phase 2
		Total	2	3	9	2 Phases

Source: JICA Study Team

17.7.2 Baseline of Environmental and Social Conditions

The following descriptions are collected information on pollution, natural environment, reserved areas of natural protection and cultural heritages, land use, living areas of indigenous people, and social conditions of land acquisition and involuntary resettlement.

(1) Socio-Economic Conditions

a) Population

The total population of the three LGUs of the study area is 311,477 as of 2015 and presented in **Table 17.7-2**.

Table 17.7-2 Population of the Proposed Project Area

Municipality/ City	Area (km²)	Population	Population Density (Person/km²)
Municipality of Santa Rita	552.63	41,591	75
Municipality of Babatngon	152.07	27,797	183
Tacloban City	201.72	242,089	1,200

b) Education Opportunity

There were 731 or 4.04% of the population who are 5 years old and over who had attended pre-school while 10,405 or 57.51% had acquired elementary education with 30.69% who had completed the primary grades and 26.82% finished the intermediate level up to the sixth grade. There were 4,283 or 23.67% who had reached the high school level out of which only 1,398 or 7.73% had graduated from such level, while 153 residents had enrolled in post-secondary or vocational courses with 111 or 0.62% graduates. There were 1,171 or 6.47% college under graduates, 225 or 1.24% were academic degree holders while 9 or 0.05% had acquired post-baccalaureate degrees, 271 or 1.5% whose educational attainments were not reported and 845 or 4.67% had never gone to school.

The age group of five years old and over has a total population of 35,743. There were 576 or 1.61% who had attended pre-school while 20,545 or 57.48% had acquired elementary education with 8,582 who had completed the 5th to 6th grades and 11,963 finished the primary level. There were 8,382 or 23.45% who had reached the high school level out of which, 5,219 were undergraduates and 3,163 had graduated from such level. There are 270 individuals enrolled in post-secondary courses with 104 undergraduates and 166 graduates. There were 1,114 or 3.12% college undergraduates, 964 or 2.70% were academic degree holders, 15 were post baccalaureate, 62 or 0.17% whose educational attainment were not reported, and 3,815 or 10.67% had no grade completed.

c) Health Status

The basic health service in the municipality of Babatngon is delivered by the Department of Health through its Rural Health Unit – the Main Health Center. It has a separate building which occupies a land area of 1,164 square meters located at Melchor Cañete Street, Brgy. District 2.

The Rural Health Unit has eleven (11) staff composed of one (1) Municipal Health Office (MHO), one (1) Public Health Nurse (PHN), one (1) Public Health Dentist, one (1) Dental Aid, one (1) Rural Sanitary Inspector (RSI) and six (6) Rural Health Midwives (RHM)– one (1) which is employed on “Job Order” status. To effectively serve the needs of the people, there are five (5) Barangay Health Stations (BHS) located in strategic rural barangays, namely: Malibago, Pagsulhugon, Gov. E. Jaro, Rizal I and Taguite. One (1) Rural Health Midwife mans these, respectively. These stations serve neighboring barangays within a range of two (2) to nine (9) kilometers.

The Rural Health Unit and Barangays Health Stations personnel render maternal and child health care services such as Expanded Program on Immunization (EPI), Under Six Clinic (USC), Maternal and Child Health (MCH), Nutrition Program, Family Planning, Control of Diarrheal Diseases (CDD), Control of Acute Respiratory Infection (CARI) and prevention of communicable and non-communicable diseases. They also implement the National

Tuberculosis Program (NTP), Schistosomiasis and Filariasis Control Program, Dental Services and Environmental Health Sanitation Services.

As shown in **Table 17.7-3**, the population of Babatngon for the year 2005 was 22,421. The total number of live births during the year was 542 with a corresponding crude birth rate of 24.17%. The total number of deaths was 88 resulting in a crude rate of 3.92%. No maternal mortality was reported during the year. For morbidity cases, there were 887 based from general medical consultations, or a rate of 39.56%.

Table 17.7-3 Fertility and Morbidity Rate in Babatngon, Leyte for the Past Five Years

Year	Population	Live Births Monitored/ Crude Birth Monitored		Morbidity (General Medical Consultation)	
		Number	Rate	Number	Rate
2001	21,233	485	22.84	2,976	140.16
2002	21,524	445	20.67	20,064	95.89
2003	21,819	476	21.82	2,207	101.15
2004	21,118	499	22.56	1,428	64.56
2005	22,421	542	24.17	887	39.56

Source: Municipal Health Office

For municipality of Sta. Rita, in Poblacion, there is one Rural Health Center located at Barangay Gumamela. The RHU has a new modern birthing facility. The center is manned by MHO, one (1) PHN, one (1) med-tech, two (2) RHM, and one (1) RSI. The rural barangays have seven (7) Barangay Health Stations, while Tominamos BHS is manned by one (1) midwife which serves Barangays Binanalán, San Isidro and San Eduardo.

On the other hand, Maligaya BHS is manned by one (1) midwife which serves Barangays Union and New Manunca, while Lupig BHS is manned by one (1) midwife which serves Barangays Tulay, Old Manunca, and San Pascual. Barangay Pagsulhogon BHS is manned by one (1) midwife which serves Barangays Magsaysay, Cabacungan, Bagolibas, La Paz and Alegria. In addition, Santa Elena BHS is manned by one (1) midwife which serves Barangays San Pedro, San Juan, Caticugan and Dampigan, while Anibongon BHS is manned by one (1) midwife which serves Barangays Camayse and San Roque. Hinangutdan BHS is manned by one (1) midwife which serves Barangays Igang-Igang, Cabunga-an, Tagacay and Cansadong. Other barangays not served by the mentioned BHS are served by the main RHU.

The trend for the increase or decrease in population in the municipality is presented in **Table 17.7-4** in terms of Crude Birth Rate (CBR) and Crude Death Rate (CDR) from 2012 to 2016. It shows that in 2012 to 2013 there was an increase in CBR of 0.40% while a decrease in CDR of 0.30%. In year 2013-2014 there was an increase in CBR of about 3.10% and an increase also of CDR of 0.20%. In year 2014-2015 the CBR has decreased by 0.10% and an increase of CDR by 0.80%, and in the year 2015-2016, the CBR decreased by 2.20% and also the CDR has decreased by 0.60%.

Table 17.7-4 Fertility and Morbidity Rate in Sta. Rita, Samar for the Past Five Years

Period	CBR	% Increase/Decrease from Previous Year	CDR	% Increase/Decrease from Previous Year
2012	21.37%	-	2.38%	-
2013	21.66%	0.29%	2.01%	-0.37%
2014	25.01%	3.35%	2.30%	0.29%
2015	25.34%	0.33%	1.51%	-0.08%
2016	23.10%	-2.24%	0.90%	-0.59%

Source: Municipal Health Office

(2) Pollution Items

2) Air Quality

Based on the results of ambient air quality monitoring in 2017 at six locations in Leyte, all of the tested parameters for air quality (TSP, SO₂, NO₂ and PM₁₀) were within the National Ambient Air Quality Guideline Values (NAAQGV) of the DENR (**Table 17.7-5**).

Table 17.7-5 24-hour Ambient Air Quality Monitoring Results

Parameters	DENR NAAQGV Standards (µg/Ncm)	WHO Air Quality guidelines for PM, ozone, nitrogen dioxide and sulfur dioxide	Stations					
			1	2	3	4	5	6
TSP	230	-	54.95	22.66	44.71	79.42	25.06	51.74
PM ₁₀	150	50µg/m ³ (24-hour mean)	23.56	13.51	19.99	31.18	12.25	27.56
SO ₂	180	500µg/m ³ (10-minute mean)	47.54	47.11	57.01	63.04	47.77	83.25
NO ₂	150	200µg/m ³ (1-hour mean)	0.66	0.26	1.01	1.01	1	1.17

Source: Isabel Ancillary Services Co., Ltd, 2017

3) Water Quality

The water quality monitoring locations were in Tigbao River, which is located 4.5 km south from the San Juanico Bridge. The River is classified as Class C (Fishery Water /Recreation Water Class II). All water quality parameters (pH, Chloride, Fluoride, Iron, Manganese) tested in Tigbao River were within the guideline value for the Class C water (**Table 17.7-6**). In the Philippines, sea water pollution is also recognized environmental issues.

Table 17.7-6 Water Quality Results in Tigbao River

Parameters	DAO 16-08	WHO's Global Overview of National Regulations and standards for Drinking-Water Quality (2018)	Tigbao River
pH	6.5-8.5	6.0-9.0	8.20
Chloride	350 mg/L	Non set (recommended median value- 250)	10.00
Fluoride	1 mg/L	1.5 mg/l (1500 µg/l)	0.10
Iron	1.5 mg/L	None set(recommended median value- 0.3)	0.10
Manganese	0.2 mg/L	0.4 mg/l	0.20

Note: PNSDW – Philippine National Standards for Drinking Water

(1) - Water Samples obtained from Pago Highway Bridge

(2) - Water Samples obtained at Tigbao River intake

Source: ADB Water District Development Sector Project, 2010

* Other necessary parameters such as BOD shall be measured in the F/S phase.

4) Waste

LGUs are operating solid waste management in the project areas with cooperation between private and no-governmental sectors in 3Rs activities. In case of the city of Tacloban, the population of 242,089 (2015) generated 175 tons of waste per day. The city has a decentralized collection system for household waste in 64 barangays or communities. The diversion rate for 64 barangays rose from 10 per cent in 2017, to 55 per cent by the end of 2018. This was possible due to the joint collaboration between city authorities with Mother Earth Foundation (MEF) and took on a multi-pronged approach, using policy instruments; information, education, and communication (IEC) campaign, as well as enforcement mechanisms for the city.

In Tacloban City, the City Environment and Natural Resources Office (CENRO) oversees ecological solid waste management. Starting October 2016, the city official and MEF launched phase 1 of the Ecological Solid Waste Management (ESWM) Program for the city.

5) Noise and Vibration

Based on the results of ambient noise monitoring in 2017 at six locations in the Leyte, the tested data at 5 locations were within the guideline value for Class B area (Commercial area) and D area (Industrial Area). The result of one station were beyond the guideline value for Class A area (Residential area) which could be attributed to daily life activities from nearby residential area (Table 17.7-7).

Table 17.7-7 Noise Level Monitoring Results

Station	Period	Time	Median SPL dB(A)	NPCC Standard dB(A)	IFC/WB EHS Guidelines
STN-1	Morning	0642H-0652H	46.7	70	-
	Daytime	1732H-1742H	56.0	75	55/70*
	Evening	2019H-2029H	51.1	70	-
	Nighttime	2234H-2244H	51.2	65	45/70*
STN-2	Morning	0533H-0543H	47.8	50	-
	Daytime	1703H-1713H	56.8	55	55/70*
	Evening	1943H-1953H	53.5	50	-
	Nighttime	2251H-2301H	47.3	45	45/70*
STN-3	Daytime	1518H-1528H	50.4	65	55/70*
STN-4	Daytime	1645H-1655H	55.4	75	55/70*
STN-5	Evening	1829H-1839H	53.4	60	-
STN-6	Evening	2024H-2034H	54.6	70	-

* Daytime 7:00-22:00 / Night time 22:00 - 7:00

* 55 and 45 in Residential/Institutional/Educational Area, 70 in Industrial/commercial area

Source: Isabel Ancillary Services Co., Ltd, 2017

6) Ground Subsidence

Outstanding ground subsidence due to groundwater and other kinds of activities have not been observed or reported so far. However, geological conditions such as existence of limestone is one of the risk factors of ground subsidence and sinkhole.

(2) Natural Environment

1) Protected Area

"The revised procedural manual for DENR Administrative Order (DAO) 2003-30: Implementing Rules and Regulations (IRR) for the Philippine Environmental Impact Statement (EIS) System" specifies 12 Environmental Critical Areas (ECAs) categories, as listed in

Table 17.7-8. DENR-EMB decide on the relevance of the ECA categories to the project location. ECA as defined is an area considered environmentally sensitive wherein the magnitude or impacts are easily recognized if proposed projects are built, developed, or implemented in it. It is expected that the project area is within four (4) ECA categories namely:

[No.6] Areas hard-hit by natural calamities (high susceptibility to flooding);

[No.8] Prime Agricultural Lands;

[No.10] Water bodies for domestic and wildlife/fishery support, and;

[No.11] Mangrove Areas

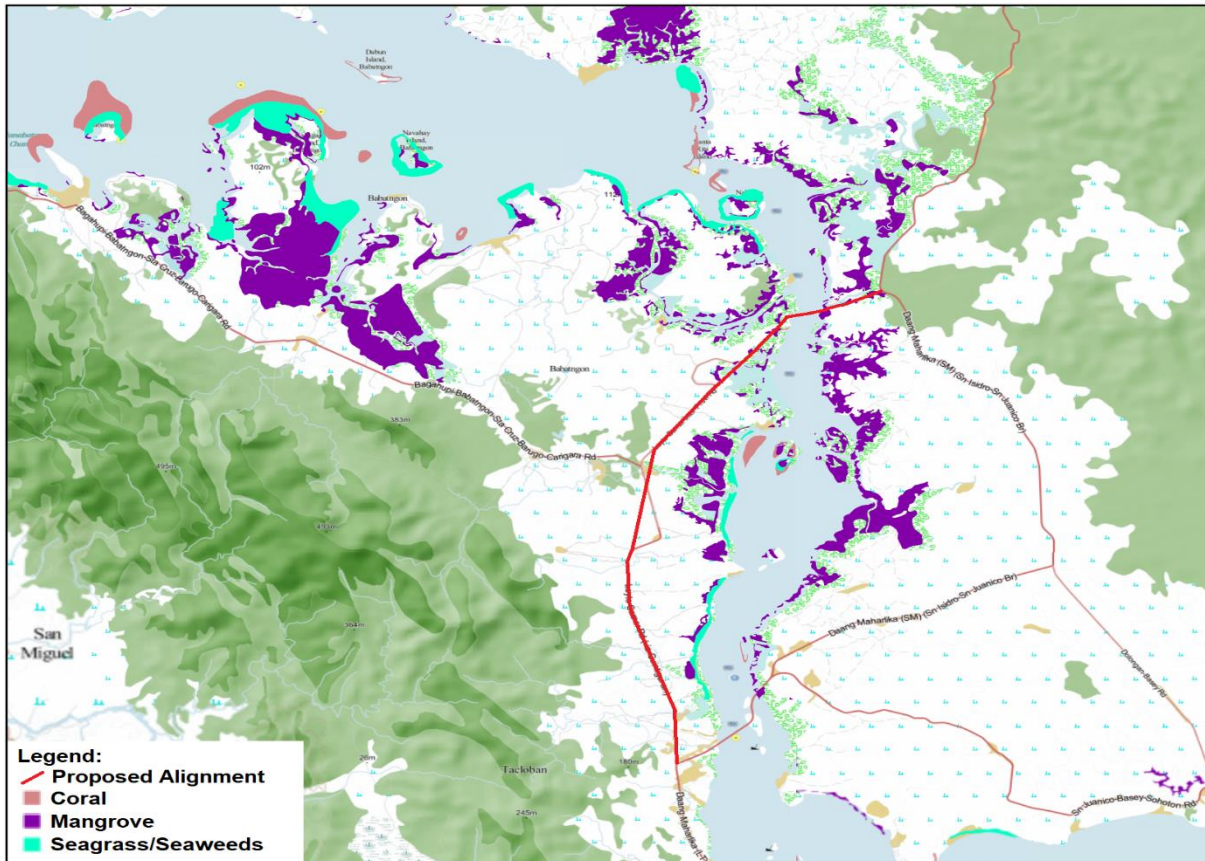
Table 17.7-8 Environmentally Critical Areas (ECAs) within or near the Project Site

No.	ECA Category	ECA within the proposed project	Remarks
1	Protected Areas (declared by National laws or local ordinances)	None	The nearest protected area (MacArthur Landing Memorial Park) from the proposed project is approximately 15.65 km away.
2	Aesthetic Potential Tourist Spots	None	The nearest aesthetic potential tourist spot (San Juanico Bridge) is approximately 10 km away from proposed 2nd San Juanico Bridge, and 0.92km away from the access road of phase 2.
3	Wildlife Habitat	None	The nearest protected area (MacArthur Landing Memorial Park) from the proposed project is approximately 15.65 km away
4	Unique Historic, Archaeological, Geological Site	None	The nearest historical site to the proposed alignment is the Leyte Provincial Capital, and the MacArthur Landing Memorial Park which are approximately 9.44 km and 15.65 km, respectively.
5	Ancestral Lands	None	Not Applicable
6	Hard-Hit by Natural Calamities	✓	Moderate to high susceptibility to flood (see Figure 17.7-3 and Figure 17.7-4)
7	Critical Slope (>50% or >27°)	None	A few of the areas near the proposed project are within the 18-30% slope
8	Prime Agricultural Lands	✓	The proposed access road will traverse agricultural lands. (see Figure 17.7-6 and Figure 17.7-7)
9	Recharge Areas of Aquifers	None	Not applicable
10	Water Bodies (for domestic use, or support wildlife/fishery)	✓	The proposed project will traverse seven (7) unknown rivers (1 for Phase 1 in Santa Risa, and 6 for Phase 2 in Babatngon), and one (1) strait (see Figure 17.7-2)
11	Mangrove Areas	✓	The proposed project will traverse mangrove areas. (see Figure 17.7-1)
12	Coral Reefs	None	The proposed project will traverse the San Juanico Strait. No protected coral reefs in and near project area (The nearest coral reef is located around 3km along the sea shore from the strait crossing point, or 1.39km from the nearest road alignment binding a residential area).

Source: JICA Study Team

2) Ecosystem

The mangrove forest in Babatngon, Leyte covers approximately 1,760.82 hectares or 11.58% of the total land area of the municipality. In Sta. Rita, Samar, as shown in **Figure 17.7-1**, mangroves are mostly located in all coastal barangays (Municipality of Sta. Rita CLUP, 2016). The San Juanico Strait separates the islands of Leyte and Samar and connects the Carigara Bay and Leyte Gulf which are rich in marine biodiversity. (Source: Comprehensive Land Use Plan (CLUP) of Municipality of Babatngon 2014, Comprehensive Land Use Plan (CLUP) of Municipality of Santa Rita 2016).



Source: geoportal PH

Figure 17.7-1 Mangrove Area Distribution Map in and around the Study Area

3) Hydrology

The proposed project (Phase 1 and Phase 2) will be traversing eight (8) water bodies, specifically, one (1) strait, the San Juanico Strait, and seven (7) unknown rivers/creeks (**Figure 17.7-2**). The San Juanico Strait has a length of 38 kilometers, and is considered the narrowest strait in the Philippines, being only two (2) kilometers wide.

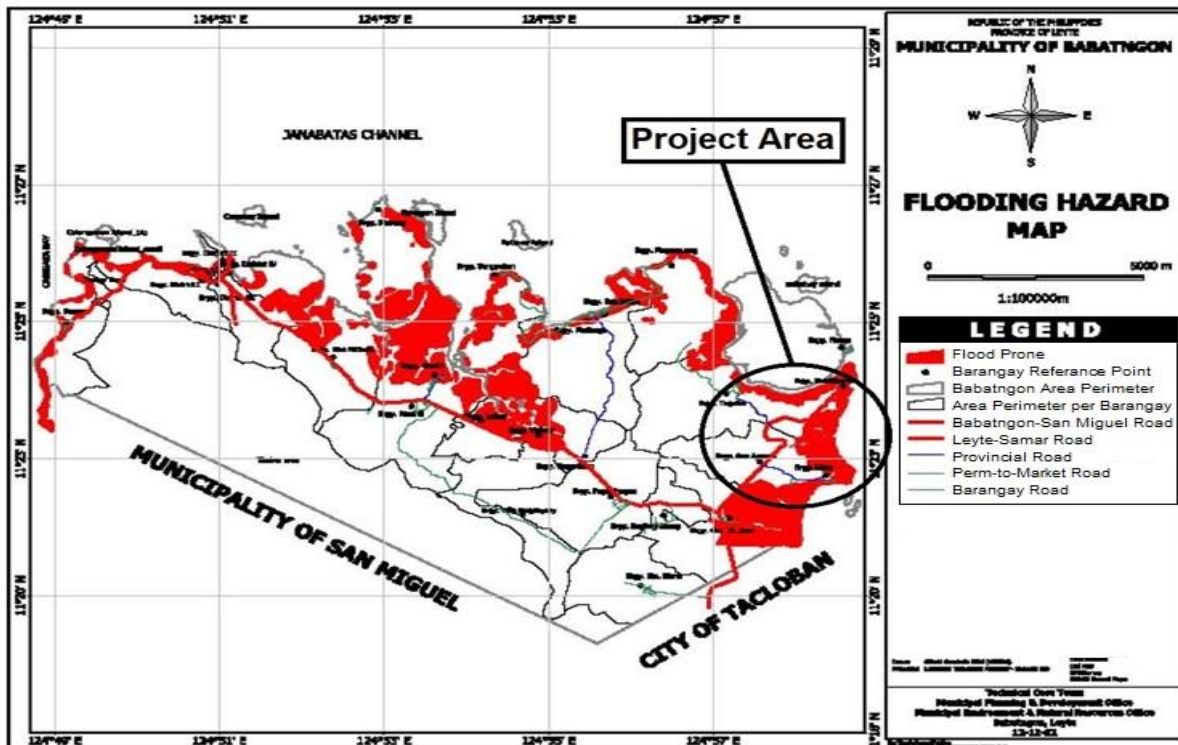
The shallow wells and deep wells used as one of water sources are distributed in Municipalities of Babatngon, Leyte and Sta. Rita, Samar.

The typhoon incidence in the Philippines is categorized by five classes which are: very high, high, medium, low, and very low. The project area will fall under medium incidence. The Municipalities of Babatngon and Santa Rita are categorized into three (3) susceptibility levels: High (1.5m flood height), Moderate (0.5m-1.5m flood height) and Low susceptibility (0.1m-0.5m flood height). The study area is considered to have a moderate to high flood susceptibility. (**Figure 17.7-3** and **Figure 17.7-4**).



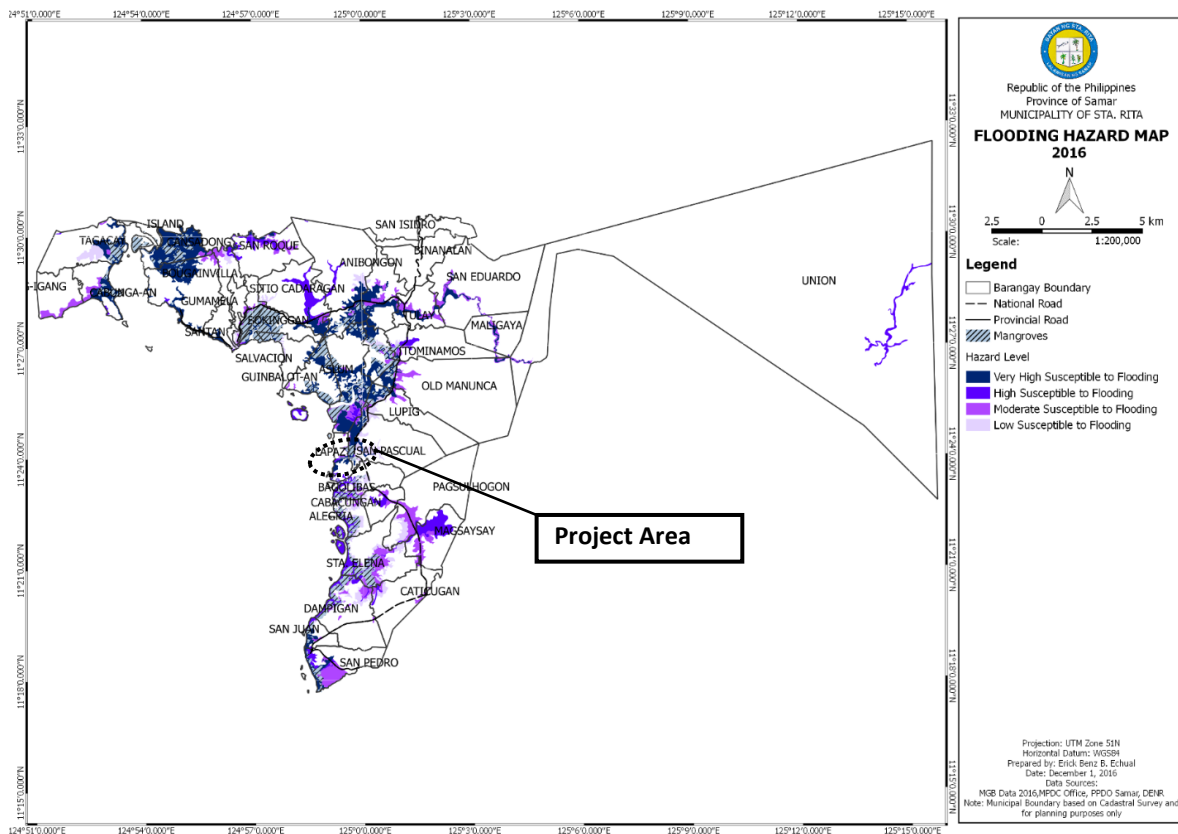
Source: JICA Study Team

Figure 17.7-2 River Network Map in and around the Study Area



Source: Mines and Geosciences Bureau (MGB), DENR, 2015

Figure 17.7-3 Flooding Hazard Map Existing of the Municipality of Babatngon, Leyte



Source: Comprehensive Land Use Plan (CLUP) of the Municipality of Santa Rita, 2016

Figure 17.7-4 Flooding Hazard Map Existing of the Municipality of Santa Rita, Samar

4) Topography and Geology

The slopes are categorized into six slope categories depending on the slope steepness such as 0-3%, 3-8%, 8-18%, 18-30%, 30-50% and 50% and above by DENR and NAMRIA. In Municipalities of Babatngon, Leyte and Sta. Rita, Samar, the four categorized slope type (0-3%, 3-8%, 8-18%, 18-30%) are distributed. The project area is categorized into three susceptibility levels: High, Moderate and Low susceptibility defined by Mines and Geosciences Bureau (MGB). The study area in Municipality of Babatngon is categorized in low to moderate susceptibility, and municipality of Santa Rita is categorized in moderate to susceptibility (Source: Mines and Geosciences Bureau (MGB)).

(3) Social Environment

1) Land Acquisition and Resettlement

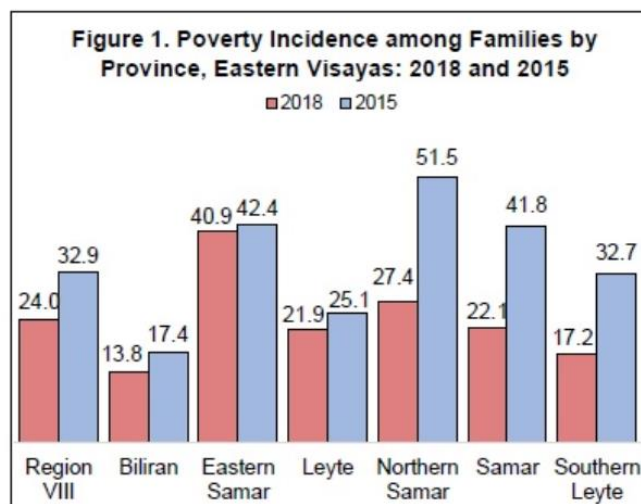
There have been many experiences of land acquisition and resettlement in and around the project areas including projects under safeguard policies of Asian Development Bank (ADB). Procedures of land acquisition and resettlement follows the system of the Philippines. Based on the 2015 statistical survey, i) Population ii) Household, iii) Area, and iv) Population density are;

[Babatngon] i) 27,797 persons, ii) 6,108 households, iii) 15,207ha, and iv) 1.83 persons/ ha

[Sta. Rita] i) 41,591persons, ii) 8,865 households, iii)55,263 ha, and iv)0.75 persons/ ha

2) Poverty

Leyte and Samar islands are the areas where poverty reduction is recognized as important social issue. According to Philippine Statistic Authority, poverty incidence among families in Eastern Visayas in 2018 significantly improved to 24.0 percent from 32.9 percent in 2015. This implies that in 2018, around 1 in every 4 families in the region is poor or has income below the poverty threshold, which is the amount required to meet basic food and non-food needs (**Figure 17.7-5**).



Source: Philippines Statistical Authority

Figure 17.7-5 Poverty Incidence of Eastern Visayas

3) Ethnic Minority and Indigenous People

There are no approved or on-going application for Certificate of Ancestral Domain Title (CADT) in Region 8, as of December 2019, in accordance with the national distribution maps of CADTs provided from National Commission on Indigenous Peoples (NCIP). (Source: The Philippine Map showing the approved CADTs on-process CADTs & Identified Ancestral Domain Areas, as of December 2019, National Commission on Indigenous Peoples (NCIP))

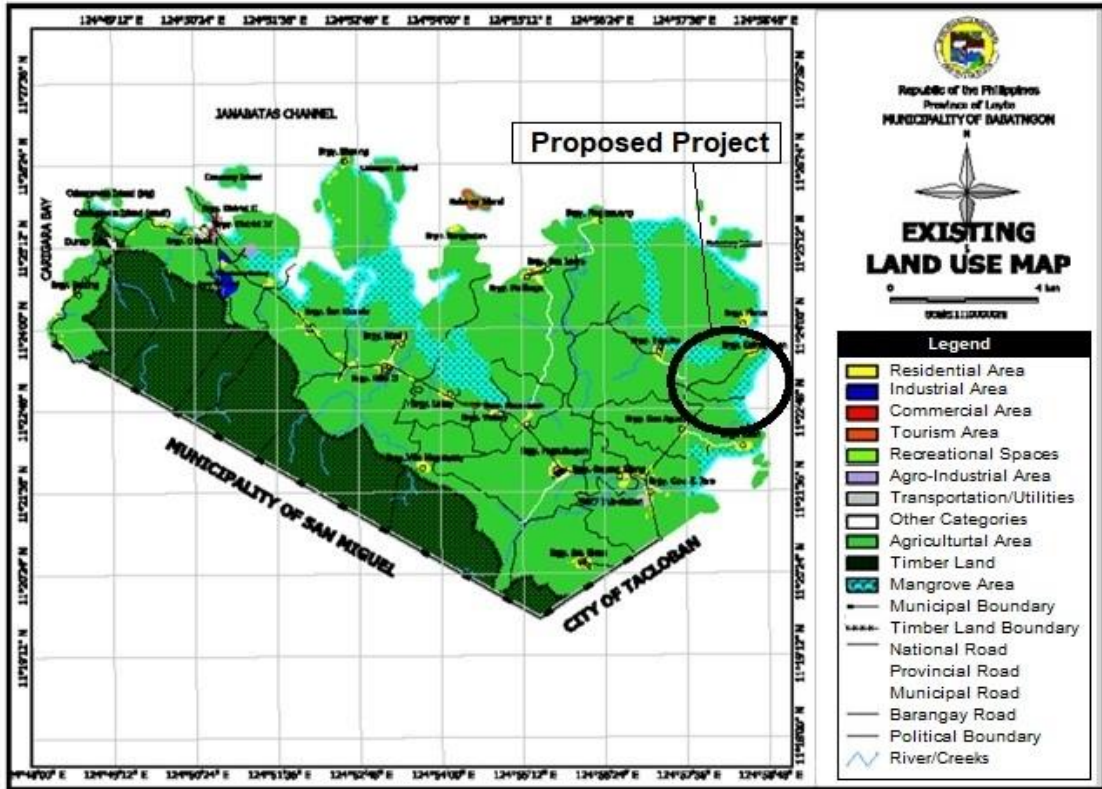
4) Local Economy such as Employment and Livelihood

The Gross Regional Domestic Product (GRDP) of the region 8 is predominantly service-based with a share of 42.5 percent, followed by Industry with 42.6 percent and Agriculture, Hunting, Forestry and Fishing with 14.9 percent (Source: Statistical Census data, Philippine Statistics Authority 2015). In Leyte and Samar islands, agriculture, forestry, and fishery are major economic sector. Thus, people's livelihood and employment depend on primary industries and other production and service sectors in urban areas. Tacloban is famous as port exporting for woods and Ormoc has thermal power plant.

5) Land use and Usage of Local Resources

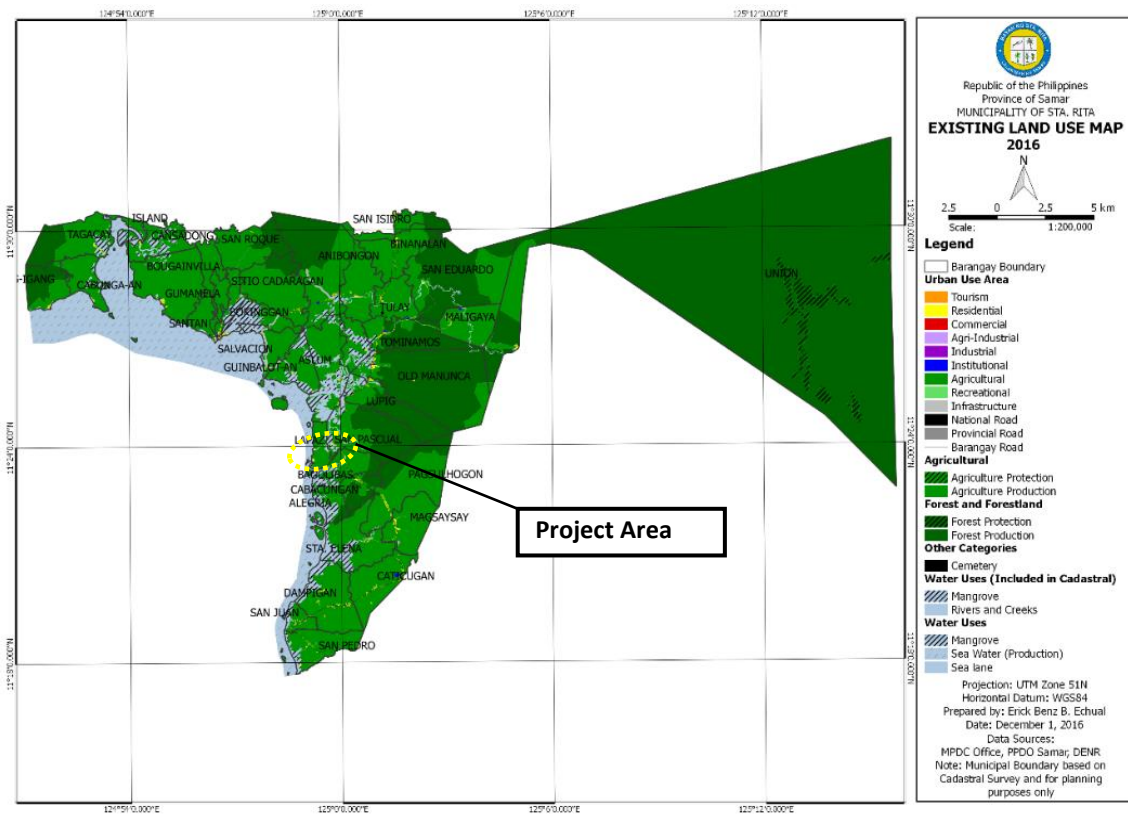
Based on the land classification of Babatngon, Leyte, agriculture area and built-up area covers 64.2% and 0.6% of the municipality, respectively.

As for the land classification of Sta. Rita, Samar, agricultural production area, agriculture protection area, mangrove area and urban land area covers 70.4%, 24.6 %, 2.3%, and 0.5% of the municipality, respectively. (Source: Comprehensive Land Use Plan (CLUP) of Municipality of Babatngon 2014, Comprehensive Land Use Plan (CLUP) of Municipality of Santa Rita 2016). **Figure 17.7-6** and **Figure 17.7-7** shows existing land use map of the project areas.



Source: Comprehensive Land Use Plan (CLUP) of the Municipality of Babatngon, 2014

Figure 17.7-6 Existing Land Use Map of the Municipality of Babatngon, Leyte



Source: Comprehensive Land Use Plan (CLUP) of the Municipality of Santa Rita, 2016

Figure 17.7-7 Existing Land Use Map of the Municipality of Santa Rita, Samar

6) Water Usage

Both surface/river water and groundwater are used for potable water, especially groundwater are important source. (Source: The Project for Improvement of Water Quality in Local Areas, JICA). Irrigation schemes are also important for agricultural activities.

7) Existing Social Infrastructures and Services

The project area has many rural communities with existing social infrastructures including school, hospital, public/social service buildings and infrastructure such as rural road networks in and around the project areas.

8) Social Institution such as Socially Related Capital and Decision-making Organizations

There is different level of local government entities such as municipality, barangay, village, etc. as social institution. Also, there are different kinds of public and private organizations in the field of specific industry/occupation, gender, NGO, etc.

9) Gender

The Philippines is one of the most developed countries in the field of gender equality.

10) Children's Rights

However, child labor cases in Philippines are commonly reported and it may occur in the survey area. Children's rights in the survey area maybe related to poverty.

11) Infectious Diseases such as HIV/AIDS

However, HIV/AIDS cases in Philippines are usually connected to prostitution workers and it maybe common in the survey area.

(4) Others

1) Transboundary Impact and Climate Change

There are internationally common recognitions on transboundary impact and climate change such as greenhouse effect gas emission in industry, transportation, and other relevant sectors in the survey areas.

17.7.3 Legal Framework of Environmental and Social Considerations in the Philippines

Laws and Regulations related to environmental and social issues in the Philippines are summarized in the **Chapter 13** of this report. Based on both legal frameworks in the Philippines and the JICA Guidelines for Environmental and Social Considerations, April 2010 (hereinafter, "JICA Environmental Guidelines"), Categorization of SSJB is estimated as follows.

(1) Categorization of EIA in Line with PEISS

Environmental Compliance Certificate (ECC) will be acquired as a requirement by the DENR before the project implementation. The proposed 2nd San Juanico Bridge and Access Road is considered as ECA project because it will traverse areas which are hard-hit by natural calamities, areas with prime agricultural lands, areas with water bodies which are used for domestic and wildlife/fishery support and areas with mangroves.

Based from the PEISS, the proposed 2nd San Juanico Bridge and Access Road (Phase 1 Section) falls under Non-Environmentally Critical Project (Non-ECP) category because its total length is less than 10 km. According to the project threshold for Coverage Screening and Categorization under the PEISS, the proposed 4.8 km 2nd San Juanico Bridge and Access Road (Phase 1) falls under **Category B**; non-ECP which will require an Initial Environmental Examination (IEE) Checklist Report to be applied in the EMB Region VIII to acquire its ECC. EMB MC 19-03 specifies that ECC for Category B projects shall be processed through the

Online System following the revised ECC online application procedure as indicated in Section 2 of the memorandum.

(2) Categorization of the Project in accordance with the JICA Environmental Guidelines

Category A defined by the JICA Guidelines for Environmental and Social Considerations, April 2010 (hereinafter, “JICA Environmental Guidelines”) generally includes i) projects in sensitive sectors, ii) projects that have characteristics that are liable to cause adverse environmental impact, and iii) projects located in or around environmental sensitive areas. Moreover, a project causing large-scale involuntary resettlement and or a project area inhabited by indigenous people are classified under Category A. Projects are classified as Category B if potential adverse impacts on the environment and society are less adverse than those in **Category A**.

Based on the above guidelines, the proposed 2nd San Juanico Bridge and Access Road (Phase 1 Section) is seemed to be classified as Category A or B by JICA because the project might be considered as a large-scale road and bridges project, as a project located in or around environmental sensitive areas (mangrove area for habitats with important ecological value) and/or large-scale involuntary resettlement under the JICA Environmental Guidelines. The categorization shall be reviewed during feasibility study based on the detail data such as the scale of mangrove area to be developed, and the number of affected persons in ROW.

17.7.4 Alternative Comparison

Discussion of alternative comparison for this project is described in **Section 17.4.6** of this chapter.

17.7.5 Scoping and ToR for Environmental and Social Considerations Surveys

(1) Scoping

Scoping means choosing alternatives for analysis, a range of significant and potentially significant impacts, and study methods. ✓ mark is applied for environmental items which will be affected by the project or cannot be decided without additional surveys. Scoping is executed for different phases of pre-construction/construction and operation in each environmental item. Items without ✓ in both two phases are not the target of following survey and evaluation if there are enough reasons that the items will not be affected by the project. Following table shows the result of scoping of SSJB.

Table 17.7-9 Result of Scoping of SSJB

No	Item	Selection Status		Reasons for Selection
		PCS/CS	OS	
1	Air Quality	✓	✓	[CS] Construction vehicles may cause air pollution temporarily. [OS] Negative impact on air quality is expected due to exhaust gas from vehicles.
2	Water Quality	✓	✓	[CS] Construction activities (such as cutting/filling works with surface erosion), construction vehicles, camp yards may cause water pollution through drainage water. [OS] Drainage from road structure may cause water pollution in water bodies including sea.
3	Waste	✓		[CS] Construction waste including concrete, asphalt, cut trees and soil may be generated through construction activities. [OS] No serious impacts are expected, because there is no plan of service / parking area which generate waste.
4	Soil Contamination	✓		[CS] There is a possibility of soil contaminant by oil leakage from construction vehicles and soil generated by the project. [OS] Operation of roads and a bridge and a bridge may not cause soil contamination both directly and indirectly.

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No	Item	Selection Status		Reasons for Selection
		PCS/CS	OS	
5	Noise and Vibration	✓	✓	[CS] Construction vehicles may cause noise and vibration temporally. [OS] Ambient noise and vibration along SSJB may cause negative impact on sensitive receivers such as residential area, school, and hospital.
6	Ground Subsidence	✓	✓	[CS/OS] Landfilling may cause ground subsidence in the area of soft soil and other specific conditions.
7	Offensive Odor	✓		[CS] There is a possibility of offensive odor by construction activities. [OS] Operation of roads and a bridge may not cause offensive odor both directly and indirectly.
8	Bottom Sediment	✓		[CS] There is a possibility of impact on the river bottom sediment by leaked oil from construction vehicles and flown soil caused by earthwork. [OS] Operation of roads and a bridge may not cause bottom sediment both directly and indirectly.
9	Protected Area			The nearest protected area (MacArthur Landing Memorial Park) is approximately 15.65km away from the proposed project. Basically, no impacts are expected at this moment, since there is no protected area within the project area.
10	Ecosystem	✓	✓	[CS/OS] The project may cause impact such as tree-cutting activities on ecosystem including indicator species along the project site. Especially, coastal mangrove areas are affected.
11	Hydrology	✓	✓	[CS/OS] There is a possibility of changes to hydrology because the project across some rivers.
12	Topography and Geology	✓		[CS] Topography might change by land cutting and filling works. There are possibilities of land slide and soil erosion due to slope cutting and/or land filling works. [OS] Operation of roads and a bridge may not cause geographical and topographical changes both directly and indirectly.
13	Land Acquisition and Resettlement	✓		[PCS] Land acquisition and resettlement are required to secure land for roads and a bridge and other facilities/structures of SSJB. [CS/OS] No additional resettlement is expected.
14	Poverty	✓		[PCS/CS] Vulnerable groups including poor households may be targets of resettlement. Some of them may get or lose their livelihood during construction phase. [OS] No additional impact on poverty groups.
15	Ethnic Minority and Indigenous People	✓	✓	[PCS/CS/OS] Ethnic minority and/or indigenous people are living along the project area.
16	Local Economy such as Employment and Livelihood	✓		[CS] Employment opportunity can be created due to the project construction. On the other hand, construction activities may cause temporal inconvenience such as access hinderance to the local economy. Employment and livelihood including fishery of project affected households are also affected by resettlement activities. [OS] No additional impact is expected during operation stage.
17	Land Use and Usage of Local Resources	✓	✓	[CS] Loss of farmland and forests for approach roads are expected. Land and local resources such as trees of project affected households are also affected by resettlement activities. [OS] SSJB may cause some negative impact on land use such as development of forest areas and using of water resources.
18	Water Usage	✓	✓	[CS] River water may be affected by earthworks. Water usage of the affected area may be affected by resettlement activities. [OS] Operation of roads and a bridge may cause impact on water usage both directly and indirectly.
19	Existing Social Infrastructure and Services	✓		[PCS/CS] Existing social infrastructure may be affected by land acquisition and construction.

No	Item	Selection Status		Reasons for Selection
		PCS/ CS	OS	
				[OS] New bridge may bring positive impact on exiting road networks around the area.
20	Social Institutions such as Socially Related Capital and Decision-making Organizations			[PCS/CS/OS] There is no possibility of the temporary physical community division by construction.
21	Misdistribution of Benefit and Damage			Misdistribution of benefit and damage caused by the road and bridge constructions are not expected.
22	Local Conflicts of Interest			[PCS/CS/OS] There is one existing bridge, therefore, regional separation and/or any other local communities' condition won't be changed seriously.
23	Cultural Heritage			The nearest historical site to the proposed alignment is the Leyte Provincial Capital, and the MacArthur Landing Memorial Park which are approximately 9.44km and 15.65km, respectively. No serious impacts are expected because there are no outstanding cultural heritages around the area.
24	Landscape	✓		[CS] There is a possibility of disturbance of landscape by the bridge. [OS] Operation of roads and a bridge may not cause impact on landscape both directly and indirectly.
25	Gender	✓		[CS] Women may be affected when they commute to working places during the construction period. There might be gaps on working conditions such as wage between men and women when local employment is considered. [OS] Improved access by the project may cause positive impact on gender.
26	Children's Right	✓		[CS] There is a possibility of occurrence of child labor [OS] Due to the improvement of traffic congestion of existing road, traveling time to school and hospital will become faster and safer.
27	Infectious Diseases such as HIV/AIDS	✓		[CS] Infectious diseases are possible to be spread due to inflow of construction workers. [OS] Operation of roads and a bridge may not cause impact on infectious diseases both directly and indirectly.
28	Labor Environment including Safety	✓		[CS] Due to construction activities, labor environment may be affected. [OS] Operation of roads and a bridge may not cause impact on labor environment diseases both directly and indirectly.
29	Accident	✓	✓	[CS] Traffic accident related to construction vehicles and accident in construction sites are expected. [OS] Traffic accident may increase due to increased traffic volume.
30	Transboundary Impact and Climate Change	✓	✓	[CS] and [OS] Greenhouse Effect Gasses may increase due to construction machinery / vehicles and newly generated traffic.

Note: Project stage: PCS: Pre-construction stage, CS: Construction stage, OS: Operation stage

Source: JICA Study Team

(2) ToR for Environmental and Social Considerations Surveys

Based on the scoping results in the previous section, terms of references (ToR) for surveys of necessary environmental items are developed to determine project induced impacts. Possible impact to be caused by project implementation will be evaluated qualitatively based on existing secondary data, interview to concerned parties and examining project design. **Table 17.7-10** shows the ToR for environmental and social considerations survey.

Table 17.7-10 ToR for Surveys of Environmental and Social Considerations

No.	Item	Survey Item	Survey Method
1	Air Quality	(1) Relevant standards on Environment (Domestic, Japanese, WHO's, etc.) (2) Status of air quality items	(1) Existing material (2) Secondary data/information from past projects nearby (3) Qualitative evaluation based on expected traffic volume and construction vehicles
2	Water Quality	(1) Relevant standards on Environment (Domestic, Japanese, WHO's, etc.) (2) Status of water quality items	(1) Existing material (2) Secondary data/information from past projects nearby (3) Qualitative evaluation based on expected construction methods
3	Waste	I. Waste management process	(1) Secondary data/information from past projects nearby (2) Qualitative evaluation based on expected construction methods and facilities
4	Soil Contamination	(1) Protection method against oil leakage	(1) Confirmation on implementation plan of construction vehicles (2) Qualitative evaluation based on expected construction methods
5	Noise and Vibration	(1) Relevant standards on Environment (Domestic, Japanese, WHO's, etc.) (2) Status of water noise and vibration	(1) Existing material (2) Secondary data/information from past projects nearby (3) Qualitative evaluation based on expected traffic volume and construction vehicles
6	Ground Subsidence	(1) Soil conditions	(1) Past study around the area (2) Qualitative evaluation based on expected construction methods
7	Offensive Odor	(1) Possible events causing odor	(1) Collection of necessary information on construction method (2) Qualitative evaluation based on expected construction methods
8	Bottom Sediment	(1) Construction method causing sedimentation	(1) Collection of necessary information on construction method (2) Qualitative evaluation based on expected construction methods
9	Ecosystem	(1) Situation of general ecosystem (2) IUCN listed species	(1) Past field surveys on occurrences of fauna and flora (2) IUCN Website etc. (3) Qualitative evaluation based on expected construction methods
10	Hydrology	(1) Situation of surface water such as river and lake (2) Impact during construction	(1) Past field surveys (2) Confirmation of construction methods (3) Qualitative evaluation based on expected construction methods
11	Topography and Geology	(1) Construction method causing changes of topography and geology	(1) Collection of necessary information on construction method (2) Qualitative evaluation based on expected construction methods
12	Land Acquisition and Resettlement	(1) Size of impact (area, structure, etc.) (2) Compensation policy	(1) Aerial photos, design, etc. (2) Existing surveys including resettlement action plan (RAP)

No.	Item	Survey Item	Survey Method
			(3) Qualitative evaluation based on expected project effects
13	Poverty	(1) Distribution of poverty groups	(1) Existing surveys and Statistics (2) Qualitative evaluation based on expected project effects
14	Ethnic Minority and Indigenous People	(1) Distribution of ethnic minority and indigenous people	(1) Existing surveys and Statistics (2) Qualitative evaluation based on expected project effects
15	Local Economy such as Employment and Livelihood	(1) Local economic status	(1) Existing surveys and Statistics (2) Qualitative evaluation based on expected project effects
16	Land Use and Usage of Local Resources	(1) Land use status	(1) Existing surveys and existing maps (2) Qualitative evaluation based on expected project effects
17	Water Usage	(1) Water usage status in rivers and other resources (2) Impact during construction	(1) Existing surveys and literature material (2) Confirmation of construction methods (3) Qualitative evaluation based on expected impact on water use
18	Existing Social Infrastructure and Services	(1) Distribution of residential areas, school, hospital, and etc.	(1) Existing surveys and literature material (2) Qualitative evaluation based on expected project effects
19	Landscape	(1) Scenic areas	(1) Existing surveys and literature material (2) Qualitative evaluation based on expected structures and topographical changes
20	Gender	(1) Impact on gender	(1) Existing surveys and literature material (2) Qualitative evaluation based on expected project effects
21	Children's Right	(1) General situation/possibility of child labor	(1) Existing surveys and literature material (2) Qualitative evaluation based on expected project effects
22	Infectious Diseases such as HIV/AIDS	(1) General situation/possibility of infectious diseases	(1) Existing surveys and literature material (2) Qualitative evaluation based on expected project effects
23	Labor Environment including Safety	(1) General situation/possibility of labor environment	(1) Existing surveys and literature material (2) Qualitative evaluation based on expected project effects
24	Accident	(1) Expected increases of accident	(1) Existing surveys and literature material (2) Qualitative evaluation based on expected project effects
25	Transboundary Impact and Climate Change	(1) Elements related to cross boundary impacts, cumulative impacts, and climate change	(1) Collect information based on highway construction and management (2) Qualitative evaluation based on expected project effects

Source: JICA Study Team

17.7.6 Results of Surveys

(1) Air Quality

There are small communities in both shores (Bagolibas and Guintigui-an) along the existing road which will be connected to the proposed project (Phase 1). In general, the large-scale project will require many heavy construction vehicles/ equipment.

[Construction Stage]

Air quality around the construction areas and relevant locations will be degraded due to exhaust gas from construction machineries and vehicles. Also, earthworks may generate particulate matters such as PM10 and PM2.5. Level of air pollution may depend on locations, therefore, further monitoring (baseline) surveys are required during F/S.

[Operation stage]

Increased traffic may cause air pollution along the bridge and approach road areas on typical elements such as NO₂, SO₂, CO and particulate matters. It may cause higher level of pollution on specific elements such as SO₂ and NO₂ which might be under domestic standard as baseline data. Level of air pollution may depend on locations, therefore further monitoring (baseline) surveys with forecasting analysis are required during F/S.

(2) Water Quality

The Project-phase 1 will traverse the San Juanico Strait and one (1) unknown river. The project area is located in the area of water bodies for domestic defined as the ECA (**Table 17.7-8**).

[Construction Stage]

Water quality around the construction areas and relevant locations including camp yards will be degraded if wastewater is discharged inadequately, especially oil leakage from consecution machineries. Earth works also cause turbid water to the surrounding environment. Level of water pollution may depend on locations, therefore, further monitoring (baseline) surveys are required during F/S.

[Operation stage]

There is no construction plan of service areas which may discharge domestic wastewater; therefore, severe water pollution may not occur during the operational phase.

(3) Waste

The Project-phase 1 will include soil excavation and land filling activities. The Project-phase 1 will traverse mangrove area.

[Construction Stage]

Construction waste which is generated by the project will be excavated soil, cut trees, asphalt mass and etc. Also, domestic waste from construction yards is expected.

(4) Soil Contamination

The Project-phase 1 will include soil excavation and land filling activities and construction of bridge piers.

[Construction Stage]

Wastewater from construction areas may cause soil contamination if wastewater is not treated appropriately. Furthermore, there is a possibility of soil contamination due to the unexpected leakage/ mishandling of oil and other chemicals, in the all-earthwork area including the main road area and borrowing pit, etc. In case that on-site soil had already polluted, dumping soils also have possibility of soil contamination when they are dumped other places.

(5) Noise and Vibration

There are small communities in both shores (Bagolibas and Guintigui-an) along the existing road, which are connecting to the proposed project-phase 1. In general, the large-scale project will require many heavy construction vehicles/ equipment.

[Construction Stage]

Construction machineries and vehicles may cause certain level of noise and vibration around the construction area. Background noise level along the planned alignment is not so high because most of the area is rural regions. Level of noise and vibration may depend on locations, therefore, further monitoring (baseline) surveys are required during F/S.

[Operation stage]

Both new alignment section and widening/improvement of existing road section will be affected by noise and vibration during operation phase. Due to increased vehicles and attracted new demand of traffic, some areas may exceed national standard in the future. Level of noise and vibration may depend on locations, therefore, further monitoring (baseline) surveys are required during F/S.

(6) Ground Subsidence

[Construction Stage] & [Operation stage]

It is difficult to forecast ground subsidence caused by project activities, however, it can be said that there is possibility of ground subsidence based on construction methods and natural conditions of the project. Changes of overweight on ground and underground flow may cause ground subsidence. Potential and risk of ground subsidence should be discussed further with geological data and basic designs in following study phases such as F/S.

(7) Offensive Odor

[Construction Stage]

As long as appropriate waste management and equipment maintenance are implemented, sever offensive odor cases are not expected. However, construction camp yards may cause offensive odor from its waste and wastewater.

(8) Bottom Sediment

The Project -phase1 will traverse the San Juanico Strait. Working on the both shores will be occurred.

[Construction Stage]

Location near rivers and sea areas may be affected on bottom sediment by construction activities. Especially, construction of piers for the bridge and viaducts as well as earth works can cause direct sedimentation and turbid water. River crossing points may be affected on bottom sediment by construction activities. Earth works and other works inside rivers can cause direct sedimentation as well as turbid water. In case that crossing river bottom sediment had already polluted, dumping soils in the riverbed also have possibility of soil contamination when they are dumped other places.

(9) Ecosystem

The project area will travers the mangrove areas defined as the ECA (**Table 17.7-8**).

[Construction Stage]

Construction activities and existence of road structures may have impact (such as damage of trees and vegetation, loss of nest/feeding area/breeding area, and migration inhibition, division of the habitation area, road killing, noise/vibration due to the new traffic flow, etc.) on surrounding ecosystem along the project alignment. There is a possibility on decreasing of biodiversity and habitat around the mangrove areas where variety of sea and land species are

using as nesting, feeding, and other necessary purpose to live. Further information and field surveys on birds and other key species confirmed in both Leyte and Samar islands should be discussed. To understand information of habitat and key species based on actual project sites, further monitoring (baseline) surveys are required during F/S.

[Operation stage]

Operation of vehicles on the newly constructed bridge and approach roads may not cause outstanding impact on existing ecosystem along the project alignment.

(10) Hydrology

The project area will traverse the hard-hit by natural calamities (flood areas) defined as the ECA (**Table 17.7-8**). The Project-phase1 will traverse the San Juanico Strait and one (1) unknown river.

[Construction Stage]

Construction works along rivers such as piers for viaducts and sheet piles may cause hydrological changes.

[Operation stage]

No severe impact on hydrology during the operation is expected.

(11) Topography and Geology

The Project-phase1 will include soil excavation and land filling activities.

[Construction stage]

Cut and fill works for approach road construction may change topography and geology. To estimate size, location and impact, further design and related surveys on geology and topography are required in following phases such as F/S. Following table and figures show observation results of general situation of topography with information of structures and typical photos.

Table 17.7-11 Site Observations

Location (from East to West)	Observations
A: Sta. Rita, Samar	Mangrove trees will be affected by the proposed alignment.
B: Sta. Rita, Samar	The proposed alignment will connect to the existing road. Some house structures are located along the road.
C: San Juanico Strait	The 1km proposed bridge will be crossed in San Juanico Strait. Terrestrial and mangrove trees will be affected (Sta. Rita side). Transmission line and towers are found along the proposed bridge.
D: Babatngon, Leyte	The 1km proposed bridge will be crossed in San Juanico Strait. Terrestrial and mangrove trees will be affected (Babatngon side). Transmission line and towers are found along the proposed bridge.
E: Babatngon, Leyte	The alignment will traverse in some structures including barangay hall and existing road.
F: Babatngon, Leyte	A rice field will be affected by the proposed alignment.
G: Babatngon, Leyte	A number of house structures and transmission lines will be affected by the proposed alignment.
H: Babatngon, Leyte	The alignment will be traversed in elevated area. Few vegetation will be affected by the project.

Note: Stations (A-H) in this table are shown in **Figure 17.7-8**.

Source: JICA Study Team

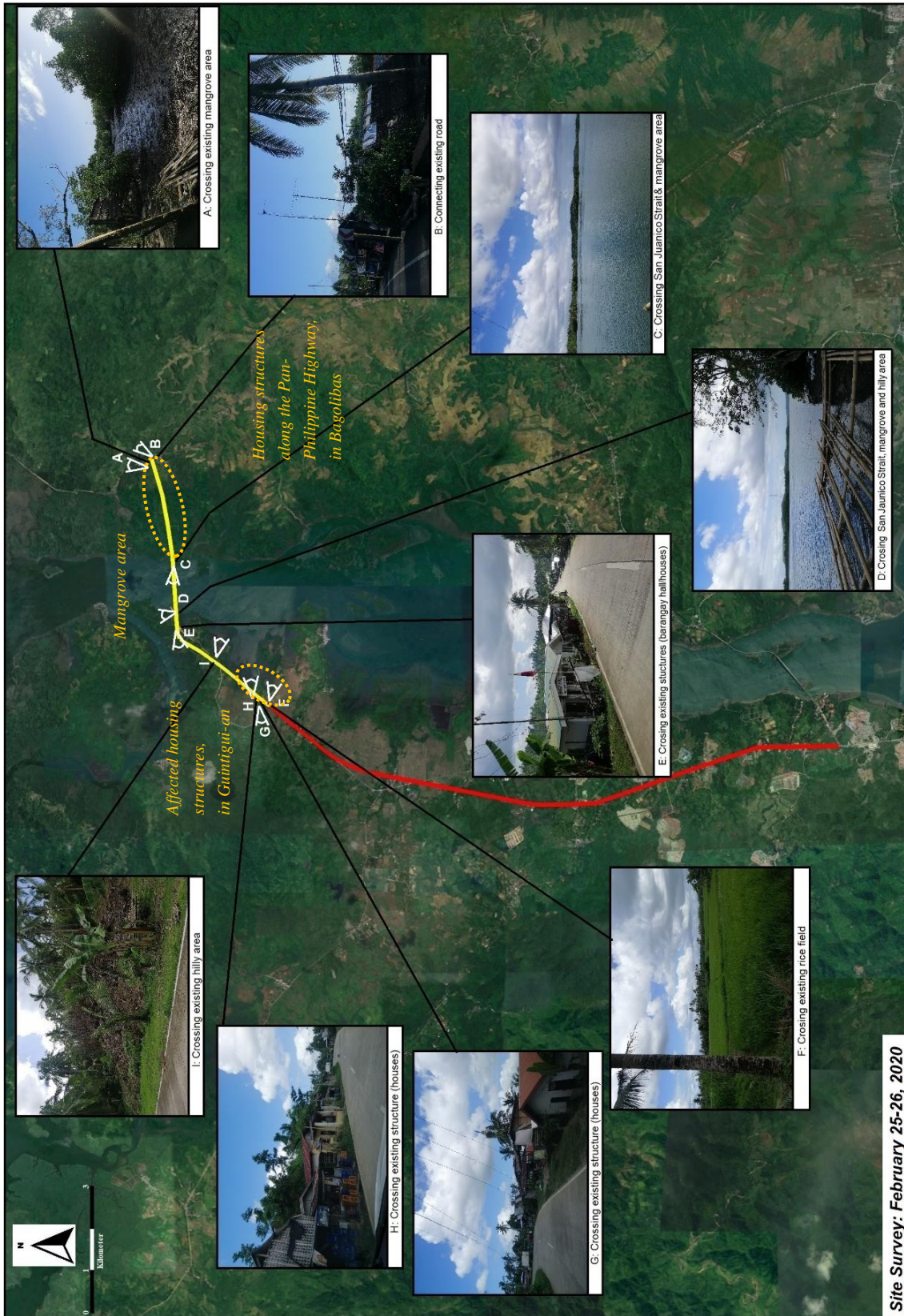


Figure 17.7-8 Proposed Project Site Map

Source: JICA Study Team

(12) Land Acquisition and Resettlement

There are a number of small communities on both shores (Bagolibas and Guintigui-an) along the existing road.

[Pre-Construction Stage]

Based on rough counting survey using satellite photos, approximately 59 structures maybe affected by the project. Assumed form of impact is physical relocation, partial slice of structure, loss of secondary assets such as gate, fruit trees, as well as private land ownership. Exact size and characteristics of land acquisition and resettlement require further survey such as socio-economic survey, census, inventory of loss, etc. to develop resettlement action plan (RAP) in following phases such as F/S.

(13) Poverty

[Pre-Construction and Construction Stage]

Based on statistical situation elaborated in the part of baseline data, there might be poverty groups in the project sites. Some households including informal settlers family (ISF) may become direct project affected household (PAH) and some may be affected their secondary properties such as crops and/or their livelihood. On the other hand, they will have opportunities to obtain new income through construction activities. Exact size and characteristics of impact on poverty requires further survey such as socio-economic survey, census, inventory of loss, etc. to develop resettlement action plan (RAP) and EIA/EIS in following phases such as F/S.

(14) Ethnic Minority and Indigenous People

There are no approved or on-going application for Certificate of Ancestral Domain Title (CADT)s in Region 8, as of December 2019

[Pre-Construction and Construction, Construction, and Operation Stage]

Even there is not observed exact existing of ethnic minority and indigenous people along the project site, there are possibility of their communities and/or living.

To confirm current status and the actual boundary of ancestral domain area, communication with relevant authorities and further field surveys such as RAP related surveys and literature examination are required in following phases such as F/S.

In case that the possibility of impact (e.g. involuntary resettlement, direct land acquisition of ancestral domain, communication disturbance, damage of livelihood, etc.) on the IPs is estimated, the impact and necessary mitigation measures shall be studied during F/S through the communication with NCIP in consideration of on-site ancestral domain condition.

(15) Local Economy such as Employment and Livelihood

[Construction Stage]

Employment opportunity can be created by construction activities and local economy will improv temporally. On the other hand, overall construction activities and traffic restriction may affect local economic activities including vendors and shop owners. To some extent temporary inconvenience due to disturbance in smooth operation of commercial/public transportation may occur. Resettlement also may cause lost or degradation of local economy through their livelihood including fishery.

(16) Land Use and Usage of Local Resources

The project area is located in the prime agricultural land defined as the ECA (**Table 17.7-8**).

[Construction Stage]

Outline of land use along the project alignment is shown in **Table 17.7-12**. The proposed project for Phase 1 section will traverse the San Juanico Strait and connect Samar and Leyte Islands.

In Barangays of Bagolibas, Santa Rita, Samar, on the east shore of the Strait, the proposed project road will connect the existing Pan-Philippine Highway. There are house structures along this existing road near the connecting point of the project. The proposed project will traverse mangrove area between this existing road and the shore.

There are some small islands in the San Juanico Strait, electric power line and towers are built near the proposed bridge.

On the west shore of the Strait, Barangay of Guintigui-an, Babatngon Leyte, the proposed project will traverse the existing community road and house structures located along the roadside.

It is expected that about 59 existing structures including houses are affected due to the implementation of the Project, in accordance with the satellite image interpretation.

Table 17.7-12 Land use along the Project Site

Land use classification	Distribution Rate
Cultivated area/ Farm/ Bare area	17.4%
Forest/Trees/Palm	63.6%
Residence / Infrastructures	1.0%
Strait	15.1%

Source: JICA Study Team

Since the proposed alignment will cross some existing community roads, the Project will consider bridges, underpass/over pass roads or box culverts to avoid intersecting with the existing road as shown in **Table 17.7-13**.

Table 17.7-13 Existing Crossing Transportations

Existing Transportations	Number of Crossing Points
Road	3
Strait	1

Source: JICA Study Team

(17) Water Usage

[Construction and Operation Stage]

Construction areas for approach roads along the rivers have potential impact on water usage. It is difficult to forecast the location, timing and amount of change of water resources due to the construction.

(18) Existing Social Infrastructure and Services

[Pre-Construction and Construction Stage]

The project may affect existing social infrastructures in the rural areas such as roads, telecommunication lines, electricity networks, and water supply networks. These existing infrastructures are target of relocation during pre-construction and construction stages. Both private and public owners of these infrastructures will be affected and some services may be degraded due to construction.

[Operation Stage]

There is a possibility of physical community diversion in case a new road traverses in a community.

(19) Landscape

[Construction Stage]

The new 1-km long span bridge will change the landscape between islands. Cut and fill works may cause change of landscape. However, it is difficult to determine location and degree of changes without further designs. So, continuous discussion and assessment is required in following phases such as F/S.

(20) Gender

[Construction Stage]

Women as commuter or daily working for their families may be affected by the construction activities. On the other hand, project can provide opportunities of works and commercial in the area and it may bring positive impact on gender balance. However, there might be gaps on working conditions such as wage between men and women when local employment is considered.

(21) Children's Right

[Construction Stage]

There are possibilities of child labor in construction yard and related activities.

(22) Infectious Diseases such as HIV/AIDS

[Construction Stage]

Construction workers coming from outside the community / island may cause HIV/AIDS cases during construction time.

(23) Labor Environment Including Safety

[Construction Stage]

Accident and inappropriate occupational condition during the construction may cause negative impact on labor environment and occupational safety as well as health.

(24) Accident

[Construction Stage]

Traffic accident due to construction vehicles may occur without appropriate measures and education.

[Operation Stage]

Traffic accident due to increased traffic may occur along the road and vicinity connecting to the project section.

(25) Transboundary Impact and Climate Change

[Construction Stage]

Greenhouse effect gas is increase by operation of machineries and vehicles in the construction sites.

[Operation Stage]

Increased traffic based on newly created demands may produce much greenhouse effect gas.

17.7.7 Impact Assessment

(1) Preliminary Impact Assessment

The result of potential negative environmental and social impact assessment at pre-F/S is shown in the following table. In consideration of survey results, the impacts were evaluated qualitatively in each of the three stages separately, namely: pre-construction stage [PCS], construction stage [CS], and operation stage [OS]. The impacts of pollution, natural environment, and social environment were classified as A to D in accordance with the following criteria, assuming no specific measures toward the impacts are taken:

- | | |
|--|---------------------------------|
| A: Significant Negative Impact | A+: Significant Positive Impact |
| B: Some Negative Impact | B+: Some Positive Impact |
| C: Impacts are not clear, need more investigation | |
| D: No impacts or impacts are negligible, no further study required | |

Table 17.7-14 Result of ESIA at pre-F/S

No	Item	Assessment at Scoping		Assessment Result based on surveys		Reasons for Assessment
		PCS /CS	OS	PCS/CS	OS	
1	Air Quality	✓	✓	B-	B-	<p>[CS] In consideration of current residential land use, temporary negative impacts are expected on air quality due to exhaust gas and dust generated from construction activities. The exhaust gas such as NO_x, SO_x, CO TSP, PM₁₀, PM_{2.5} will be generated from construction machines, equipment and traffic congestion around the construction yard due to the temporary traffic restriction. And dust will be generated by earth work including foundation excavation for piers, transporting of earth-and-sand, etc.</p> <p>[OS] Ambient air quality along existing road is already impacted by current traffic exhaust gas. Since it is expected that traffic flow will be smoother by shifting vehicles from existing road to new highway, air quality along the road will be improved. On the other hand, there is a possibility of increasing of vehicles. In that case, air quality along the road might get worse than the current condition.</p>
2	Water Quality	✓	✓	B-	D	<p>[CS] The project area is located in the area of water bodies for domestic defined as the ECA, since the Project will traverse a strait and a river. Turbid water may be generated from excavation areas due to surface run-off. Improper stockpiling of construction materials in low -lying areas could affect the water quality of nearby bodies of water bodies. Furthermore, there is a possibility of inadequate treatment and/or mishandling of wastewater, suspended matter, waste oil, and other chemicals, in the all earthwork area including the main road area and borrowing pit, etc. Additionally, domestic wastewater may be discharged from the labor camp.</p> <p>[OS] No serious impacts are expected, because there is no plan of service / parking area.</p>
3	Waste	✓		B-	N/A	<p>[CS] Construction waste including waste soil, asphalt mass and cutting trees are expected at the construction site. Additionally, domestic waste (garbage) may be generated from the labor camp, if any.</p>
4	Soil Contamination	✓		B-	N/A	<p>[CS] There is a possibility of soil contaminant by wastewater from tunneling work/piling construction/excavation process, if wastewater is discharged without adequate treatment and/or miss handling. Dumping soil also can cause soil contamination if they have specific chemicals. Furthermore, there is a possibility of soil contamination due to the unexpected leakage/ mishandling of oil and other chemicals, in the all earthwork area including the main road area and borrowing pit, etc.. Dumping soil and muck also can cause soil contamination if they have specific chemicals.</p>
5	Noise and Vibration	✓	✓	B-	B-	<p>[CS] In consideration of current land use temporary negative impacts are expected on ambient noise due to higher noise generated from construction machines and equipment.</p> <p>[OS] Ambient noise and vibration along existing road is already impacted by current vehicle traveling. Though it is expected that traffic flow is smooth by shifting from existing road to new highway, noise and vibration level might increase because of the increase in traffic and travelling speed of vehicles.</p>
6	Ground Subsidence	✓	✓	B-	B-	<p>[CS/OS] The extent of impact is unknown, because there is no detail amount of ground water and geographical test data, and no decided proposed ROW and tunnel excavation methodology at this moment. In case of large amount of discharge water and/or worse ground foundation than expectations, there is a possibility of ground subsidence in the</p>

No	Item	Assessment at Scoping		Assessment Result based on surveys		Reasons for Assessment
		PCS /CS	OS	PCS/CS	OS	
						mountain area, due to the tunnel construction. To clarify the baseline condition of geographic mechanism including ground water level and geological test shall be conducted along the proposed alignment during the feasibility study.
7	Offensive Odor	✓		B-	N/A	[CS] There are no direct project-related activities that can generate offensive odor due to the general road construction, however impact of construction basecamp operations may have temporary impact.
8	Bottom Sediment	✓		B-	N/A	[CS] There is a possibility of impact on the river bottom sediment by flown soil caused by earthwork in the river, depending on the construction methodology. In case that crossing river bottom sediment had already polluted, dumping soils in the riverbed also have possibility of soil contamination when they are dumped other places.
9	Ecosystem	✓	✓	B-	D	[CS] The project area will travers the mangrove areas defined as the ECA. Mangroves are growing on both shores of the San Juanico Strait. Though there is no reserved forest within the project area, most of existing trees including mangroves within ROW will be cut down or replanted. Construction activities and existence of road structures may have some impact (such as damage of trees and vegetation, loss of nest/feeding area/breeding area, and migration inhibition, division of the habitation area, road killing, noise/vibration due to the new traffic flow, etc.) on surrounding ecosystem along the project alignment. There is a possibility on decreasing of biodiversity and habitat around the mangrove areas where variety of sea and land species are using as nesting, feeding and breeding due to the implementation activities of the project depending on the final design and construction process. To evaluate the impact, seasonal flora and fauna survey and tree inventory survey shall be conducted during the feasibility survey. [OS] Operation of roads may not cause any severe impact on ecosystem along the road.
10	Hydrology	✓	✓	B-	B-	[CS/OS] The project area will travers the hard-hit by natural calamities (flood areas) defined as the ECA. There is a possibility of disturbance of water flow by construction of bridge piers and viaduct in sea and rivers. Not only permanent structures but also temporary works such as sheet piles may change water flow. To clarify the baseline condition of geographic mechanism including groundwater level and flow, geological tests shall be conducted along the proposed alignment during the feasibility study. The amount of water use and source during construction, construction methodology and road structures shall be clarified during the feasibility study. And also, there is a possibility of disturbance of water flow by construction of bridge pier in the river and preventing /changing water flow by concrete structures.
11	Topography and Geology	✓		B-	N/A	[CS] Topography might change by land cutting in the construction areas. There is a possibility of topsoil erosion in the construction site during rainy season (May-October).
12	Land Acquisition and Resettlement	✓		A-	N/A	[PCS] It is expected that about 59 existing structures including houses are affected due to the implementation of the Project, in accordance with the satellite image interpretation. To clear the project affected people, their assets and compensation, identification of landowner, socio-economic survey, inventory survey and market value survey for preparation of the Resettlement Action Plan shall be conducted during the feasibility survey.

No	Item	Assessment at Scoping		Assessment Result based on surveys		Reasons for Assessment
		PCS/CS	OS	PCS/CS	OS	
13	Poverty	✓		B+/-	N/A	[PCS/CS] The project may bring positive impact on local economy through construction activities and rural development. Some poor groups may be negatively affected by the project if their properties are acquired and/or their livelihood is lost by the project.
14	Ethnic Minority and Indigenous People	✓	✓	B-	B-	There might be ethnic minority and/or indigenous people in and around the project site and they might be affected by the project. The location and relation between CADTs and the Project site shall be verified through the feasibility study.
15	Local Economy such as Employment and Livelihood	✓		B+/-	N/A	[CS] Employment opportunity can be created due to the project construction. On the other hand, overall construction activities and traffic restriction would affect local economy activities including vendors and shop owner to some extent temporary inconvenience due to disturbance in smooth operation of commercial/public transportation. Employment and livelihood including fishery of project affected households are also affected by resettlement activities.
16	Land Use and Usage of Local Resources	✓	✓	B-	B+/-	[CS] The project area is located in the prime agricultural land defined as the ECA. Loss of farmland and forests for new roads are expected and land use may be changed along alignment of the bridge and approach roads. Land and local resources such as trees of project affected households are also affected by resettlement activities. [OS] Effective use of lands and local resources due to high accessibility are expected. At the same time, project-induced development may affect local resources adversely.
17	Water Usage	✓	✓	B-	B-	[CS/OS] Though water source during construction is not decided at this moment, water use permission in line with regulation shall be approved from relevant agencies prior to the construction to avoid conflict with water users. The amount of water use and source during construction shall be clear during the feasibility study. Water usage of project affected households are also affected by resettlement activities.
18	Existing Social Infrastructure and Services	✓		B-	B-	[PCS/CS] There might be existing utilities (transmission lines, telecom lines, water lines, etc.) along the existing road. These infrastructures shall be protected and/or diverted before construction work. Inconvenient access to services due to traffic congestion by work vehicles. [OS] There is a possibility of physical community diversion in case a new road traverses in a community.
19	Landscape	✓		B-	N/A	[CS] There is a possibility of disturbance of landscape by the road structures including the main bridge.
20	Gender	✓		B-	N/A	[CS]: Temporary inconvenience to residents, commuters, and pedestrians because of construction activities is expected. On the one hand, the Project can provide additional employment opportunities during this phase, which women can take advantage of. However, there might be gaps on working conditions such as wage between men and women when local employment is considered.
21	Children's Right	✓		B-	N/A	[CS] There is a possibility of occurrence of child labor

No	Item	Assessment at Scoping		Assessment Result based on surveys		Reasons for Assessment
		PCS /CS	OS	PCS/CS	OS	
22	Infectious Diseases such as HIV/AIDS	✓		B-	N/A	[CS] Infectious diseases such as HIV/AIDS are possible to be spread due to inflow of construction workers. Furthermore, alteration to the ground by cutting, soil excavation and land filling may lead to the creation of habitats for mosquitos that possibly transmit dengue fever.
23	Labor Environment including Safety	✓		B-	N/A	[CS] Accident and harm to health for workers in the construction area for bridge section; however, it will be secured in accordance with the domestic laws and regulations during construction.
24	Accident	✓	✓	B-	B-	[CS] Traffic accident related to construction vehicles and accident in construction sites are expected. [OS] Traffic accident may increase due to increased traffic volume.
25	Transboundary Impact and Climate Change	✓	✓	B-	B-	[CS] Significant deforestation is not expected on this project and construction period is limited. [OS] Increase of Greenhouse Effect Gas is anticipated but the level is still unknown

Note:

Project stage: PCS: Pre-construction stage, CS: Construction stage, OS: Operation stage

Impact:

A+/-: Significant positive/negative impact is expected.

B+/-: Positive/negative impact is expected to some extent.

D: No impact is expected.

N/A: Impact assessment isn't conducted because the items was not checked ✓ in scoping phase.

Source: JICA Study Team

17.7.8 Mitigation Measures

Items rated as A- and B- in the table of impact assessment are the target of mitigation measures. Mitigation measures should be feasible and practical. **Table 17.7-15** shows mitigation measures for the project classified into construction and operation phases.

Table 17.7-15 Mitigation Measures

No.	Items (Impacts)	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost (Php)
Construction Stage					
1	Air Quality	<ul style="list-style-type: none"> - Water sprinkling to reduce particulate matter - Routine / periodic maintenance and washing of construction machineries and vehicles to minimize air pollutants -Announcement of construction work to surround resident - In the event of complaint from resident, review the additional mitigation measures including the construction schedule or location of heavy vehicles through the communication with local people 	Contractor	DPWH	TBD
2	Water Quality	<ul style="list-style-type: none"> - Installing sedimentation tank to reduce discharged turbid water - Cover exposed earth especially before heavy rains are expected.- Installing septic tanks for origin of polluted water such as camp yard - Appropriate wastewater treatment such as connecting drainage system to existing sewage systems 	Contractor	DPWH	TBD
3	Waste	<ul style="list-style-type: none"> -Prepare detailed waste management program in consideration with LGU's waste management system - Education on waste treatment for workers - Separation of hazardous waste and bring out to appropriate treatment facilities - 3Rs promotion to reduce waste 	Contractor	DPWH	TBD
4	Soil Contamination	<ul style="list-style-type: none"> - Necessary laboratory test to identify contaminated soil and mock for special cares - Find feasible treatment facilities or filling area in earlier stage of the project such as F/S 	Contractor	DPWH	TBD
5	Noise and Vibration	<ul style="list-style-type: none"> - To avoid disturbance of daily life, construction time shall be set within day time, especially residential areas. - Apply low-noise and vibration machineries as much as possible nearby -Provide the temporary noise barrier and/or fence around the construction yard near residential area, if necessary -Announcement of construction work to surround resident - In the event of complaint from resident, review the additional mitigation measures including the construction schedule or location of heavy vehicles through the communication with local people 	Contractor	DPWH	TBD
6	Ground Subsidence	<ul style="list-style-type: none"> - Avoid extraction of ground water for construction 	Contractor	DPWH	TBD

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No.	Items (Impacts)	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost (Php)
		- Applying replacement methods for soft soil areas and prevention measures for liquefaction based on further studies and discussion in F/S. - Monitoring to identify early symptoms of subsidence			
7	Offensive Odor	- Education and instruction of rules in camp yards to keep good hygiene	Contractor	DPWH	TBD
8	Bottom Sediment	- Installing sedimentation tank to reduce discharged turbid water	Contractor	DPWH	TBD
9	Ecosystem	- Avoid tree cutting to reduce impact on habitat -Relocation/replant of trees - Consider construction season and time if specific rare species' breeding points / nests / important feeding ground are confirmed in the affected areas. -Conduct awareness campaign to all relevant construction workers about the careful consideration for ecosystem -Adoption of lower noise and vibration construction method and machines - Adoption of adequate pass route, based on the field survey, estimated impact and advices from biological expert, if necessary	Contractor	DPWH / DENR	TBD
10	Hydrology	- Avoid large amount of extraction of ground water	Contractor	DPWH	TBD
11	Topography and Geology	- Slope protection is required after cutting slopes especially in the period of rainy season	Contractor	DPWH	TBD
12	Land Acquisition and Resettlement	- Alignment discussion should be carefully done during F/S study to avoid and minimize resettlement - Appropriate RAP must be prepared consistent with domestic and development partner's policies.	Consultant, Contractor, DPWH, LGUs, NHA	DPWH	TBD
13	Poverty	- Appropriate RAP must be prepared consistent with domestic and development partner's policies.	Consultant, Contractor, DPWH, LGUs, NHA	DPWH	TBD
14	Ethnic Minority and Indigenous People	- Appropriate RAP must be prepared consistent with domestic and development partner's policies. - If there are indigenous people in and around the project areas, Indigenous People Plan (IPP) must be prepared with cares	Consultant, Contractor, DPWH, LGUs, NHA	DPWH	TBD
15	Local Economy such as Employment and Livelihood	- Appropriate RAP must be prepared consistent with domestic and development partner's policies with assistance for business disturbances. - In case that fishery along the project areas is affected, compensation and/or assistance are considered as well as necessary hard-measures such as slope protection and turbid water protection.	Consultant, Contractor, DPWH, LGUs, NHA	DPWH	TBD
16	Land Use and Usage of Local Resources	- Appropriate RAP must be prepared consistent with domestic and development partner's policies.	LGUs	LGUs	TBD
17	Water Usage	- Avoid large amount of extraction of ground water	Contractor	DPWH	TBD
18	Existing Social	- Appropriate / agreed compensation for owners of infrastructures to recover, divert, and replace.	DPWH, LGUs	DPWH	TBD

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No.	Items (Impacts)	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost (Php)
	Infrastructure and Services	- Road-crossing measures such as over path / under path should be considered for possible community diversion cases.			
19	Landscape	- Minimize cutting trees and slopes - Consider earth color for temporal works and fences - Installation of slope seeding / planting to recover construction areas	Contractor	DPWH	TBD
20	Gender	- Positive employment of women for light works in construction activities such as cleaning with fair salary and other conditions - Prepare toilet and dressing spaces for women workers - Education on gender equality for workers	Contractor	DPWH	TBD
21	Children's Right	- Restrict child labor (workers under 14 years old) in contract with punishment - Report list of workers with their age information	Contractor	DPWH	TBD
22	Infectious Diseases such as HIV/AIDS	- Education on infectious diseases for workers	Contractor	DPWH	TBD
23	Labor Environment including Safety	- Education on occupational safety for workers - Safety patrol - Sign boards	Contractor	DPWH	TBD
24	Accident	- Periodic maintenance of machineries and vehicles - Sign boards - Employ enough number of traffic guards	Contractor	DPWH	TBD
25	Transboundary Impact and Climate Change	- Periodic maintenance of machineries and vehicles - Recommendation of idling stop activities	Contractor	DPWH	TBD
Operational Stage					
1	Air Quality	- Strengthening of vehicle inspection	DPWH	DPWH	TBD
2	Noise and Vibration	- Noise barriers if the level significantly exceeds the standard - Restriction of maximum speed	DPWH	DPWH	TBD
3	Ground Subsidence	- Periodic observation of level changes	DPWH	DPWH	TBD
4	Hydrology	- Avoid large amount of extraction of ground water - Periodic observation of water flow / level	DPWH	DPWH	TBD
5	Ethnic Minority and Indigenous People	- If there are indigenous people in and around the project areas, Indigenous People Plan (IPP) must be prepared with cares.	DPWH, LGUs	DPWH	TBD
6	Land Use and Usage of Local Resources	- Controlled rural development under legal framework and masterplans by LGUs	LGUs	LGUs	TBD
7	Water Usage	- Avoid large amount of extraction of ground water - Periodic observation of water flow / level	DPWH, LGUs	DPWH	TBD
8	Accident	- Sign boards - Traffic violation crackdown by police - Road safety education at schools and other appropriate facilities	DPWH, LGUs, Police	DPWH	TBD

No.	Items (Impacts)	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost (Php)
9	Transboundary Impact and Climate Change	- Strengthening of vehicle inspection	DPWH	DPWH	TBD
Total Cost					TBD

17.7.9 Monitoring Plan

(1) Proposed EMoP

Table 17.7-16 presents general/typical proposed Environmental Management Plan (EMP) and Environmental Monitoring Plan (EMoP) for mitigating the negative impact. Feasible and specific EMP and EMoP shall be studied during the Feasibility Study.

Table 17.7-16 Monitoring Plan

No	Environmental Item	Items	Location	Frequency	Responsible agent	Supervisor	Cost (Php)
Construction Stage							
1	Air Quality	PM10, PM2.5, SO ₂ , CO, NO ₂	Construction sites, major access routes to the construction sites	Once a month	Contractor	DPWH	TBD
2	Water Quality	BOD5, COD, Oil and Grease, pH, Total Coliform, Total Nitrogen, Total Phosphorous, Total suspended solids, Turbidity, Arsenic, Iron, Sulphate	Rivers, drainages, camp yards, wells, springs	Once every three-month	Contractor	DPWH	TBD
3	Waste	Types and amount of waste	Temporal waste storage	Once every three-month	Contractor	DPWH	TBD
4	Soil Contamination	Soil quality test in accordance with the baseline survey and existing land use, Monitoring accident, maintenance record of machineries and vehicles, site observation	Construction sites and camp yards	Once a month	Contractor	DPWH	TBD
5	Noise and Vibration	Sound level and vibration.	Construction sites, major access routes to the construction sites	Once a month	Contractor	DPWH	TBD
6	Ground Subsidence	Visible observation on markers and gauges	Surrounding structures of construction sites	Once a week	Contractor	DPWH	TBD
7	Offensive Odor	Types and amount of waste, other specific cases such as oil leakage	Temporal waste storage	Once every three-month	Contractor	DPWH	TBD
8	Bottom Sediment	Visible observation of rivers and drainage from construction sites	Construction sites and rivers	Once every	Contractor	DPWH	TBD

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No	Environmental Item	Items	Location	Frequency	Responsible agent	Supervisor	Cost (Php)
				three-month			
9	Ecosystem	Field confirmation by experts, number of cutting trees (Mangrove species)	Construction sites and surrounding areas	Once a year	Contractor	DPWH	TBD
10	Hydrology	Visible observation, interview, measurement of water volume	River, spring, well, etc.	Once every three-month	Contractor	DPWH	TBD
11	Topography and Geology	Visible observation, reviewing of cut and fill plan, tree cutting plan with certification	Forest (approach roads areas)	Once every three-month	Contractor	DPWH	TBD
12	Land Acquisition and Resettlement	Internal / External monitoring report defined in RAP, grievance records	Project Areas	Following RAP	LGUs, NHA, other relevant bodies	DPWH	TBD
13	Poverty	Internal / External monitoring report defined in RAP, grievance records	Project Areas	Following RAP	LGUs, NHA, other relevant bodies	DPWH	TBD
14	Ethnic Minority and Indigenous People	Internal / External monitoring report defined in RAP, grievance records, IPP, if any	Project Areas	Following RAP and IPP	LGUs, NHA, other relevant bodies	DPWH	TBD
15	Local Economy such as Employment and Livelihood	Internal / External monitoring report defined in RAP, grievance records, income restoration program (IRP)	Project Areas	Following RAP, IRP	LGUs, NHA, other relevant bodies	DPWH	TBD
16	Land Use and Usage of Local Resources	Construction plan including lease land, grievance records	Project Areas	Once every three-month	Contractor	DPWH	TBD
17	Water Usage	Water volume, visible observation, interview, grievance records	Water usage areas	Once a month	Contractor	DPWH	TBD
18	Existing Social Infrastructure and Services	Visible observation, interview, grievance records	Project Areas	Once every three-month	Contractor	DPWH	TBD
19	Landscape	Visible observation, interview, grievance records	Project Areas	Once every three-month	Contractor	DPWH	TBD
20	Gender	Visible observation, interview, grievance records, list of construction worker, record of education, number of facilities for women in construction site and camp yard	Project Areas	Once a month	Contractor	DPWH	TBD
21	Children's Right	Visible observation, interview, grievance records, list of construction worker, record of education	Construction sites	Once a month	Contractor	DPWH	TBD
22	Infectious Diseases such as HIV/AIDS	Visible observation, interview, grievance records	Construction sites	Once a month	Contractor	DPWH	TBD

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No	Environmental Item	Items	Location	Frequency	Responsible agent	Supervisor	Cost (Php)
		records, record of education					
23	Labor Environment including Safety	Visible observation, interview, grievance records, record of education, record of safety patrol, sign boards	Construction sites	Once a month	Contractor	DPWH	TBD
24	Accident	Record of accident, record of education, sign boards	Construction sites and surrounding areas	Once a month, on demand	Contractor	DPWH	TBD
25	Transboundary Impact and Climate Change	Record of maintenance of machinery and vehicles, sign boards	Construction sites	Once a year	Contractor	DPWH	TBD
Operational Stage							
1	Air Quality	PM10, PM2.5, SO ₂ , CO, NO ₂	Residential area, junctions, tunnels, etc.	Once a year	Regional Office (RO) - DPWH	DPWH	TBD
2	Noise and Vibration	Sound level and vibration.	Junctions, tunnels and residential areas	Once a year	RO	DPWH	TBD
3	Ground Subsidence	Visible observation on markers and gauges	Surrounding structures of construction sites	Once a year	RO	DPWH	TBD
4	Hydrology	Visible observation, interview, measurement of water volume	River, spring, well, etc.	Once a year	RO	DPWH	TBD
5	Ethnic Minority and Indigenous People	Interview, observation, socio-economic survey, if needed	Project Areas	Once a year	RO	DPWH	TBD
6	Land Use and Usage of Local Resources	Regional development plan, visible observation	Project Areas	Once a year	LGUs	DPWH	TBD
7	Water Usage	Water volume, visible observation, interview, grievance records	Water usage areas	Once a year	RO	DPWH	TBD
8	Accident	Record of accident, record of education, sign boards	Project road and surrounding areas	Once a year	RO	DPWH	TBD
9	Transboundary Impact and Climate Change	Record of maintenance of machinery and vehicles, sign boards	Project road and surrounding areas	Once a year	RO	DPWH	TBD

Source: JICA Study Team

17.7.10 Implementation Structure

Implementation structure for the project will be established based on the country's legal frameworks with reporting/discussion channels to investors/development partners. Based on existing project institutional plan such as Cebu-Mactan Bridge Construction Project under JICA's cooperation, **Table 17.7-17** and **Table 17.7-18** shows rough implementation structure of environmental and social considerations of the project.

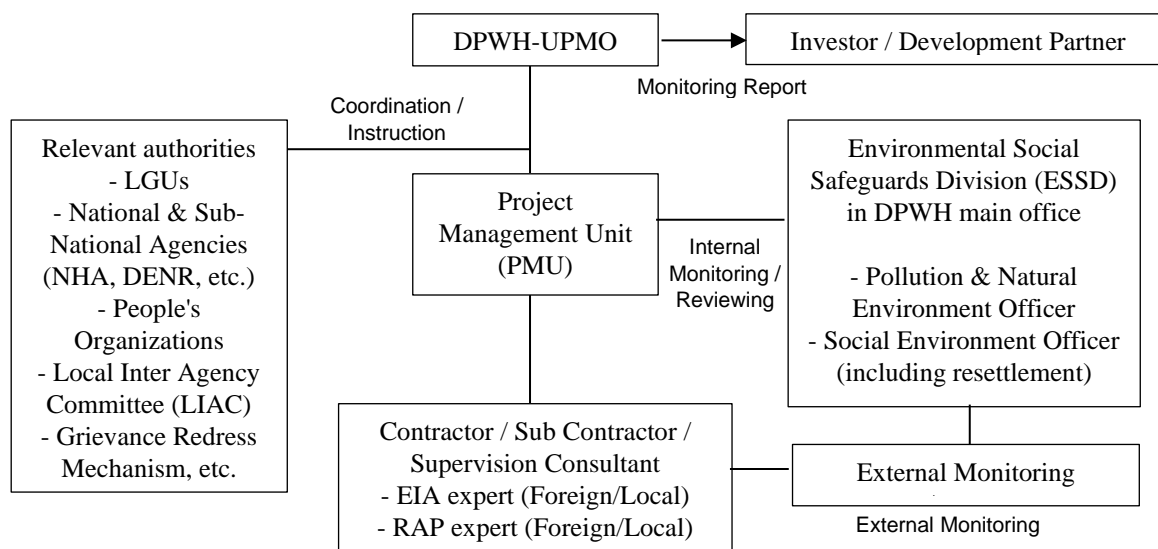


Table 17.7-17 Implementation Structure of Environmental and Social Considerations During Construction Stage

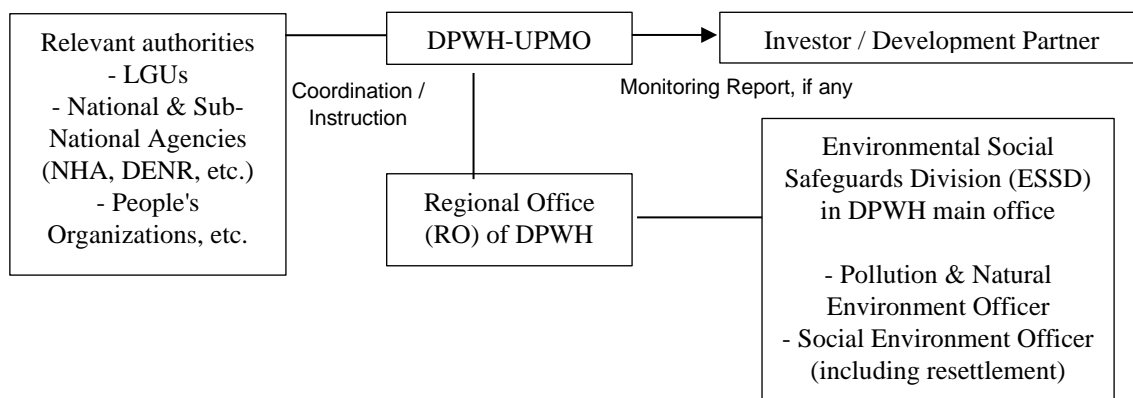


Table 17.7-18 Implementation Structure of Environmental and Social Considerations During Operation Stage

17.7.11 Stakeholder Meetings

(1) Key Informant Interview (KII)

Key Informant Interviews (KIIs) were conducted at the Municipal Halls of Sta. Rita, Samar and Babatngon, Leyte on 24 and 27 of February 2020. The agenda was to brief the stakeholders about the project as well as to seek their perception and engage their participation. The team also interviewed representatives from DENR and the Municipal Mayors and Municipal Engineers of the affected areas.

Based on the KII results, the following were the concerns and opinions of the people about the proposed project:

- The officials of the Municipalities of Babatngon and Sta. Rita expressed their support to the project as it will decongest the traffic in the existing San Juanico Bridge.
- The Municipality of Sta. Rita highlighted that this proposed project will be a big help to them since it will reduce their travel time.
- The Municipality of Sta. Rita confirmed that the proposed alignment may damage the existing natural ecosystem (marine, terrestrial and mangrove forests) where the project will be located. They proposed that environmental mitigation should be followed for the protection of the environment.

- Both Municipalities acknowledged that the project will lead towards economic development of their areas.



KII with the Municipal Officials of Sta. Rita



KII with the Municipal Officials of Sta. Rita

(2) Focus Group Discussion (FGD)

The summary of FGD for the Project is shown in **Table 17.7-19**. Focus Group Discussion (FGD) activities were initiated in the Municipality of Babatngon and the Municipality of Sta. Rita with the aim of eliciting their issues and concerns (**Table 17.7-20**) regarding the development and construction of the proposed project in their respective areas. Participants made answers and showed concerns to specific fields such as gender, social and environmental aspects given at the FGD. Project side replied that their comment and concerns are to be reflected into the on-going survey and the succeeding F/S. The activity tackled issues on environment, social aspect, economy, and gender sensitivity. The participants were asked about their positive and negative perceptions regarding the proposed Project.

Results of the FGD show that majority of the stakeholders support the project, both in Babatngon and Sta. Rita. They perceived that the project will have a set of positive and beneficial effects to their communities. The project can generate employment opportunities during its construction as well as it will reduce their travel time to other municipalities (Tacloban City or Ormoc City).

On the other hand, apprehensions about relocation of the possible affected structures and agricultural lands were expressed during the discussion as they feared that some of the owners will be relocated. In addition, they were concerned if the capacity/capability of the bridge or road network will be able to withstand the occurrence of natural calamities.

Other issues tackled are the possibility that mangrove areas and existing schools might be affected by the proposed project alignment.

Table 17.7-19 Summary of FGDs

Items	Manolo Fortich	Tagoloan
Venue	Conference Room, Sta. Rita Municipal Hall	Conference Room, Babatngon Municipal Hall
Time & Date	Time: 2:00 PM – 03:30 PM Date: 24 February 2020	Time: 2:00 PM Date: 27 February 2020
Participants	14 persons (4 females and 10 males) - Municipal Mayor - Representatives from different municipal offices	13 persons (5 females and 8 males) -Different heads of the municipal departments -DENR-EMB Region 8 -1st district DPWH Leyte
Agenda	1. Presentation of the project outline 2. Presentation of the general impact of Project 3. Group Discussion 4. Presentation by group 5. Question and Answer session	

Source: JICA Study Team

Table 17.7-20 Issues and Concerns

Given Fields	Issues / Concerns from Participants
<ul style="list-style-type: none"> • Economic 	<ul style="list-style-type: none"> • Project would have a positive effect for the LGUs of Sta. Rita, Samar. The travel time going to Tacloban City, Leyte will be shorter compared to the travel time they are spending using the existing San Juanico Bridge. If they do not want to pass through the area of Tacloban City, Leyte, they can go directly to the area of Ormoc passing through Babatngon, Leyte. • With the construction of the bridge, the people of Sta. Rita, Samar can have alternative access to transportation and lessen travel time. • The decrease of agricultural areas and degradation of mangroves were also identified to be the possible effects of the project.
<ul style="list-style-type: none"> • Gender 	<ul style="list-style-type: none"> • Once the construction of the bridge will push through, it can generate employment opportunities for the local residents of the site. The opportunities of employment for the people should be gender sensitive.
<ul style="list-style-type: none"> • Social 	<ul style="list-style-type: none"> • Eventually it was confirmed that there are no IPs within Sta. Rita, Samar. • In terms of tourism opportunity, there is an area the LGU proposed to serve as viewing deck within/near the project alignment. • There are existing schools within the proposed project alignment. According to one of the participants, the schools will be subject to relocation in case the proposed project will be approved for implementation.
<ul style="list-style-type: none"> • Environmental 	<ul style="list-style-type: none"> • It was determined that there is a possibility that a mangrove area might be affected by the project alignment. • For the protected forest areas, it was identified that the proposed project alignment does not have protected areas/ forest areas. However, there are agricultural lands/areas that will be affected. • For the environmental aspects/issues, the project alignment was identified to be located in areas where coconut trees need to be cut prior to construction.



Mr. JM Agoncía from 1st district DPWH Leyte summarized the perception on the project impacts



Consultant team explaining the things to be done during the FGD



Participants of the FGD in the Municipality of Babatngon



Participants of the FGD in the Municipality of Sta. Rita

(3) Stakeholders Meeting (SHM)

Stakeholders meeting (SHM) were undertaken on 22 February 2021. The SHM was held through online platform due to COVID-19. For those who were not able to access to the internet, the venues on the sites where people could participate to the online meeting were arranged.

A total of 163 persons (male 96 and female 67) including local people (affected barangay residents, barangay caption) and representatives of Central/Regional/Local Government officers joined the meeting. The agenda was to present the project description of Pre-F/S including the proposed alignment, alternatives, outline of legal framework regarding environmental and social considerations, and potential environmental and social impact due to the project implementation. The detailed program of SHM is described in **Section 13.8.4**. **Table 17.7-21** shows the summary of comments, questions and suggestions raised in the open forum. Some of the reactions of the residents are positive for their local economy and accessibility, and they are looking forward on this Project. The major concerns of participants were the linking to the regional road plan, the avoiding the mangrove area and the damage of structures. DPWH and the JICA Study Team replied that their comments and concerns are to be reflected in the report. Regarding the resettlement issues, DPWH explained its policy regarding resettlement action plan (ROW Action Plan of DPWH) and the detail survey for resettlement would be conducted in the succeeding F/S.

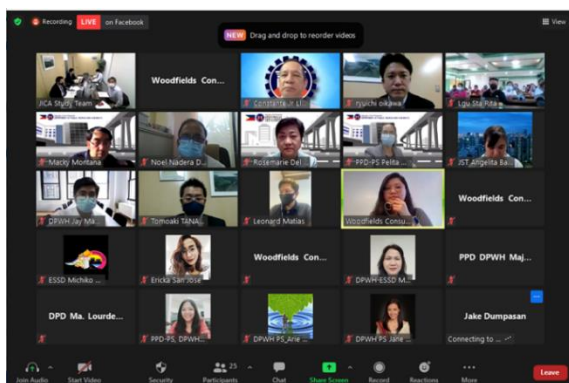
Table 17.7-21 Opinion and Suggestions from Stakeholders

No	Comment, Questions and Suggestion	Answers
1	Question Would it be possible to reflect the alignment in google earth because we want to confirm the number of structures to be affected by the project? (Representative of Santa Rita, Samar/Male)	We cannot provide the exact location of the project since the alignment is not yet final. (DPWH and JICA Study Team)
2	Suggestion Would it be possible for the proposed alignment to connect to our road opening project located in Brgy. Bagolibas and La Paz to avoid the protected mangrove area? (Vice Mayor of Santa Rita, Samar/Male)	The proposed alignment is not yet final because the project is still under the Masterplan and Pre-Feasibility Study Stage. DPWH is open to suggestions and will consider the concern of the LGU about the protection of mangrove areas. The assessment of possible impact of the removal of mangroves will be studied further including the identification of mangrove species and on how to countermeasures/mitigate the impact of the project in the environment. (JICA Study Team)
3	Comment We will provide the exact coordinates of their road opening project. (Vice Mayor of Santa Rita, Samar/Male)	We will get the details of the road opening project to the LGU of Sta. Rita then we will coordinate with DPWH. (JICA Study Team)

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No	Comment, Questions and Suggestion	Answers
4	<p>Comment DPWH-VIII established three alignments for the proposed 2nd San Juanico Bridge in Santa Rita part. One alignment is to be located in San Pascual because this is the shortest route to the highway. (DPWH Region VIII/Male)</p>	<p>The San Pascual alignment is more congested than the other alignment in which more houses and people will be affected. (Representative of Santa Rita, Samar/Male)</p>
5	<p>Suggestion I would like to request the JICA Study Team to take note of the clarification of LGU Santa Rita regarding the San Pascual alignment. (DPWH Region VIII/Male)</p>	<p>The clarification of LGU Santa Rita will be noted and considered. (JICA Study Team)</p>
6	<p>Question We would like to ask if a relocation site will be provided to the affected people if San Pascual alignment will be pursued. (DPWH Planning Service/Male)</p>	<p>As much as possible DPWH will avoid a considerable number of people being affected. However, if the project cannot avoid the removal of structures and people. There is a policy about the ROW Action Plan or RA 10752 that the government shall acquire the properties provided that it will give compensation to the Project Affected Families (PAFs). The project is still in the Masterplan and Pre-Feasibility Stages. It is too early to identify the relocation site at this stage. Moreover, based on the Local Government Code, the LGU shall allocate space for a relocation site. (JICA Study Team)</p>
7	<p>Question What is the classification of the existing San Pascual road? (DPWH-PS/Male)</p>	<p>The road is classified as a National Road before the San Juanico Bridge is not constructed. (Vice Mayor of Santa Rita, Samar)</p>
8	<p>Comment Based on DPWH Central's assessment, the alignment in Babatngon Leyte is already established. DPWH Central is just awaiting for the alignment of Samar to be approved. (DPWH-PS/Male)</p>	<p>It will be noted. (JICA Study Team)</p>
9	<p>Question What is positive impact or benefit of this project in your LGU (JICA Study Team).</p>	<p>The project has a positive impact on the LGU in terms of economic and social aspects. (Representative from Santa Rita, Samar/Male)</p> <p>The project is good news to the LGU because it will give a livelihood to the people that boost their local economy. It will also help the local tourism because of the easy access to their tourist sites and the proposed 2nd San Juanico Bridge will be a landmark in the LGU.</p> <p>The project will give a better life to the people of Santa Rita because it will provide an easy access to the province of Leyte. (Vice Mayor of Santa Rita, Samar/Female)</p>
10	<p>Question We would like to ask if the location of the project is acceptable to LGUs. (JICA Study Team).</p>	<p>We are satisfied with the location of the proposed bridge. We just requested to revise the alignment to avoid the area with mangrove trees. (Vice Mayor of Santa Rita, Samar/Female)</p>

Source: JICA Study Team



On-line Zoom Meeting



Participants from Local Venue

17.8 Land Acquisition and Resettlement

Actual impact on land acquisition and resettlement can't be firmly determine during this Pre F/S stage hence necessary discussions in this chapter are based on rough estimation and there is a need to continuously discussed and study in the succeeding F/S stage.

17.8.1 Requirement of Land Acquisition and Resettlement

The project will be the second alternative route between Layte and Samar island. Proposed project outline based on the survey with a map of the target area is elaborated in **Section 17.1**. Project component which will cause adverse impact is found as road construction, viaduct and bridge as shown in **Section 17.4**. In addition, **Section 17.9.1** elaborates further information.

Based on above-mentioned project outlines, this project requires land acquisition and resettlement to construct roads and related facilities including bridges and viaducts.

17.8.2 Legal Frameworks on Land Acquisition and Resettlement

Laws and Regulations related to environmental and social issues in the Philippines are summarized in the **Chapter 13** of this report. The chapter also includes JICA's policy and gap analysis.

(1) JICA's Policy on Resettlement

Following is JICA's policy on resettlement (as a reference).

The key principle of JICA policies on involuntary resettlement is summarized below.		
I.	Involuntary resettlement and loss of means of livelihood are to be avoided when feasible by exploring all viable alternatives.	
II.	When, after such an examination, 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.	
III.	People who must be resettled involuntarily and people whose means of livelihood will be hindered or lost must be sufficiently compensated and supported, so that they can improve or at least restore their standard of living, income opportunities and production levels to pre-project levels.	
IV.	Compensation must be based on the full replacement cost ¹ as much as possible.	

¹ Description of "replacement cost" is as follows.

Land	Agricultural Land	The pre-project or pre-displacement, whichever is higher, market value of land of equal productive potential or use located in the vicinity of the affected land, plus the cost of preparing the land to levels similar to those of the affected land, plus the cost of any registration and transfer taxes.
	Land in Urban Areas	The pre-displacement market value of land of equal size and use, with similar or improved public infrastructure facilities and services and located in the vicinity of the affected land, plus the cost of any registration and transfer taxes.
Structure	Houses and Other Structures	The market cost of the materials to build a replacement structure with an area and quality similar or better than those of the affected structure, or to repair a partially affected structure, plus the cost of transporting building materials to the construction site, plus the cost of any labor and contractors' fees, plus the cost of any registration and transfer taxes.

- V. Compensation and other kinds of assistance must be provided prior to displacement.
- VI. For projects that entail large-scale involuntary resettlement, resettlement action plans must be prepared and made available to the public. It is desirable that the resettlement action plan include elements laid out in the World Bank Safeguard Policy, OP 4.12, Annex A.
- VII. 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. When consultations are held, explanations must be given in a form, manner, and language that are understandable to the affected people.
- VIII. Appropriate participation of affected people must be promoted in planning, implementation, and monitoring of resettlement action plans.
- IX. Appropriate and accessible grievance mechanisms must be established for the affected people and their communities.
- Above principles are complemented by World Bank OP 4.12, since it is stated in JICA Guideline that “JICA confirms that projects do not deviate significantly from the World Bank’s Safeguard Policies”. Additional key principle based on World Bank OP 4.12 is as follows.
- X. Affected people are to be identified and recorded as early as possible in order to establish their eligibility through an initial baseline survey (including population census that serves as an eligibility cut-off date, asset inventory, and socioeconomic survey), preferably at the project identification stage, to prevent a subsequent influx of encroachers of others who wish to take advance of such benefits.
- XI. Eligibility of Benefits include, the PAPs who have formal legal rights to land (including customary and traditional land rights recognized under law), the PAPs who don't have formal legal rights to land at the time of census but have a claim to such land or assets and the PAPs who have no recognizable legal right to the land they are occupying.
- XII. Preference should be given to land-based resettlement strategies for displaced persons whose livelihoods are land-based.
- XIII. Provide support for the transition period (between displacement and livelihood restoration).
- XIV. Particular attention must be paid to the needs of the vulnerable groups among those displaced, especially those below the poverty line, landless, elderly, women and children, ethnic minorities etc.
- XV. For projects that entail land acquisition or involuntary resettlement of fewer than 200 people, abbreviated resettlement plan is to be prepared.
- In addition to the above core principles on the JICA policy, it also laid emphasis on a detailed resettlement policy inclusive of all the above points; project specific resettlement plan; institutional framework for implementation; monitoring and evaluation mechanism; time schedule for implementation; and, detailed Financial Plan etc.

(2) Policy for Land Acquisition and Resettlement of the Project

The following is draft policy on land acquisition and resettlement of the project.

- I. The Government of Philippines will use the Project Resettlement Policy (the Project Policy) for the Second San Juanico Bridge Project (Temporal) specifically because existing national laws and regulations have not been designed to address involuntary resettlement according to international practice, including JICA’s policy. The Project Policy is aimed at filling-in any gaps in what local laws and regulations cannot provide in order to help ensure that PAPs are able to rehabilitate themselves to at least their pre-project condition. This section discusses the principles of the Project Policy and the entitlements of the PAPs based on the type and degree of their losses. Where there are gaps between the Philippines legal framework for resettlement and JICA’s Policy on Involuntary Resettlement, practicable mutually agreeable approaches will be designed consistent with Government practices and JICA’s Policy.
- II. Land acquisition and involuntary resettlement will be avoided where feasible, or minimized, by identifying possible alternative project designs that have the least adverse impact on the communities in the project area.
- III. Where displacement of households is unavoidable, all PAPs (including communities) losing assets, livelihoods or resources will be fully compensated and assisted so that they can improve, or at least restore, their former economic and social conditions.
- IV. Compensation and rehabilitation support will be provided to any PAPs, that is, any person or household or business which on account of project implementation would have his, her or their:

- Standard of living adversely affected;
 - Right, title or interest in any house, interest in, or right to use, any land (including premises, agricultural and grazing land, commercial properties, tenancy, or right in annual or perennial crops and trees or any other fixed or moveable assets, acquired or possessed, temporarily or permanently;
 - Income earning opportunities, business, occupation, work or place of residence or habitat adversely affected temporarily or permanently; or
 - Social and cultural activities and relationships affected or any other losses that may be identified during the process of resettlement planning.
- V. All affected people will be eligible for compensation and rehabilitation assistance, irrespective of tenure status, social or economic standing and any such factors that may discriminate against achievement of the objectives outlined above. Lack of legal rights to the assets lost or adversely affected tenure status and social or economic status will not bar the PAPs from entitlements to such compensation and rehabilitation measures or resettlement objectives. All PAPs residing, working, doing business and/or cultivating land within the project impacted areas as of the date of the latest census and inventory of lost assets (IOL), are entitled to compensation for their lost assets (land and/or non-land assets), at replacement cost, if available and restoration of incomes and businesses, and will be provided with rehabilitation measures sufficient to assist them to improve or at least maintain their pre-project living standards, income-earning capacity and production levels.
- VI. PAPs that lose only part of their physical assets will not be left with a portion that will be inadequate to sustain their current standard of living. The minimum size of remaining land and structures will be agreed during the resettlement planning process.
- VII. People temporarily affected are to be considered PAPs and resettlement plans address the issue of temporary acquisition.
- VIII. Where a host community is affected by the development of a resettlement site in that community, the host community shall be involved in any resettlement planning and decision-making. All attempts shall be made to minimize the adverse impacts of resettlement upon host communities.
- IX. The resettlement plans will be designed in accordance with Philippines' Domestic Resettlement Policies and JICA's Policy on Involuntary Resettlement.
- X. The Resettlement Plan will be translated into local languages and disclosed for the reference of PAPs as well as other interested groups.
- XI. Payment for land and/or non-land assets will be based on the principle of replacement cost.
- XII. Compensation for PAPs dependent on agricultural activities will be land-based wherever possible. Land-based strategies may include provision of replacement land, ensuring greater security of tenure, and upgrading livelihoods of people without legal land titles. If replacement land is not available, other strategies may be built around opportunities for re-training, skill development, wage employment, or self-employment, including access to credit. Solely cash compensation will be avoided as an option if possible, as this may not address losses that are not easily quantified, such as access to services and traditional rights, and may eventually lead to those populations being worse off than without the project.
- XIII. Replacement lands, if the preferred option of PAPs, should be within the immediate vicinity of the affected lands wherever possible and be of comparable productive capacity and potential. As a second option, sites should be identified that minimize the social disruption of those affected; such lands should also have access to services and facilities similar to those available in the lands affected.
- XIV. Resettlement assistance will be provided not only for immediate loss, but also for a transition period needed to restore livelihood and standards of living of PAPs. Such support could take the form of short-term jobs, subsistence support, salary maintenance, or similar arrangements.
- XV. The resettlement plan must consider the needs of those most vulnerable to the adverse impacts of resettlement (including the poor, those without legal title to land, ethnic minorities, women, children, elderly and disabled) and ensure they are considered in resettlement planning and mitigation measures identified. Assistance should be provided to help them improve their socio-economic status.
- XVI. PAPs will be involved in the process of developing and implementing resettlement plans.

- XVII. PAPs and their communities will be consulted about the project, the rights and options available to them, and proposed mitigation measures for adverse effects, and to the extent possible be involved in the decisions that are made concerning their resettlement.
- XVIII. Adequate budgetary support will be fully committed and made available to cover the costs of land acquisition (including compensation and income restoration measures) within the agreed implementation period. The funds for all resettlement activities will come from the Government.
- XIX. Displacement does not occur before provision of compensation and of other assistance required for relocation. Sufficient civic infrastructure must be provided in resettlement site prior to relocation. Acquisition of assets, payment of compensation, and the resettlement and start of the livelihood rehabilitation activities of PAPs, will be completed prior to any construction activities, except when a court of law orders so in expropriation cases. (Livelihood restoration measures must also be in place but not necessarily completed prior to construction activities, as these may be ongoing activities.)
- XX. Organization and administrative arrangements for the effective preparation and implementation of the resettlement plan will be identified and in place prior to the commencement of the process; this will include the provision of adequate human resources for supervision, consultation, and monitoring of land acquisition and rehabilitation activities.
- XXI. Appropriate reporting (including auditing and redress functions), monitoring and evaluation mechanisms, will be identified and set in place as part of the resettlement management system. An external monitoring group will be hired by the project and will evaluate the resettlement process and final outcome. Such groups may include qualified NGOs, research institutions or universities.

Cut-off-date of Eligibility

The cut-off-date of eligibility refers to the date prior to which the occupation or use of the project area makes residents/users of the same eligible to be categorized as PAPs and be eligible to Project entitlements. In the Project, Cut-off-date will be declared during F/S phase.

Principle of Replacement Cost

All compensation for land and non-land assets owned by households/shop owners who meet the cut-off-date will be based on the principle of replacement cost. Replacement cost is the amount calculated before displacement which is needed to replace an affected asset without depreciation and without deduction for taxes and/or costs of transaction. Further discussion will be implemented during resettlement action plan (RAP) development.

17.8.3 Size and Areas of Land Acquisition and Resettlement

The project requires land acquisition and resettlement for construction of approximately 3.6 km road section (embankment and high-cut), an approximately 1.2 km bridge as well as 3 intersections. Rough estimate of necessary land acquisition areas and roughly counted affected structures are shown in **Table 17.8-1**.

Table 17.8-1 Rough Estimation of Land Acquisition and Resettlement of SSJB

Component	Approx. Length	Number	Land acquisition	Affected Structures	Remarks
1. Road Sections	3.6 km	-	21.6 ha	59	Estimation with fixed width of 60 m
2. Bridge	1.2 km	20	Small amount		Limited within abutment areas
3. Interchange	-	3	15 ha	-	Estimation with fixed area of 5 ha per one interchange
Total	-	-	Approx. 37 ha	59	

17.8.4 Policies of Compensation and Assistance

Entitlement matrix as a policy of compensation and assistance for land acquisition and resettlement should be further discussed and elaborated in RAP which will be developed in following study phases. This pre-feasibility study presumes possible form of impacts with practical mitigation measures. **Table 17.8-2** shows initial entitlement matrix of the project.

Table 17.8-2 Temporal Entitlement Matrix

Type of Loss	Application	Entitled Persons	Entitlement
1. Land			
Classified as Agricultural, Residential, Commercial, or Institutional	Severely Affected	PAFs with Original Certificate of Title (OCT), Transfer Certificate of the Title (TCT) or Tax Declaration (TD) showing 30 or more years of continuous possession (Tax Declaration may be legalized to full title)	<ul style="list-style-type: none"> • Cash Compensation for loss of entire land based on the current market value free of taxes. • Transaction costs (e.g. administrative charges and registration or title fees) . • If feasible, land for land will be provided in terms of a new parcel of land of equivalent value or productivity, at a location acceptable to PAFs • Rehabilitation Assistance in the form of Skills Training equivalent to PhP 15,000 per family, if the present means of livelihood is no longer viable and the affected family will have to engage in a new income activity.
		Holders of Certificates of Land Ownership Award (CLOA) Granted under the Comprehensive Agrarian Reform Act	<ul style="list-style-type: none"> • Cash Compensation for loss of entire land at the current market value free of taxes. • Transaction costs (e.g. administrative charges and registration or title fees) • If feasible, land for land will be provided in terms of a new parcel of land of equivalent value or productivity, at a location acceptable to PAF's. • Rehabilitation Assistance in the form of Skills Training equivalent to Php. 15,000 per family, if the present means of livelihood is no longer viable and the affected family will have to engage in a new income activity.
		Holders of Free or Homesteads Patents and CLOA under CA 141	No compensation for land up to 20 m width if patent was granted prior to 1975 or up to 60 m width for patents granted thereafter, but compensation on land improvement only. For area in excess of government lien, same as PAFs with OCT
		PAP's without OCT, TCT or Tax Declaration	<ul style="list-style-type: none"> • Compensation on land improvement only
		Holders of Free or Homesteads Patents and CLOA under Public Land's Act	<ul style="list-style-type: none"> • Compensation on land improvements only • Disturbance compensation equivalent to five times the average of the gross harvest for the past 5 years but not less than PhP 15,000
		Lessees of Agricultural Land	<ul style="list-style-type: none"> • Disturbance compensation equivalent to 5 times the average gross harvest during the last 5 years contrary to the statement of only 3 years but not less than PhP 15,000
		Agricultural Tenant/Settlers/ Occupants	<ul style="list-style-type: none"> • Financial assistance equivalent to the average gross harvest for the last 3 years but not less than PhP 15,000 per hectare
	Marginally Affected	PAF with TCT or TD (Tax declaration may be legalized to full title)	<ul style="list-style-type: none"> • Cash compensation for affected land at the current market value of land free of taxes

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Type of Loss	Application	Entitled Persons	Entitlement
		Holders of CLOA granted under the Comprehensive Agrarian Reform Act	<ul style="list-style-type: none"> Transaction costs (e.g. administrative charges and registration or title fees)
		Holders of Free or Homesteads Patents CLOA under CA 141 Public Lands Act	<ul style="list-style-type: none"> Compensation on land improvements only
2. Structure			
(1) Residential	Severely Affected	Owners with or without TCT or TD (Tax Declaration may be legalized to full title)	<ul style="list-style-type: none"> Cash compensation for the entire structure at 100 % Replacement Cost (compliant with RA 10752) including transaction costs without deduction for depreciation or salvaged materials. Inconvenience Allowance in the amount of Php 10,000 for relocation and new construction Transportation Assistance
		Homeless, landless, underprivileged, informal occupants of public land, except professional squatters and squatting Syndicates) as defined in RA 7279	<ul style="list-style-type: none"> If qualified, apply for housing in LGU or NHA Resettlement sites Transportation Assistance to transfer to Resettlement Site or return to original province
	Marginally Affected	Owners with or without TCT or TD (Tax Declaration may be legalized to full title)	<ul style="list-style-type: none"> Cash compensation for affected portion of the structure at 100 % replacement cost
	Severely Affected	Renters and Rent-Free Occupants of Dwelling Structures	<ul style="list-style-type: none"> Provide sufficient time (i.e. at least 3 months) for moving If renters or rent-free occupants of dwelling structures do not own any real property whether in the urban or rural areas as defined in RA 7279, may apply for housing in LGU or NHA Resettlement Sites only if they are qualified.
(2) Commercial	Severely Affected	Owners with or without TCT or TD (Tax Declaration may be legalized to full title)	<ul style="list-style-type: none"> Cash compensation for the entire structure at 100 % Replacement Cost compliant with RA 10752) including transaction costs without deduction for depreciation or salvaged materials. Transportation Assistance
	Marginally Affected	Owners with or without TCT or TD (Tax Declaration may be legalized to full title)	<ul style="list-style-type: none"> Cash compensation for affected portion of the structure at 100 % Replacement Cost
(3) Industrial	Severely affected	Owners with or without TCT or TD (Tax Declaration may be legalized to full title)	<ul style="list-style-type: none"> Cash compensation for the entire structure at 100% Replacement Cost compliant with RA 10752) including transaction costs without deduction for depreciation or salvaged materials. Transportation Assistance
	Marginally affected	Owners with or without TCT or TD (Tax Declaration may be legalized to full title)	<ul style="list-style-type: none"> Cash compensation for affected portion of the structure at 100% Replacement Cost
3. Commercial Activity			
(1) Business	Severely Affected	Business Owner	<ul style="list-style-type: none"> Rehabilitation assistance in the form of livelihood and skills training

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Type of Loss	Application	Entitled Persons	Entitlement
			<ul style="list-style-type: none"> • Administrative support to apply capital for small business in cooperation with concerned LGUs • Income Rehabilitation Assistance for the period to the stoppage of business according to business/ income level based on tax record, income statement and/or business permit for small scale business commercial establishments only if business owners continue their business at the remaining area or another area. Appropriateness of the period of business stoppage shall be validated with concerned parties.
	Marginally Affected	Business owners	<ul style="list-style-type: none"> • Income Rehabilitation Assistance for the period to the stoppage of business according to business/ income level based on tax record, income statement and/or business permit for small scale business commercial establishments only if business owners continue their business at the remaining area or another area. Appropriateness of the period of business stoppage shall be validated with concerned parties.
		Employees in displaced establishments and lose jobs for reasons of reasonably attributable to the damages caused by the project	<ul style="list-style-type: none"> • Rehabilitation assistance in the form of livelihood and skills training • One month or longer prior notice to the establishments • Priority in employment during construction and operation stage of projects • Rehabilitation assistance in the form of skill trainings and other development activities
4. Improvements			
(1) Other Non-Dwelling Structures	Severely or Marginally Affected	PAFs with or without TCT or TD	<ul style="list-style-type: none"> • Cash Compensation for the affected improvements at 100% Replacement Cost
5. Crops, Trees, Perennials			
	Severely or Marginally Affected	Owners of crops, trees, perennials	<ul style="list-style-type: none"> • Cash Compensation for crops, trees, and perennials in full replacement cost¹
6. Graves			
		Owners of graves	<ul style="list-style-type: none"> • Compensate for the transfer/relocation cost of graves in coordination with LGUs and relevant Government Agencies. • Ensure observance of practices/beliefs.
7. Vulnerable Households			
(1) Additional Support to Nos. 1 to 6 above		Households with poor, solo households, households headed by elderly (over 60 years old) or a disabled person	<ul style="list-style-type: none"> • Cash allowance if it is justified as necessary • Administrative support for applying respective governmental social welfare program based on household conditions in cooperation with concerned LGUs • Provide priority for jobs related to the project based on capability of PAFs • Rehabilitation assistance in the form of skill trainings and other development activities
		Homeless, landless, underprivileged, informal occupants of public land,	<ul style="list-style-type: none"> • If qualified, apply for housing in LGU or NHA Resettlement sites

Type of Loss	Application	Entitled Persons	Entitlement
		except professional squatters and squatting Syndicates) as defined in RA 7279	<ul style="list-style-type: none"> • Transportation Assistance to transfer to Resettlement Site or return to original province
8. Loss of Community or Public Structures			
	Severely or marginally affected	Community or public structure owners/ administrators	<ul style="list-style-type: none"> • Cash Compensation for entire or affected portion of the structure at 100% Replacement Cost.

1. According to World Bank OP 4.12, the replacement cost for fruit and trees are defined below:

For fruit: Where markets exist, the value of a tree of a specified age and use can be used to determine compensation rates. Where markets do not exist, surrogate values must be determined. For timber trees, the value of a tree equals that of the lumber. For fruit or fodder trees, the value is equal to the cumulative value of the fruit crop for its productive life (and any timber value). If replacement trees are provided, good practice indicates that compensation be based on the value of the harvests lost until the replacement trees come into full production (typically, 7-10 years). In the case of immature trees, a less costly alternative may be to directly supply seedlings as a replacement and provide compensation for the resulting delay in reaching fruit-bearing capacity.

For crops: When arrangements cannot be made to allow for harvest, the market value for lost cash crops is paid. In some countries the value of the harvest is determined by the average market value of crops for the previous three years. Whatever the multiplier, if food supplies are sold in the area enough cash compensation is paid to purchase equivalent supplies, taking into account the possibility of price increases caused by heightened demand from DPs. In areas of predominantly subsistence production, good practice recommends that in-kind compensation be made for subsistence crops.

Source: JICA Study Team

17.8.5 Grievance Redress Mechanism

Grievance Redress Mechanism (GRM) is an indispensable part of RAP and defined in LARRIPP (2017). Usually, a responsible body called Grievance Redress Committee is organized to manage GRM appropriately. Generally, Resettlement Implementation Committee (RIC) and LIAC (Local Inter-Agency Committee) that consist of LGUs and other relevant authorities play a role of GRC in Philippines. Also, ESSD in DPWH functions as internal monitoring agency to monitor and follow up GRM. GRM for SSJB shall be discussed further in following phases such as F/S when RAP is developed.

As a reference, outlines of GRM in the case of "RAP from Cebu-Mactan Bridge Project (2019)" is summarized as follows.

- RIC's responsibilities is to receive and record the voices, complaints opinions and suggestions provided by the PAPs, except complaints and grievances that specifically pertain to the valuation of affected assets since such will be decided upon by the proper courts, and to address them as the first stage of the decision-making body.
- If the response to the complaint is deemed inadequate in the view of the PAPs, they may elevate their grievance to the ROW Task Force that consists of higher-level officials of DPWH Central Office before resorting the case finally to the court. Under this project, grievances from the PAPs would be handled in the following manner.
- Grievance shall be filed by the PAP with the RIC who will act within 15 days upon receipt, except complaints and grievances that specifically pertain to the valuation of affected assets, since such will be decided upon by the proper courts.
- If no understanding or amicable solution can be reached, or if the PAP does not receive a response from the RIC within 15 days of registry of the complaint, he or she can appeal to the ROW Task Force, which should act on the complaint or grievance within 15 days from the day of its filing
- If the PAP is not satisfied with the decision made by the ROW Task Force, he/she, as a last resort, can submit the complaint to any court of law PAPs shall be exempted from all administrative and legal fees incurred pursuant to the grievance redress procedures as is guaranteed under LARRIPP (2007). All complaints received in writing (or written when received verbally) from the PAPs will be documented and shall be acted upon immediately

17.8.6 Implementation Structures

Implementation structure for SSJB will be established based on the country’s legal frameworks with reporting/discussion channels to investors/development partners. Based on existing project institutional plan such as Cebu-Mactan Bridge Construction Project under JICA's cooperation, **Figure 17.8-1** and **Figure 17.8-2** shows rough implementation structure of environmental and social considerations of the project.

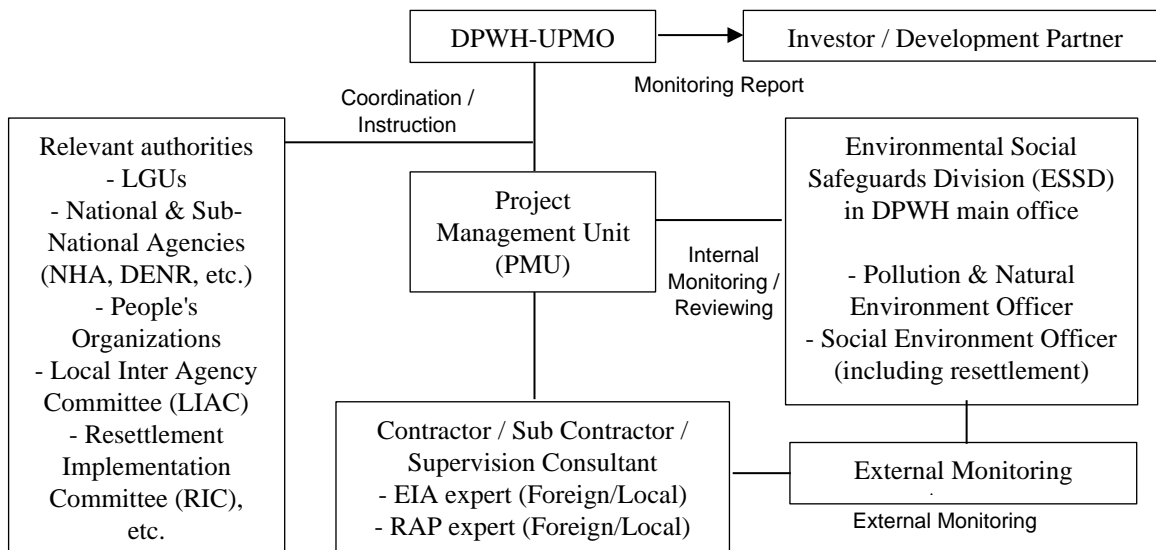


Figure 17.8-1 Implementation Structure of Environmental and Social Considerations During Operation Stage

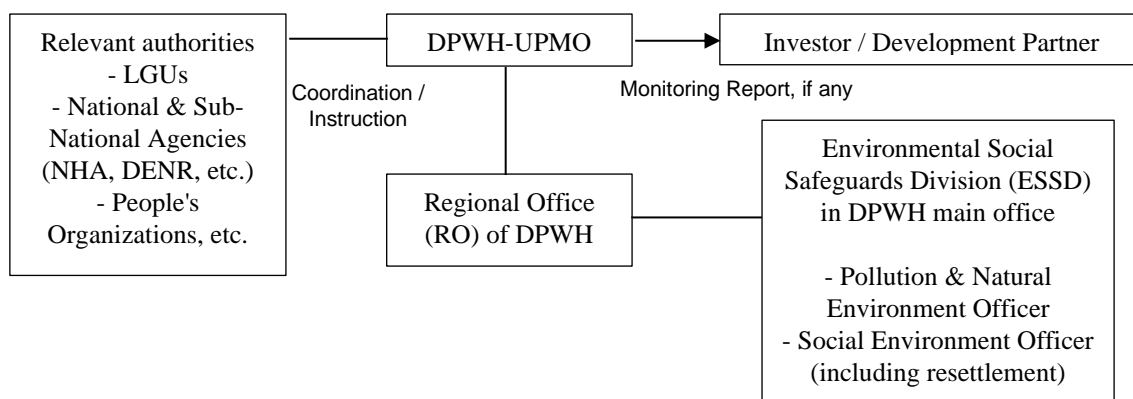


Figure 17.8-2 Implementation Structure of Environmental and Social Considerations During Operation Stage

17.8.7 Implementation Schedule

Implementation schedule cannot be determine with certainty during this pre-F/S stage without F/S, RAP, and other plans and activities during the civil works. However, it is roughly estimated that land clearance requires at least two years after RAP is authorized. During that time, final parcellary survey with census are required to determine eligible PAPs and other preparation and processes such as negotiation, payment, preparation of relocation sites, etc. will take certain time. These processes are discussed in RAP based on size of impact.

17.8.8 Cost and Budget

Cost and budget for land acquisition and resettlement shall be calculated with the results of RAP related field surveys such as census survey, parcellary survey, replacement cost survey, and so on in following study phases such as F/S. If roughly estimate such cost for 21.6 ha of

land and 59 households with unit price of 100 USD (equal to 5,000 Php) per sqm and 5,000 USD (equal to 250,000 Php) per structure, total cost is estimated approx. 21,600,000 USD for land acquisition and 295,000 USD for structures (Totally around 22 million USD). This rough calculation is not accurate because of uncertain unit price, areas including public land, and any other assumptions.

17.8.9 Monitoring by Implementing Agency and Monitoring Forms

Contents of internal and external monitoring shall be discussed during RAP development and that will provide monitoring forms.

17.8.10 Public Consultations

Public consultations for actual project affected persons (PAPs) will be implemented in following phases such as F/S when RAP is developed. Stakeholder meetings during master plan study invited representatives of residents, expected PAPs and outlines are described in separated materials (will be implemented in February 2021, and the results will be involved in FR of the master plan study.)

17.9 Economic Evaluation of the Project

17.9.1 General Methodology of Economic Evaluation

Economic validity of the project was evaluated by economic benefits and costs “With” and “Without” the projects. EIRR are calculated by using economic benefits and economic costs. Economic benefits are estimated by calculating unit VOC, TTC and the demand forecast in **Section 17.3**. Assumptions of economic evaluation is shown in **Table 17.9-1**.

Table 17.9-1 Assumptions of Economic Evaluation

Items	Assumptions	Remarks
Social Discount Rate	10%	
Project Period	2022-2057	2022-2027: Detailed Design (D/D), Right of Way (ROW) Acquisition, and Civil Work 2028-2057: Operation (30 years)
Price Level Year	2020	Inflation is not considered.
Physical Contingency	10%	1) 10% of Construction Cost 2) 10% of Consulting Service Cost

Source: Department of Finance and National Economic and Development Authority (NEDA) (2016) “Revisions on ICC Guidelines and Procedures Updated Social Discount Rate for the Philippines” for discount rate, NEDA (2004) “ICC PROJECT EVALUATION PROCEDURES AND GUIDELINES” for physical contingency.

17.9.2 Economic Cost for the Project

Economic cost includes construction cost, ROW cost, consulting service cost and administration cost of the projects. VAT (12%) was deducted from financial cost of the project. Since this is an approximate cost, it needs to be discussed in detail in the F/S.

- ROW cost: unit cost of land (Residence and Agriculture) and total ROW area
- Consulting service cost: 8% of construction cost (DED: 3%, CS:5%)
- Administration cost: 3% of construction cost

(1) Financial Cost to Economic Cost

Financial cost and converted economic cost are shown in **Table 17.9-2** and **Table 17.9-3**.

Table 17.9-2 Financial Cost

Unit: million PHP

Construction cost	ROW Cost	Consulting Service (D/D)	Consulting Service (C/S)	Administration Cost	Total
9,171	52	275	459	328	10,285

Source: JICA Study Team

Table 17.9-3 Converted to Economic Cost

Unit: million PHP

Construction cost	ROW Cost	Consulting Service (D/D)	Consulting Service (C/S)	Administration Cost	Total
8,188	48	246	409	293	9,184

Source: JICA Study Team

(2) O&M Cost

O&M cost is set at 1% of construction in this Pre-F/S. It is estimated at 82 million pesos/year.

17.9.3 Economic Benefit of the Project

Economic benefits were calculated by measuring “Saving of TTC and VOC” since they are measurable in monetary value. JICA study team estimated Unit TTC and VOC in 2019, which are explained in **Section 12.4**. The economic benefit of the projects is shown in **Table 17.9-4**.

Table 17.9-4 Economic Benefit of the Projects

Unit: million PHP/Year

Economic Benefit (TTC+VOC Saving)	
2028	2040
959	1,836

Source: JICA Study Team

17.9.4 Results of Economic Evaluation

(1) Results of Base Case

The following economic indicators: EIRR, B/C and ENPV of the project were calculated. Calculation formula and remarks of them are explained in **Section 12.4**. Results of economic evaluation are shown in **Table 17.9-5**.

Table 17.9-5 Results of Economic Evaluation

Indicators of Economic Analysis		
EIRR (%)	B/C	ENPV (million PHP)
11.4%	1.17	1,083.7

Source: JICA Study Team

(2) Sensitivity Analysis

Sensitivity analysis of EIRR regarding the economic cost and the economic benefit is conducted. Results of sensitivity analysis of economic evaluation are shown in **Table 17.9-6**. If the benefit is minus 10% with the base case and plus 10% of the cost and the benefit is base case with plus 10% of cost, EIRR is lower than 10%. Therefore, the project is feasible in the cases excluding the above cases.

Table 17.9-6 Sensitivity Analysis of EIRR

EIRR		Cost		
		-10%	Base Case	+10%
Benefit	-10%	11.3%	10.4%	9.7%
	Base Case	12.3%	11.4%	10.6%
	+10%	13.2%	12.3%	11.5%

Source: JICA Study Team

17.10 Conclusion and Recommendation

The main purpose of the Pre-F/S is to identify issues to be addressed during the F/S stage by examining the alternative alignments and long-span bridge type between Leyte Island and Samar Island utilizing the limited basic data such as the available free satellite maps and contour map data.

During the conduct of the F/S, Pre-F/S results must be referred to before proceeding with a detailed field survey (During the Pre-F/S, it could not be conducted sufficiently due to the restrictions brought about by the COVID-19 pandemic), such as topographic survey including the strait condition, geological survey, environmental impact study, evaluation of alternative routes, design outline, cost estimation, economic analysis and minimization of negative impacts to the natural environment such as mangroves.

Lastly, determination of bridge location using comparative study of the two proposed alternatives during the Pre-F/S based on a detailed survey is one of the main focuses in the F/S stage. With regards to the mitigation of impact to mangroves, it is necessary to discuss the conservation policies based on the surveyed types and ages of trees with DENR.

17.10.1 Bridge

For more than 50 years, the San Juanico Bridge has created an excellent surrounding environment, making it a bridge that is loved not only by local residents but also by the Filipinos. The 2nd San Juanico Bridge will be inevitably compared to the current bridge. Therefore, while considering "respect for the existing bridge," the Study Team compared and considered "progress of technology and materials" and "reduction of maintenance works," and proposed an overall superior **Arch Bridge**, which the general plan is shown in **Figure 17.4-9**.

Regarding the bridge position of the 2nd San Juanico Bridge, it is recommended to be located at the narrowest section of the strait 15 km away from the existing bridge. This is not only due to the effort not to distract the magnificent scenery of the existing bridge but also considering economic efficiency.

No site survey was conducted in this report. Therefore, it is necessary to further investigate the following:

1. Survey
 - Topographic survey
 - Bathymetric survey
2. Wave flow survey (velocity, flow direction)
3. Meteorological and Oceanographic survey (wind direction/speed, wave, storm surge, tide level)
4. Geological and soil survey (the scheduled pier location on the land and the sea)

The width of the navigation channel is 113m, but the appropriate span length depends on the water depth at the bridge site and the shape of the channel. Therefore, it is recommended to conduct a wide range (Area-A, shown in **Figure 17.4-3**) topographic survey and water depth survey.

17.10.2 Road

Hereunder are the necessary information to investigate further:

- The position of the tower and the height of the power lines as it intersects the project road. It is necessary to get the information from HVDC.
- The natural condition of mangroves at swampy areas.

17.10.3 Environmental and Social Considerations

During the following F/S stage, a detailed survey and analysis of environmental and social considerations should be carried out with more accurate project design to understand the following impacts:

(1) General Issues

- Confirmation of construction methodology and necessary machinery and vehicles.
- Confirmation of soil borrow pit, quarry, waste dumping site, etc.
- Necessary budget for mitigation and monitoring.
- Confirmation of specific role and responsibility for mitigation, monitoring, and resettlement implementation.
- Stakeholder Meetings and Public Consultations as F/S level.
- F/S and RAP shall refer issues and concerns from FGDs and SHMs in **Table 17.7-20** and **Table 17.7-21** to develop their contents.

(2) Pollution Control

- Measurement of necessary items of air, water, noise and vibration, etc. as baseline data, at appropriate locations in appropriate seasons (e.g., dry and wet season) are necessary.
- Survey for soil quality (possible contamination) and geological conditions based on boring survey, soft soil survey, and relevant surveys for tunnel sections for determining risks of subsidence and liquefaction of ground.
- Quantitative forecasting and evaluation for the future impact should be discussed including numerical simulation.
- Further study for waste and waste water treatment status and possible impact is required.
- Some important parameters such as BOD in water quality shall be measured additionally in the F/S phase.

(3) Natural Environment

- Field surveys for fauna and flora at appropriate locations in appropriate seasons (e.g., dry and wet season).
- Impact on the ecosystem due to cutting mangroves in the swampy area based on detailed survey for living species including IUCN species.
- Location of major habitat with specific location of nesting areas and feeding areas around the project area shall be confirmed.
- Impact due on coral reefs around the sea areas shall be confirmed further in following F/S-Study, although direct impact may not be expected at this pre-F/S stage.
- Alternative discussion shall be done again to avoid protected areas (sensitive areas from development impact based on JICA's Guidelines for Environmental and Social Considerations) as many as possible.
- Alternative route shall be carefully studied and discussed in the F/S to avoid or minimize the impact on mangrove forests.

(4) Social Environment

- RAP-related surveys including Census, Socio-Economic Survey, Inventory of Loss, Replacement Cost Survey, and etc.
- Confirmation of status of vulnerable people including poor people and illegal resident around the project area.
- Confirmation of status of ethnic minority and/or indigenous people.
- Impact on livelihood of fishery such as fish cultivation and coastal fishery shall be surveyed and considered with appropriate compensation and assistance in RAP, if any.
- Confirmation of public/social facilities around the project sites.

- Impact on the existing water resources and water usage by resident due to the interception/changing of groundwater flow caused by the construction of road structures including soft ground treatment or liquefaction measures.
- Necessity of compensation for fishery activities, if any.
- Surveys finding traffic-vulnerable people and relevant facilities including schools shall be implemented during F/S phase and road safety education might be considered as one of the mitigation measures of accidents.
- In case that livelihood of PAPs is likely to be affected based on socioeconomic survey and stakeholder meetings during F/S and/or monitoring processes during implementation, appropriate compensation and livelihood restoration program to PAPs shall be provided based on RAP.
- Land price along the project sites may increase after the completion of each project area. Therefore, actual unit prices for compensation shall be determined based on replacement cost surveys which reflect transaction prices of PAP's properties in and around the project areas so that PAPs can recover and keep their living environment.
- Further study of traffic volume, traffic characteristics, business along the existing road are required to determine indirect impacts including economic impact and necessity of mitigation measures due to bypass function by the new highway in F/S.
- Project-induced impact on business along existing road bypassed by the planned highway shall be discussed in the items of "Poverty" or "Local Economy such as Employment and Livelihood". In addition, appropriate mitigation measures shall be proposed if any such impact is expected based on the results from stakeholder meetings and any other surveys.
- JICA asks the project proponents to consider following conditions. In case that impact is expected on existing roads bypassed by the highway, relevant households and/or business bodies should be involved in public participation processes such as stakeholder meetings, and socioeconomic survey shall be implemented, if necessary.

CHAPTER 18

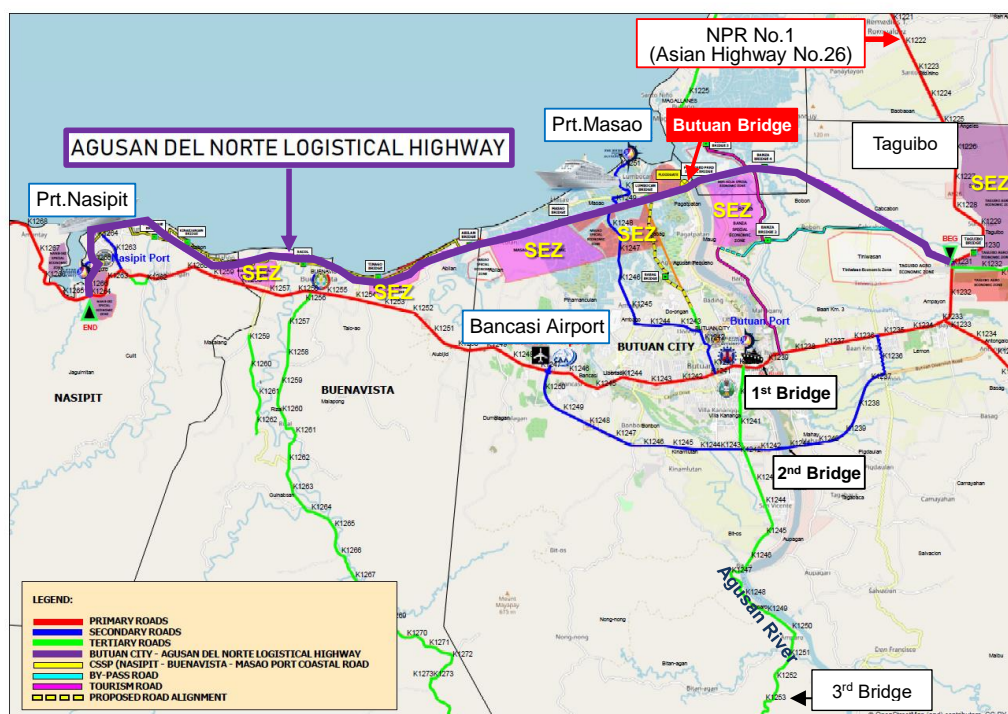
AGUSAN DEL NORTE – BUTUAN CITY LOGISTICAL HIGHWAY

CHAPTER 18

AGUSAN DEL NORTE – BUTUAN CITY LOGISTICAL HIGHWAY

18.1 Project Background and Existing Condition

The Agusan del Norte - Butuan City Logistical Highway Project is an important component of the Mindanao Logistics Infrastructure Network being promoted by the Philippine Government. This project is planned as a logistical road that connect the Asian Highway No. 26 to Masao International Port and Nasipit Port crossing over the Agusan River on the way to Butuan City in Caraga Region. The area is near the sea, of a flat terrain and the ground level is about 5 m while the area near the end point is of a hilly terrain and the ground level is about 20 m. The area of the project road is of soft ground. A number of small rivers and creeks flows to Agusan River. There are mangroves in the swampy areas and ponds for fish farming abounds. Appropriate treatment measures regarding the soft ground condition are required during the road planning and construction.

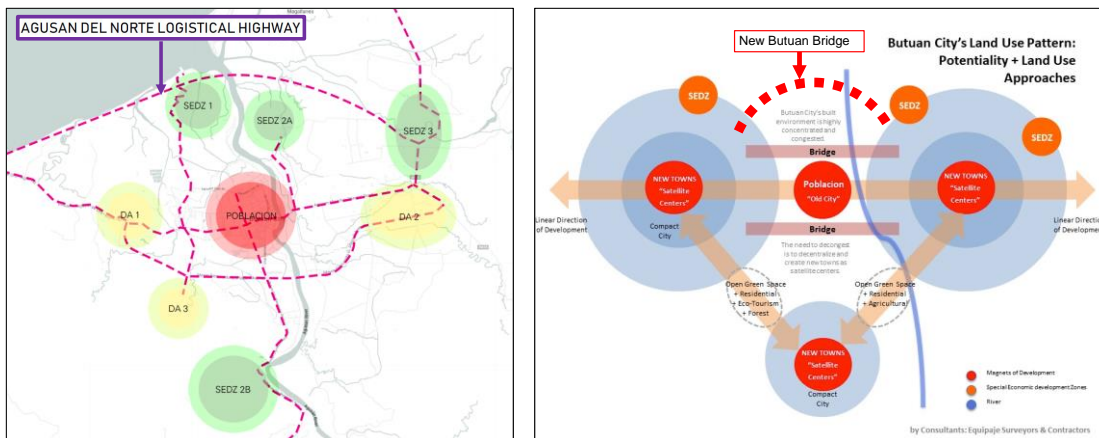


Source: Butuan City Planning Office

Figure 18.1-1 Location of Agusan del Norte - Butuan City Logistical Highway

Butuan City is geographically divided into east and west by the Agusan River. There are existing two bridges: the 1st Magsaysay Bridge is made of a steel truss and the 2nd Magsaysay Bridge is a cable-stayed bridge constructed as a JICA Yen Loan Project. Both bridges are a 2-lane road. A third bridge is planned at the 12-km upstream of the second bridge (**Figure 18.1-1**).

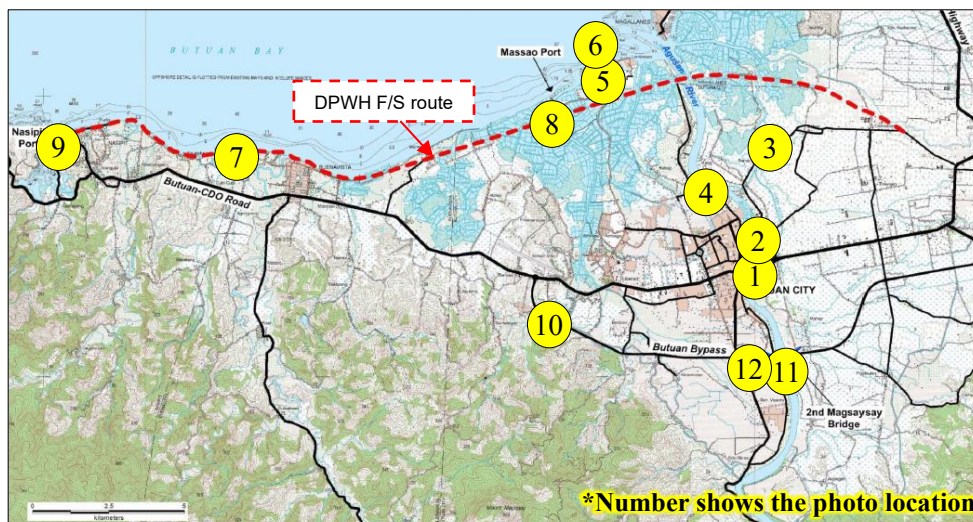
The local regional government formulated the Caraga Regional Development Plan 2017-2022 and the Caraga Coastal Regional Economic Development Action Plan, while the city government of Butuan have an updated City Land Use Plan 2019-2048. In these development plans, six major industrial parks or SEZ are planned along the project road that functions a development axis. Currently, a small part of Taguibo SEZ. The city is planning to attract Japanese companies such as agricultural processing industry. The city is also planning the development of a new city such as Airport City and University Town. These future plans would generate heavy traffic and sure to cause traffic congestion (**Figure 18.1-2**).



Source: Butuan City Planning Office

Figure 18.1-2 Future Urban Structure of Butuan City

DPWH has planned and has started the construction of portion of the road along the alignment plan of this project. Bridges are currently under construction in the western area of the Agusan River. However, these bridges are constructed with two lanes and do not satisfy the geometric condition of the project road which are planned by HSH Class-2. According to the DPWH Regional Office, these roads are planned and constructed along the planned alignment of the project road, but this will function as a service road of the future project road (Figure 18.1-3). The current condition of the area along the road alignment is presented in Figure 18.1-4 and Figure 18.1-5)



Source: JICA Study Team

Figure 18.1-3 Location of Snapshots along the Project Road and in Butuan City



1. Old Truss Bridge over Agusan River



2. Agusan River



3. Coconut Oil Factory (Celebes Oil) at
Banza Special Economic Zone



4. Flood Water Prevention Wall from Agusan
River



5. Banza Bridge 2 under construction



6. Masao Port

Source: JICA Study Team

Figure 18.1-4 Existing Condition of the Project Road Area



7. Existing Road along the coast



8. Masao Bridge under construction



9. Nasipit Port



10. Butuan Bypass Road



11. Agusan Bridge 2 (Cable-stayed Bridge)



*12. Approach Section of Agusan Bridge 2
(2-Main Girder Type of Bridge)*

Source: JICA Study Team

Figure 18.1-5 Existing Condition of the Project Road Area

18.2 Outline of Project

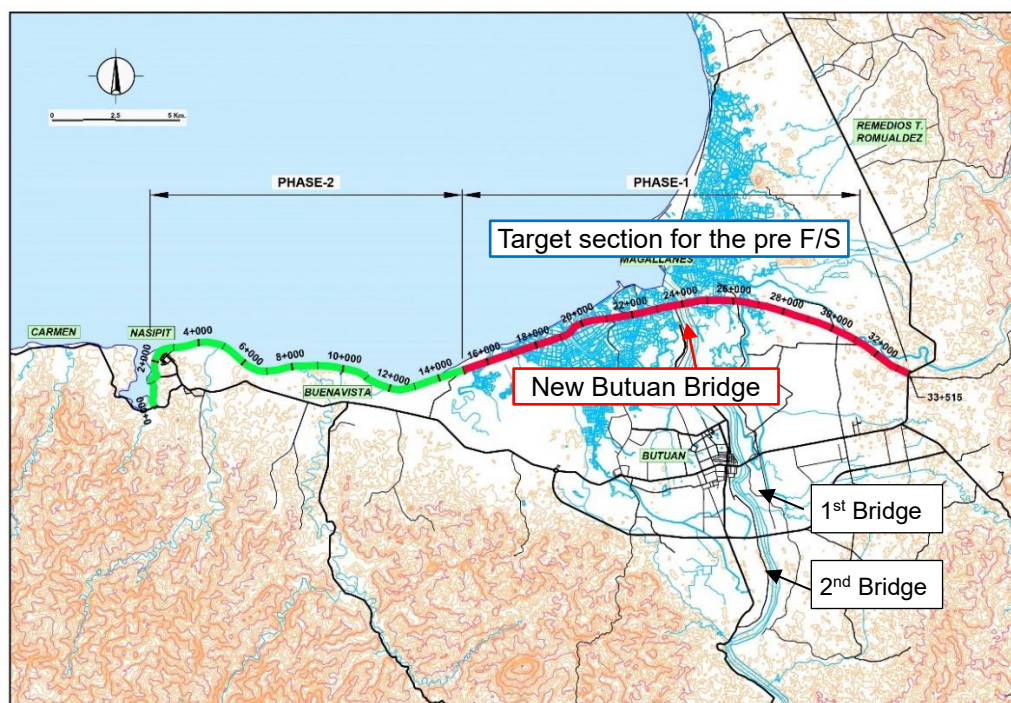
18.2.1 Selection of Route and Position of Bridge

DPWH has already specific idea of the route of the entire Agusan del Norte - Butuan City Logistical Highway except for the Butuan Bridge section. The alignment of the project has been confirmed based on the Mindanao Logistical Highway Network Plan and SEZs location planned by the local government of Butuan city. Therefore, the route of DPWH with a total length of 38 km is applied in the pre-F/S as shown in **Figure 18.2-1**. It is proposed as short term (the present to 2025) in the implementation program for HSH Class-2.

The proposed New Butuan Bridge would be a long span bridge of more than 500 m in length including its approach road. A vast area along the route is of soft ground with a depth of about 20 to 30 m. The application of an advanced technology is expected for the design and construction of the long span bridge considering soft ground treatments. This Pre-F/S is conducted for the Phase-1 which requires an advanced technology (**Figure 18.2-1**). Existing condition of the area is presented in **Figure 18.2-2**.

Table 18.2-1 Outline of Pre-F/S: Butuan City Logistical Highway

Name	Butuan City Logistical Highway (Agusan del Norte - Butuan City Logistical Highway)
Class	HSH Class-2
Length	19.2 km (New Road)
Number of Lanes	4 lanes
Design Speed	60 km/h



Source: JICA Study Team

Figure 18.2-1 Target Phase for Pre-F/S



Figure 18.2-2 Existing Condition near the Proposed Route

18.2.2 Existing Traffic Condition and Traffic Demand Forecast

(1) Existing Traffic Condition

The urban area of Butuan City is divided by Agusan River. Two bridges connect the divided city. According to the traffic survey result by the DPWH, the traffic volume of the 1st Magsaysay Bridge is 19,400 PCU/day in 2019. The traffic volume on the 2nd Magsaysay Bridge is estimated at 6,600 PCU/day in 2019 (Table 18.2-2). Since the number of lanes of each bridge is two, the maximum capacity is around 15,000 PCU/day. The capacity of the 1st Magsaysay Bridge therefore has been reached (or the bridge is serving a traffic beyond its capacity) while the 2nd Magsaysay Bridge can still accommodate some additional traffic. The total capacity of the two bridges is 30,000 PCU/day and currently the total traffic using the two bridges are 26,000 PCU/day. Hence the two bridges are closely reaching their total capacity which help justify to construct additional bridge.

Table 18.2-2 Current Traffic Volume of Agusan on Butuan Bridge(2019)

Road class (Bridge Name)	veh./day	PCU/day
National road (1 st Magsaysay Bridge)	16,800	19,400
National road (2 nd Magsaysay Bridge)	4,700	6,600
Total	21,500	26,000

Source: DPWH

(2) Development Plan Affecting Future Traffic Volume

The population and GRDP of Butuan City area are estimated and presented in **Table 18.2-3**. The population in 2040 is projected to reach around 500,000. The annual growth of GRDP is estimated by 6.0%. The planed six (6) SEZ along the route of the project road covering an area of 68,000 hectares is expected to create 70,000 employment that affect the future traffic demand of the project road.

Table 18.2-3 Current Socio-Economic Indicator in Butuan City

	Year 2019	Year 2040	Year 2040/2019 (Annual growth rate)
Population (thousand)	389	485	1.25 (1.1%)
GRDP (million PHP)	40,009	140,867	3.52 (6.2%)

Source: DPWH

(3) Future Traffic Demand Forecast

The future traffic demand is estimated to understand the number of users of the road project in the future. This is data is important as well in the economic evaluation of the project. The basic assumptions in the demand forecast analysis are as follows:

- Year: 2040
- Method of traffic demand forecast:
 - ✓Traffic assignment,
 - ✓Road network: 2040 road network including all proposed HSH class1 and HSH class 2,
 - ✓Link condition of the project road 4-lane, non-Toll road,
 - ✓OD table: 2040, 4-type vehicles (Car, Jeepney, Bus and Truck).

Since traffic zone in the OD table are large for analysis of traffic flow for the project road, the OD table was divided to create the suitable OD table for the analysis. The internal traffic volume was set in consideration of Butuan Industrial Development Plan, growth of population and GRDP.

Future Traffic Volume of the project road is forecasted as shown in **Table 18.2-4**. Based on the traffic demand forecast, the new road project is expected to attract around 26,600 PCU per day under Scenario 2 (100% progress of area development and occupancy rate of SEZ is 100%). In the case of the Scenario 1 (50% progress of area development), the estimated traffic volume would be 15,200 PCU per day in 2040. This value corresponds to the road traffic capacity of a 2-lane road. If the area development will progress by more than 50%, a 4-lane road is needed. It is desirable to plan for four lanes for the time being taking into account future traffic demand.

Table 18.2-4 Future Traffic on Butuan Bridge

Unit : PCU/ day

Section	Butuan Bridge (New Project)	1 st Magsaysay Bridge	2 nd Magsaysay Bridge	Total (Annual Growth Rate 2019-2040)
Year 2019	-	19,400	6,600	26,000
Scenario 1 Year 2040 50% progress of SEZ development	15,200	11,200	9,100	35,500 (1.6%)
Scenario 2 Year 2040 100% progress of SEZ development	26,600	15,500	13,600	55,700 (3.9%)

Source: JICA Study Team

18.3 Preliminary Highway Design

18.3.1 Applied Design Standards and Criteria

The following design guidelines were applied:

- DPWH Design Guidelines, Criteria and Standards Volume 4, Highway Design (2015)
- AASHTO A Policy on Geometric Design of Highways and Streets, 7th Edition (2018)
- Japan’s Road Structure Ordinance (2015)

The project road is classified as a highway in accordance with DPWH’s 2015 Design Guideline and classified as HSH Class-2 in this HSH Master Plan. The geometric design standards specified in the 2015 Design Guideline of the DPWH are applied on the project road and supplemented by the AASHTO, A Policy on Geometric Design of Highways and Streets, 7th Edition (2018) and Japan’s Road Structure Ordinance (2015). The geometric design standards for main elements are shown in **Table 18.3-1**.

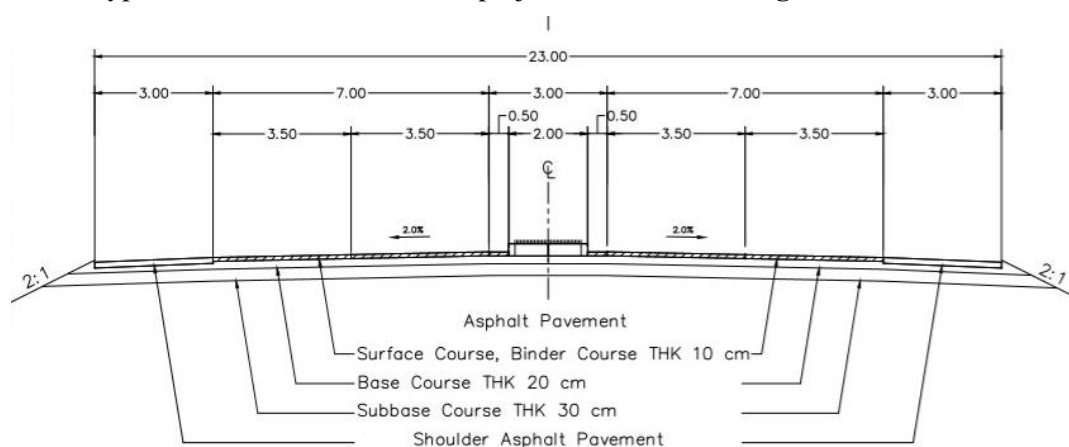
Table 18.3-1 Geometric Design Criteria

Item		Standard Value	
Road Class		HSH Class-2	
Design Speed		60 km/h (Flat Terrain)	
Number of Lane		4-lane	
Width	Lane	3.5 m	
	Shoulder	Out side	3.0 m
		In side	0.5 m
	Median	2.0 m	
Minimum Horizontal Radius		150 m	
Maximum Vertical Grade		5%	
Maximum Vertical Curve Radius	Crest	2,000 m (K=20)	
	Sag	1,500 m (K=15)	
Minimum Vertical Curve Length		60 m	
Vertical Clearance		5.0 m	
Right of Way		60 m	

Source: JICA Study Team

18.3.2 Typical Cross Section

The typical cross section of the road project is illustrated in **Figure 18.3-1**.



Source: JICA Study Team

Figure 18.3-1 Typical Cross Section of Embankment of the Project Road

18.3.3 Alignment Design and Cross Section Design

(1) Alignment Design

The horizontal alignment was planned following in principle the alignment determined in the study of Agusan del Norte - Butuan City Logistical Highway by the DPWH.

The vertical alignment was planned based on the topographic condition of the existing ground level including river's level. The addition of a gradient was adopted in consideration of drainage.

(2) Cross Section Design

The cross section for embankment and cutting was planned in consideration of the traffic safety and the road structure. The designed cross section elements are as follows:

- Carriageway width: 7.0 m (2 lanes) *2 direction,
- Medium strip width: 3.0 m,
- Shoulder width: 3.0 m including 1.0 m soft shoulder,
- And, super elevation of 2.0% is added.

(3) Embankment Structure Design

The slope gradient was planned as 1V:2H for embankment, and 1V:1H for cutting. The gabion works was planned in order to protect the slope embankment near the river in consideration of the flooding and the soft ground.

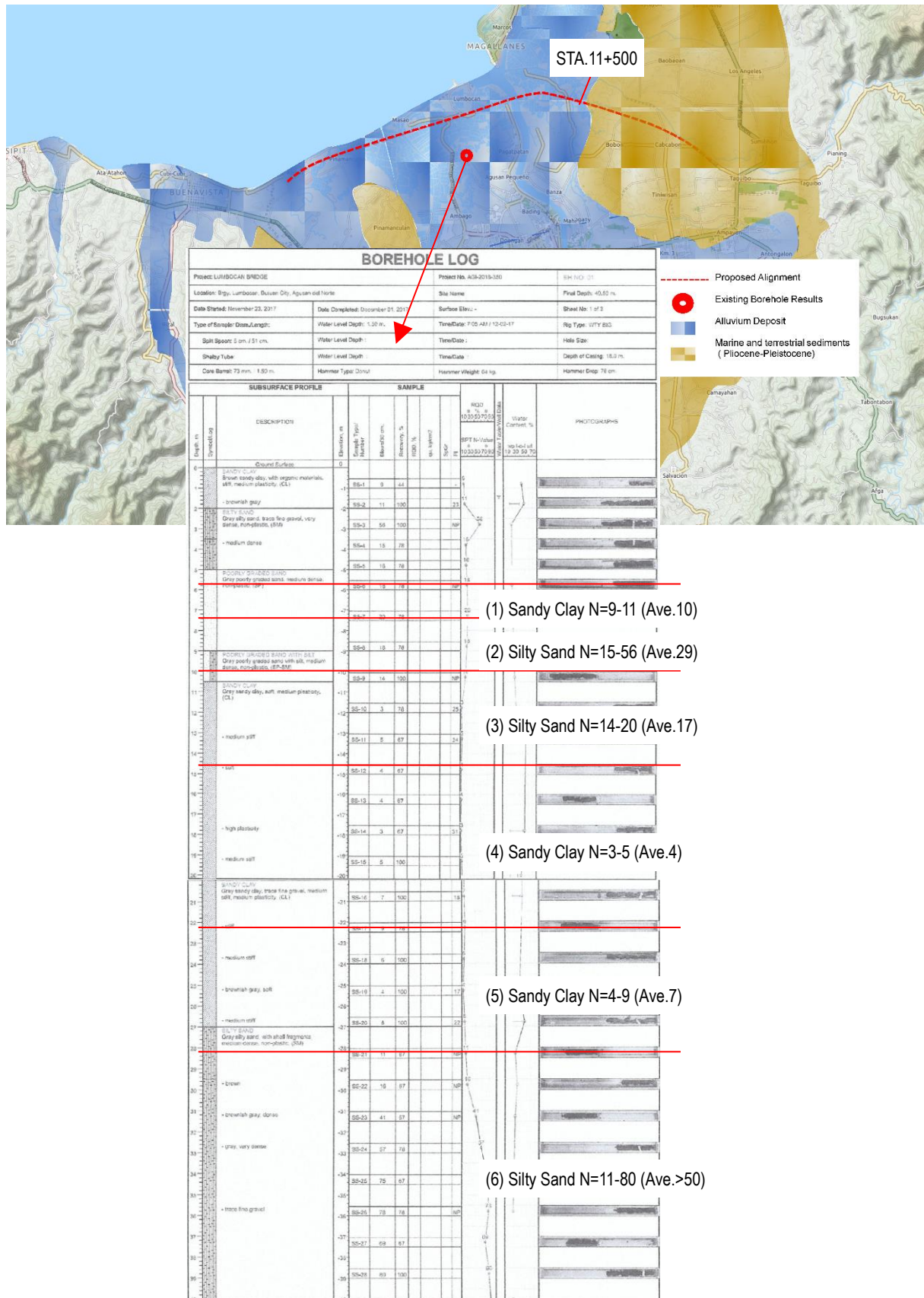
(4) Soft Ground Treatment

1) Geological Condition

The geological condition of the project area is summarized as shown in **Figure 18.3-2** in reference to the existing geological information. Aluvium deposits form the plain around the target area along the Agusan River, and the terrain Pliocene-Pleistocene sediments surrounds the plain.

In reference to the geotechnical investigation report for Lumbocan Bridge by DPWH, one of the borehole logs near the area (approx. 1.3 km from the project road) shows that the loose sand and soft silt/clay layer deposit at depth of approx. 30m as shown in **Figure 18.3-2**.

According to this borehole log, a high possibility of liquefaction in Layer (1), (3), harmful consolidation settlement in Layer (4) and (5) and sliding failure are expected to occur due to these loose and soft layers. Unexpected deformation of soil layers may cause damage of abutment structure, insufficient height of embankment to the flood level, and harmful roughness of the pavement. Therefore, a suitable soft ground treatment measures to deal with this geological condition is required for the implementation of the project road design and construction.



Source: Geological map-JICA Study Team, Borehole log: Geotechnical Investigation Report on Lumbocan Bridge

Figure 18.3-2 Geological Condition and Existing Borehole Log

2) Soft Ground Treatment Method

The soft ground treatment methods are classified based on the principles shown in **Table 18.3-2**. The table shows the typical methods, their principles and expected effects. Considering the expected problems of the ground condition at the project site, countermeasures to reduce risks due to liquefaction, consolidation settlement and sliding failure are considered in this study.

Table 18.3-2 Soft Ground Treatment Methods, Principle and Expected Effects

Principle	Typical methods		Expected Effects															
			Settlement		Stability			Deformation			Liquefaction							
			Reduction of residual settlement	Reduction in total settlement	Increase in strength gain due to consolidation	Increase in resistance force	Reduction of sliding force	Isolation of stress	Reduction of stress	Preventing liquefaction				Increase in effective stress	Dispersion of excess pore water pressure	Control of shear	Measures to reduce damage of structure under liquefaction	
										Improvement of sand properties								
							Densification	Consolidation	Grading treatment	Reduction of saturation								
Consolidation and drainage	Surface water drainage																	
	Sand mat		+															+
	Slow banking method				+													
	Surcharge		+		+													
	Vertical drain	Sand drain	+		+													
		Vertical drain	+		+													
	Vacuum consolidation		+		+													
Groundwater level reduction		+		+								+	+					
Compaction	Vibratory compaction	Sand compaction pile	+	+	+	+				+	+							
		Rod compaction			+	*					+							
		Vibro-floatation			+	*					+							
		Vibro-tamper			+	*					+							
	Falling weight compaction			+	*					+								
	Static compaction	Static compacted sand pile	+	+	+	+					+	+						
Static pressure-fit compaction											+							
Cementation	Shallow soil stabilization			+		+			+			+						+
	Deep mixed	Mechanical mixed		+		+			+	+		+				+	+	
		Jet grouting		+		+			+	+		+				+	+	
	Lime pile			+		+					+	+						
	Chemical injection			+		+						+						
Freezing					+													
Excavation replacement	Excavation replacement			+		+			+									
Lowering Pore water pressure	Pore-pressure dispersing														+			
Load reduction	Lightweight embankment	Styrofoam block		+			+		+									
		Bubble-mixed lightweight soil		+			+		+									
		Formable bead-mixed lightweight soil		+			+		+									
Culvert			+			+		+										
Embankment reinforcement	Embankment reinforcement					+											+	
Structural measures	Counterweight filling					+											+	
	Contiguous wall															+		
Reinforcing materials	Sheet pile					+		+						***			+	
	Pile			+		+			+								+	
Geosynthetics					+												+	

+: Effective for sand ground, +*: Cases with drainage function

Source: Design and Construction Guideline on soft ground treatment for road projects, 2012 Japan Road Association

As a result of considering the effect and applicability of the measures, two methods below are applied in the project shown in **Table 18.3-3**.

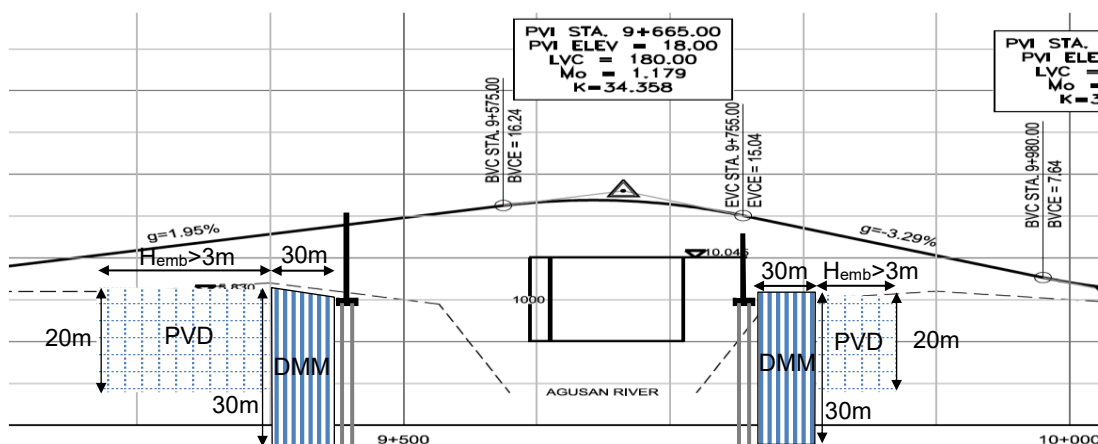
Table 18.3-3 Soft Ground Treatment Methods for the Project

Method	Outline	Advantage/Disadvantage
PVD (Pre-fabricated Vertical Drain)	Install the drainage material into ground by specified machine and accelerate consolidation settlement for reduction of residual amount.	<ul style="list-style-type: none"> ➤ Many experiences in the world and easy to obtain materials. Low cost. ➤ Limited effect (decreasing residual settlement only), long construction period is required
DMM (Deep Mixing Method)	Mix cement material with soil on the ground by specified machine. Cemented column will have high strength and resist to horizontal/vertical load.	<ul style="list-style-type: none"> ➤ Certain effect. ➤ Without harmful effect to adjacent structures during construction. ➤ High cost.

Source: JICA Study Team

3) Layout Plan of Soft Ground Treatment

For road sections that need to deal with soft ground treatment, measures with certain effect is required near the abutment structure and measures for accelerating settlement in other high embankment sections based on the similar projects. The depth of PVD is assumed to be 20m from the ground considering the soil strata and the load effect of embankment. The DMM for the abutment sections is assumed to be 30m from the ground. The concept layout of soft soil treatment method near an abutment is shown in **Figure 18.3-3**.



Source: JICA Study Team

Figure 18.3-3 Concept layout of Soft Ground Treatment Method

(5) Pavement Design

Asphalt pavement was adopted for the carriageway of project road in consideration of traffic volume and the settlement of soft ground. The asphalt pavement was likewise adopted for shoulder.

The standard of pavement structure and thickness of pavement are as follows:

- The surface course and binder course: 10 cm,
- The base course: 20 cm,
- The subbase course: 30 cm.

(6) Interchange Design

Two interchanges are planned for connection with the existing road as follows:

- Diamond type interchange: STA 6+828.
- Half-diamond type interchange: STA 11+850.

(7) Intersection Design

As an intersection method between project roads and existing roads, the following intersections are planned.

- Four-legged at-grade intersection: STA 2+300, STA 2+925, STA 7+550, STA 14+100 and STA 15+840.
- Three-legged at-grade intersection: STA 4+080, STA 17+140, STA 19+235 (end point of the project road).

(8) Relocation of Existing Local Road

Relocation of existing road is planned at following road sections.

- Existing road between STA 6+670 and STA 6+900,
- Existing road between STA 7+420 and STA 7+740.

(9) Widening of Connecting Roads

Widening of connecting roads from 2-lane to 4-lane between the beginning point to national road (Butuan-Cagayan de Oro – Iligan Road).

(10) Traffic Safety Facility

Installation of traffic safety facilities are proposed as follows:

- Guard rails at the shoulder of high embankment section.
- Traffic signs such as guide sign and regulatory sign at the interchange and at-grade intersection.

(11) Drainage Design

Vertical ditch at the sag point of embankment section.

Pipe culvert crossing embankment at the lowest point of ground.

(12) Data for Calculation of Construction Cost (project scale)

Data for calculation of construction cost are shown in **Table 18.3-4**.

Table 18.3-4 Data for Calculation of Construction Cost (project scale)

Item			Quantity / Ratio		
Project Road Length	New Construction	Earth work section (Classified into flat terrain)	Embankment	13.250 km	69%
			Cutting	0.350 km	2%
			Sub Total	13.600 km	71%
		Special Bridge (1 bridges)	1.750 km	3%	
		Ordinary Bridge (5 bridges)	0.600 km	9%	
		Sub total	15.940 km	83%	
	Utilization of Existing Road	Pavement Work (Widening from 2-lane to 4-lane)	3.295 km	17%	
Total		19.235 km	1.00		
Number of Interchanges			Diamond Type	1 Ramp way Length : 1,360 m	
			Half-Diamond Type	1 Ramp way Length : 810 m	
Number of at-grade Intersections			Four-legged Intersection	5	
			Three-legged Intersection	3	
Relocation of Existing Roads (2-lane)			L=0.92 km		
Widening of Connecting Roads (2-lane to 4-lane)			L=1.81 km		

Source: JICA Study Team

Work quantities for estimation of the cost of soft ground treatment is shown in **Table 18.3-5**.

Table 18.3-5 Work quantities for Estimation of Soft Ground Treatment

	Length	Width	Area / No. of Pile	Pile Length	Depth	Total
Sand Mat	8,960 m	56.6 m (embankment height:7.0m)	244,890 m ²	-	0.3 m	230,928 m ³
PVD	1,010 m	56.6 m (embankment height:7.0m)	34,980 m ² /pile	20 m	-	1,143,320 m
DMM	400 m	56.6 m (embankment height:7.0 m)	13,200 m ²	-	30 m	679,200 m ³

Source: JICA Study Team

18.4 Preliminary Bridge Design

18.4.1 Applied Design Standard and Criteria

The following Guidelines, Department Orders (DOs) and Specifications are applied for the bridge design:

- 1) DPWH Design Guidelines, Criteria and Standards, Volume V 2015 (DGCS)
- 2) DPWH LRFD Bridge Seismic Design Specifications, 1st Edition 2013 & Interim Revision 2019 (BSDS)
- 3) AASHTO LRFD Bridge Design Specifications, 8th Edition 2018
- 4) AASHTO LRFD Bridge Construction Specifications, 3rd Edition 2016
- 5) Japan Road Association, Specifications for Highway Bridges, Part 1 to Part 5, Nov 2017

18.4.2 Summary of Design Results

Table 18.4-1 shows the summary of bridges plans results.

Table 18.4-1 Summary of Bridge Plan

Classification	Type	Number	Length
Special Bridge	Steel Truss Bridge	1	555 m
Standard Bridge	AASHTO PC I-girder Steel Box Girder	5	Total: 1,745 m 280 m (STA. 1+550) 390 m (STA. 4+705) 355 m (STA. 6+660) 285 m (STA. 7+845) 435 m (STA. 11+670)

Source: JICA Study Team

18.4.3 Preliminary Design of Butuan Bridge

Based on the following condition, the Butuan Bridge crossing Agusan River was studied for Preliminary Design.

(1) Design Condition

1) Topographic and Geotechnical Condition

Topographic condition:

- The Contour map was utilized the secondary data of google satellite map and ASTER GDMv2 Worldwide Elevation Data.

Geotechnical condition:

- The bearing layer and ground condition is assumed from the existing data based on the geotechnical report, Geotechnical Investigation Report of Lumbocan Bridge (DPWH).

2) River Condition

a) Design High Water Level

The design high water level for the bridges over Agusan River is set in consideration of the tide levels of Butuan Bay.

- High Water Level (Mean Higher High Water) = 0.645 m

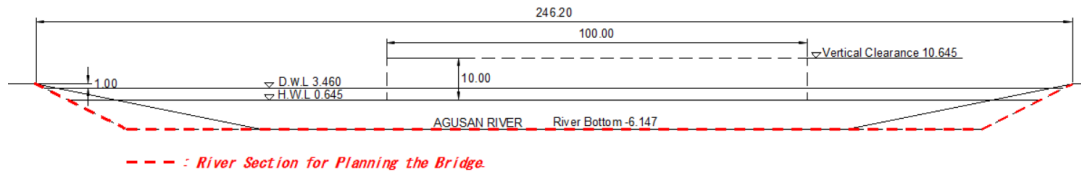
b) Design Flood Water Level

Since the hydrologic analysis for the design flood levels is not conducted for the study, the design flood water level was assumed based on the current riverbank condition.

- Design Flood Water Level = 3.460 m

c) River Cross Section

The river cross section for the bridge design was set as shown in the figure below.

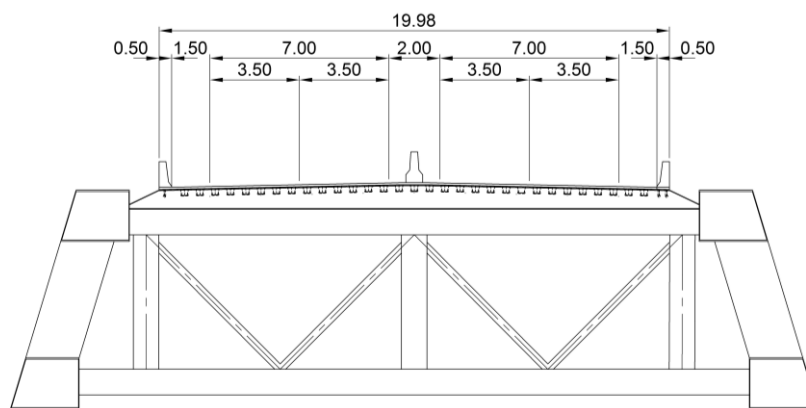


Source: JICA Study Team

Figure 18.4-1 Cross Section of Agusan del Norte River

3) Typical Cross Section for Butuan Bridge

The typical cross section for Butuan Bridge is planned as shown in the figure below.



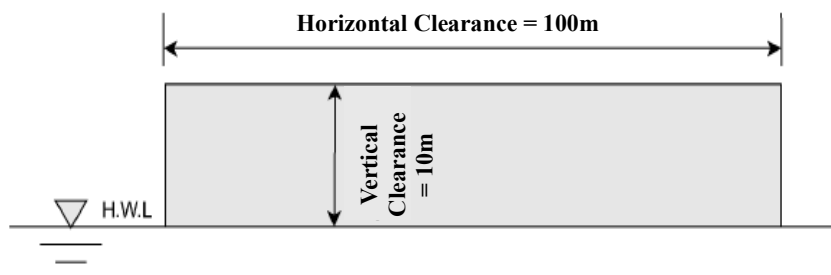
Source: JICA Study Team

Figure 18.4-2 Typical River Cross Section for Bridge

4) Clearance

a) Navigation

The navigational clearance is set as shown in **Figure 18.4-3**.

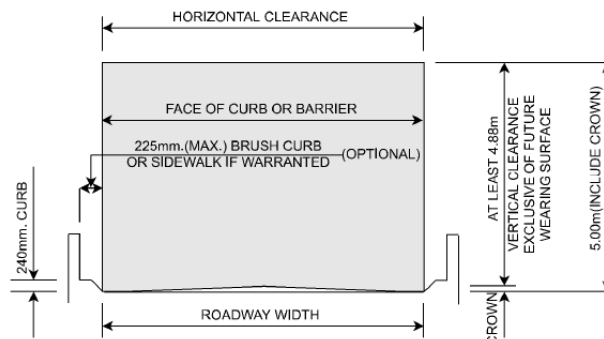


Source: JICA Study Team

Figure 18.4-3 Navigational Clearance

b) Highway

The vertical clearance is proposed to be 5.0 m based on the DGCS that shows a minimum clearance of 4.88 m.



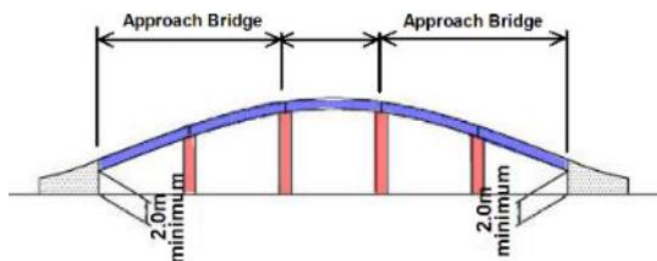
Source: JICA Study Team

Figure 18.4-4 Bridge Clearance

(2) Study for Bridge Length and Span Arrangement

1) Abutment Location (Bridge Length)

The number of piers should be limited to minimize the impact of soft ground against the bridge structure. The height of the abutment is planned at 5.0 m from the ground in order to reduce the impact of backfilling of the foundation. The vertical clearance in front of abutment is planned at 2.0 m for an easier maintenance.

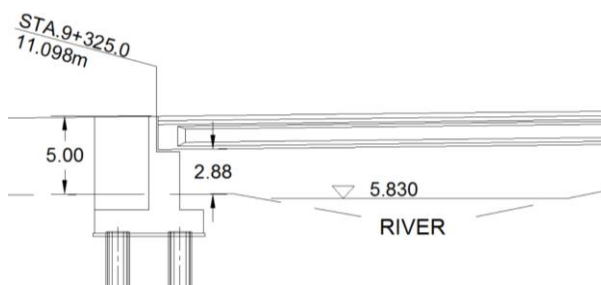


Source: JICA Study Team

Figure 18.4-5 Minimum Vertical Clearance at the Front of Abutment

a) Location for Abutment A

The location for abutment A can be set at STA.9 + 325.0 m with only minimal influence in the river section.

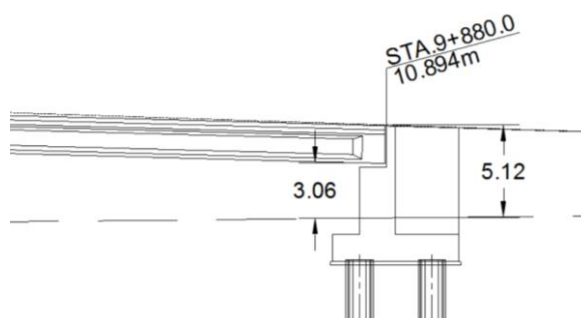


Source: JICA Study Team

Figure 18.4-6 Location for Abutment A

b) Location for Abutment B

The location for abutment B can be set at STA.9 + 880.0 m.



Source: JICA Study Team

Figure 18.4-7 Location for Abutment B

c) Bridge Length

The total bridge length is 555.0 m from the location of abutment A and abutment B inclusive of the main bridge in Agusan River and the approach bridge on land.

Table 18.4-2 Position of Abutment and Bridge Length

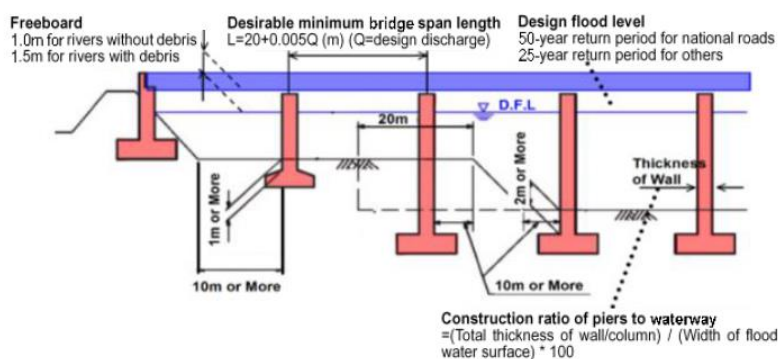
	STA. No
Abutment A	STA.9 + 325 m
Abutment B	STA.9 + 880 m
Bridge Length	555.0 m

2) Pier Location

Consideration of Bridge Pier Location is not only limited to river condition and navigational clearance. The following are also taken into consideration:

a) River Parameters Associated with Bridge Planning by the River

The following will be considered for the pier location.



Source: JICA Study Team

Figure 18.4-8 River Parameters Associated with Bridge Planning by the River

b) Pier Planning Avoiding Dike

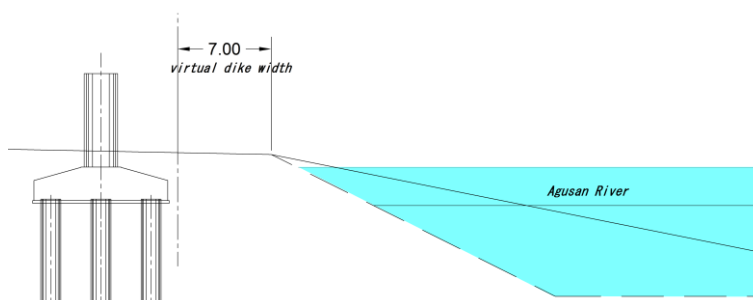
Bridge piers must be located avoiding dikes to prevent from vibration characteristics damages.

In Agusan River, the pier location will avoid the virtual maximum dike width shown in Table 18.4-3. In this stage, we shall use the maximum dike width for virtual dike due to non-conduct of the hydrologic analysis.

Table 18.4-3 Recommended Crest Widths for Dike (DGCS Volume 3)

Design Flood Discharge, Q (m ³ /sec)	Crest Width (m)
Less than 500	3
500 and less than 2,000	4
2,000 and less than 5,000	5
5,000 and less than 10,000	6
10,000 and over	7

Source: JICA Study Team

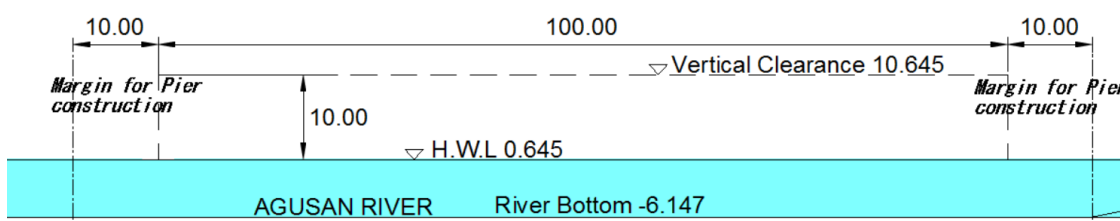


Source: JICA Study Team

Figure 18.4-9 Pier Planning Avoiding Dike

c) Margin for Pier Construction

The temporary cofferdam is needed for the pier construction in Agusan River. Therefore, about 10 m from navigational clearance area will be ensured as margin for pier construction.

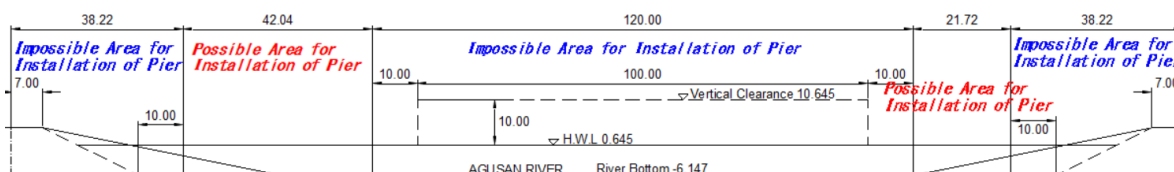


Source: JICA Study Team

Figure 18.4-10 Margin for Pier Construction

• Possible Area for Installation of Pier in Agusan River

From the above conditions, the possible area for the installation of the pier in Agusan River is shown in the figure below.

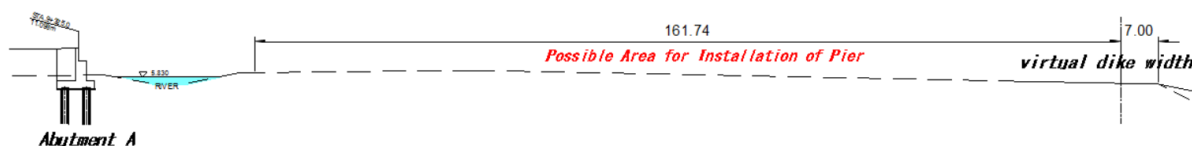


Source: JICA Study Team

Figure 18.4-11 Possible Area for Installation of Pier in Agusan River

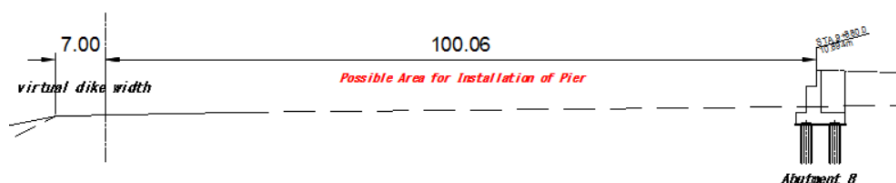
• Possible Area for Installation of Pier outside Agusan River

Regarding to the Pier position outside Agusan River, basically, there is no limit by avoiding the virtual dike of Agusan River and the river section in front of the abutment A.



Source: JICA Study Team

Figure 18.4-12 Possible Area for Installation of Pier in Left Bank Side



Source: JICA Study Team

Figure 18.4-13 Possible Area for Installation of Pier in Right Bank Side

3) Span Arrangement

The Span arrangement will be considered based on the result of the study for bridge length and pier location.

For the main bridge in Agusan River, there are two (2) positions for possible installation of pier in Agusan River by avoiding the navigational clearance and dikes. A 3-span bridge shall be proposed for the main bridge. The center span of the main bridge can be set from 120m to 180m. The span arrangement of main bridge will be decided based on the balance of center span and side span depending on the bridge type.

On the other hand, regarding to the approach bridge outside Agusan River, the pier can be free set because there are no topographic conditions restrictions excluding the virtual dike. Therefore, the span length can be set by bridge type and its applicable girder length.

a) Extraction of the Alternative of Bridge Type for Main Bridge

As shown above, the Center span length will be between 120 m and 180 m.

Therefore, the alternative of bridge type for the main bridge can be extracted based on this center span length as shown in Table 18.4-3.

Table 18.4-3 Applicable Span for Each Bridge Type (for Main Bridges)

Materials	Type of Bridge	Range	100m	200m	300m	400m	500m
Concrete Bridge	Extra-Dosed	100~275m					
	Cable-Stayed	100~450m					
Steel Bridge	Truss	50~500m					
	Arch	70~500m					
	Cable-Stayed	100~1000m					

: The optimal range
 : The applicable range specified by DGCS

Source: JICA Study Team

For the comparison of bridge types, the bridges selected from Table 18.4-3 are shown in the following:

- Alternative 1: Steel Truss Bridge
- Alternative 2: Steel Arch Bridge
- Alternative 3: Extra-Dosed Bridge (Concrete Bridge)

Cable-Stayed Bridge type was excluded in the comparison because the range of Span length is not optimal.

b) Extraction of the Alternative of Bridge Type for Approach Bridge

As shown above, the approach bridge will be on land only because almost the entire area of Agusan River will be covered by the main bridge. At the approach bridge part, the road alignment is almost straight, so PSCG is adopted.

The girder type of PSCG used for approach bridge, Type 5 (35 m) or Type 6 (40 m) of long span type will be used to reduce the number of substructures.

Table 18.4-4 Applicable Span for Each Bridge Type (for Approach Bridges)

Materials	Type of Bridge	Range	Span Length (m)												
			10	15	20	25	30	35	40	50	100	200			
RC	Precast Slab, Flat Slab	6- 12m	█	█											
	Concrete Deck Girder (RCDG)	13- 20m		█	█	█									
	Box Girder	22- 30m				█	█	█							
	Hollow Slab Bridge	10- 20m		█	█	█									
PC	Channel beams	11- 14m	█	█											
	Tee beams	15- 18m		█	█										
	I-beams	21- 30m				█	█	█							
	AASHTO girder (PSCG)	20- 40m				█	█	█	█	█					
Steel	Box girders	30-200m											█	█	█
	Hollow (voided) slab	15- 30m				█	█	█							
	I-beams	15- 30m				█	█	█							
Steel	Plate girder	20- 50m													
	Box girder	30-100m													
	Bailey bridge	9- 30m	█	█	█	█	█	█							
	Truss	40-130m													
Steel	Arch	50-400m													

- Onshore type bridge
- Offshore type bridge
- Common used type of bridge in Philippine

c) Span Arrangement

Based on the above, the following span arrangement are compared corresponding to each alternative type of the main bridge.

Table 18.4-5 Comparison of Bridge Types

	Span Arrangement
Alternative 1	<p>Main Bridge: Steel Truss Bridge</p>
Alternative 2	<p>Main Bridge: Steel Arch Bridge</p>
Alternative 3	<p>Main Bridge: Extra-Dosed Bridge (Concrete Bridge)</p>

Source: JICA Study Team

(3) Type of Substructure and Foundation

1) Substructure

Abutment type is a RC Type abutment. As for the pier in the river, in order to avoid disturbance of the river flow and cause local scouring at the pier and impact on the structural stability of the pier, an oval shape type pier is preferred. On the other hand, for the on land pier, a ramen structure which is light weight will be used because of the soft ground location.

2) Foundation

For soft ground is widely distributed in this location, a spread footing for the foundation is not advised.

Therefore, on land foundation is a cast-in-place pile which is generally common in the Philippines. As for the foundation in the river, a temporary structure like a cofferdam is needed

not only for the foundation but also for the substructure. Therefore, the foundation is a steel pipe sheet pile which can reduce the temporary structure works and be installed as a unit as a permanent structure and a temporary structure. In addition, this steel pipe sheet pile is an advanced construction technology.

(4) Comparison of Bridge Type

1) Summary of Study Results

The table below shows the results of quantitative comparison of the study plans extracted in the next section with respect to structure, workability, maintainability, landscaping, and life cycle cost. As a result of the comparison, we recommend the “Steel Truss Bridge” with the highest evaluation. There are no obvious differences in aspects of Environmental and Social Considerations among options except landscaping because structural impact and construction impact due to each option is almost same.

Table 18.4-6 Summary of Result for Selection of Bridge Type

Bridge Type	Weight	Alternative 1 Steel Truss Bridge	Alternative 2 Steel Arch Bridge	Alternative 3 Extra-Dosed Bridge
Structure	20	18.0	12.6	11.4
Constructability	15	12.4	11.8	9.8
Maintainability	10	4.8	6.8	9.2
Landscaping	15	12.0	14.6	9.8
Cost	40	40.0	38.3	38.2
Total	100	87.2 Recommend	84.1	78.4

Source: JICA Study Team

2) Result of Comparison

Evaluation criteria and evaluation results are shown on **Table 18.4-7** and **Table 18.4-8**.

An extra-dosed Bridge has an excellent maintainability due to the concrete bridge, but other evaluation items are poor. A steel arch bridge has an excellent aesthetic and the most harmonious with the landscape but is inferior relative to the steel truss bridge in the structure, constructability and economically. The steel truss bridge is inferior in maintainability and landscape, but it is excellent at the other evaluation items and it can evaluate the most excellent for overall.

Table 18.4-7 Evaluation Criteria

Evaluation Items		Score	Evaluation Point	★★★★★: x 1.0	★★★★: x 0.8	★★★: x 0.6	★★: x 0.4	★: x 0.2
Structure (20 Points)	Wind Resistance Stability	5	The type that is less likely to be deformed in the lateral direction during a storm and the case where vibration does not easily occur are evaluated as high	Less deformation and vibration				Deforms significantly in the lateral direction Vibration is likely to occur
	Impact on foundation ground	7	The ground condition on Butuan site is soft and very bad. Therefore, high evaluation is given for the case where the superstructure is low weight and is low impact on foundation ground.	Superstructure with light weight Low impact on foundation ground				Superstructure with heavy weight High impact on foundation ground
	Seismic Adequacy	5	High evaluation is given for the case where the inertia force acts at low position and the case where the superstructure weight is light. And also it is given for the case where it is different to resonate during an earthquake and has a Long period because seismic frequency characteristics in Philippines is short.	Low inertia force action position Superstructure with low weight Long natural period				High inertia force action position Superstructure with heavy weight Short natural period
	Redundancy	3	A type with high redundancy is highly evaluated. And if it has a critical member, the evaluation is low	High redundancy No critical members				Low redundancy And there is a critical member whose damaged case the bridge collapse.
Constructability (15 Points)	Safety Risk	5	The type that the temporary structure is not at a high place, has excellent structural stability during construction, and has a small influence on the navigation route when the member falls is highly evaluated.	Temporary structures are not at altitude The structure is stable during construction Small components and little effect on the navigation route.				Temporary structure is at high altitude The structure becomes unstable during construction The components are large and the effect on the navigation route is large
	Construction Duration	7	High evaluation is for the type with a short construction period	Short construction period				Long construction period
	Construction Yard Required	3	The type with a small construction yard and type that does not require concrete plant equipment will be highly evaluated.	Small construction yard No plant facilities required				Large construction yard Requires plant facilities
Maintainability (10 points)	Work Volume	4	Highly rated if: Number of parts to be inspected: Small Repainting area: Small Inspection frequency: Less type	Number of parts to be inspected; Less Repaint area; Low Inspection frequency; Low	It is halfway between ★ 5 and ★ 1, but closer to ★ 5	The intermediate value between ★ 5 and ★ 1	It is halfway between ★ 5 and ★ 1, but closer to ★ 1	Number of parts to be inspected; Many Repaint area; Many Inspection frequency; Many
	Workability	4	A type with sufficient maintenance workspace and a short total length of maintenance route will be highly evaluated.	The space for maintenance work is enough. The total length of the maintenance route is short.				The space for maintenance work is narrow. The total length of maintenance route is long
	Availability of Procurement for Maintenance Works	2	The type that can be maintained by general equipment is highly appreciated.	Can be maintained with common equipment				Requires special maintenance equipment
Landscaping (15 Points)	A bridge type that is different from existing bridges while maintaining harmony with the surrounding landscape		5	The bridge type with different from existing bridge on upstream side while the form that harmonizes with the characteristics of the surrounding landscape (elements of the natural landscape) are highly evaluated.	Existing bridge; Difference of bridge type Harmony with the surrounding landscape; Good			Existing bridge; Similar in bridge type Harmony with the surrounding landscape; Bad
	Architectural Features	Landmark	3	A type that is different from the current bridge and that creates a landscape that is a symbol of this place is highly evaluated as having high landmarkability	Highly symbolic and constitutes a unique landscape			Due to the same type as the existing bridge the difficult to create a unique landscape
		Originality	3	The use of new technologies and new materials will be highly evaluated for the type in which originality that is worthy of attention worldwide can be expressed by design (shape) based on structural rationality.	Can be created advanced structures and types			It is difficult to express novelty because there is little room for new technology to be applied
		Technological Progress	2	A type that has a visual sense of stability against horizontal force (a structural type with a feeling of stiffness and low visual center of gravity) is highly evaluated.	There is a sense of stability in the hem spread The low visual center of gravity			There is a no sense of stability in the hem spread The high visual center gravity
	Environment Impact		2	High evaluation is given to a type that visually non-impaired when viewed from outside by a bridge user (passing vehicle, passerby)	A strong sense of open because there are few members that obstruct the view			A strong sense of obstruction because there are many members that obstruct the view
Cost (40 Points)	Life Cycle Cost		40	= 40 - 40 x (ratio - 1.0)	Life Cycle cost = Initial Cost + Maintenance Cost (100 Years)			

Source: JICA Study Team

Table 18.4-8 Comparison Table for Bridge Type

Item		Alternative-1		Alternative-2		Alternative-3			
Bridge Type (★★★★: x 1.0, ★★★: x 0.8, ★★: x 0.6, ★: x 0.4, ☆: x 0.2)		Truss Bridge		Arch Bridge		Extra-Dosed Bridge			
Evaluation Items		Score		Score		Score			
Structure (20 Points)	Wind Resistance Stability	5	4.0	3.0	Both deformation and vibration are the largest in alternatives. Wind resistance measures are required for cables.	5.0	Less deformation and vibration because the concrete bridge with high member rigidity.		
	Impact on foundation ground	7	7.0	4.2	It is intermediate characteristics between truss and extradosed bridge.	2.8	High impact on foundation ground in all alternatives because superstructure with heavy weight.		
	Seismic Adequacy	5	4.0	3.0	Since ground condition is soft in this site, the design seismic intensity can be considered low due to long natural period. In addition, the position where the inertial force acts is low. Regarding to the superstructure weight, It is intermediate between truss and extradosed bridge.	2.0	Since ground condition is soft in this site, the design seismic intensity can be considered low due to long natural period. In addition, the position where the inertial force acts is low. But superstructure weight is heavy.		
	Redundancy	3	3.0	2.4	Redundancy is second only to trusses. And it is necessary to take measures against cable breakage.	1.6	Measures must be taken to prevent the main cable from breaking in order to prevent the bridge collapse		
Constructability (15 Points)	Safety Risk	5	3.0	3.0	Monitoring of navigating vessels from outside the channel is required when single-operation erection by floating crane is enforced.	4.0	Overhanging construction is possible over all sections.		
	Construction Duration	7	7.0	7.0	Shortest construction period due to single-operation erection by floating crane	2.8	Longest construction period due to cantilever erection by cast-in-place		
	Construction Yard Required	3	2.4	1.8	No plant facility is required, but the construction yard is maximum in all alternatives.	3.0	The plant facility is required for main tower and girder but the construction yard is minimum in all alternatives because the erection method is Cantilever which does not require the girder brock yard.		
Maintainability (10 points)	Work Volume	4	1.6	2.4	The number of parts to be inspected is medium. The repainting area is slightly larger	4.0	The number of parts to be inspected is low. Repainting is not needed for concrete bridge.		
	Workability	4	1.6	3.2	The space for maintenance work: Many (tilt truss) The total length of the maintenance route; Longest	4.0	The space for maintenance work: Small (Use of inspection vehicle, inside box girder) The total length of the maintenance route; small (Girder, Pylon, Cable)		
	Availability of Purocuament for Maintenance Works	2	1.6	1.2	Can be maintained with common equipment	1.2	Requires special maintenance equipment for cable		
Landscaping (15 Points)	Harmony with the Bridge of the Existing Bridge and Surroundings	5	4.0	5.0	The arch bridge is different from the existing bridges and is in harmony with surrounding landscape.	3.0	The extradosed bridge is similar bridge type in the existing bridge but is in harmony with surrounding landscape.		
	Architectural Features	Landmark	3	2.4	3.0	Demonstrating originality while respecting the existing bridge, it will be a unique landscape different from the current bridge	1.8	It is unlikely to have a unique landscape because it is the similar type the existing bridge	
		Originality	3	2.4	3.0	New materials and technologies can create advanced structures and type	1.8	It is possible to bring out the novelty of the part of members and materials, but the room for newness in form is limited only to the pylon	
		Technological Progress	2	1.6	2.0	The silhouette can be combined with delicateness, showing the extensibility of technology	1.2	Thirty years ago, the type was almost nonexistent, and the technology was extensible, but poor in freshness as of now	
	Environment Impact	2	1.6	1.6	Few members obstruct the view	2.0	Since there are no members in the vertical direction, an open space can be secured.		
Cost (40 Points)	Lifr Cycle Cost	40	40.0	38.3	13,700	38.2	15,300		
	Initial Cost (JPY_unit Milion)							12,700	13,700
	Maintenance Cost (JPY_unit Milion)							6,350	6,165
	Total Cost (JPY_unit Milion)							19,050	19,865
	Ratio							1.000	1.043
Total Score		87.2		84.1		78.4			

* Mainly landscapes are compared because other environmental and social considerations are almost same in terms of structural conditions
Source: JICA Study Team

18.4.4 Preliminary Design of Other Bridge

(1) Bridge Length

1) Abutment Location

Abutment location shall be considered as the same as Butuan Bridge as follows:

- The height of the abutment is planned at 5.0 m.
- The vertical clearance in front of abutment is planned at 2.0 m.

Based on the above, the abutment locations are listed in Table 18.4-9.

Table 18.4-9 Location of Abutments

	Abutment A	Abutment B
Bridge 1	STA.1 + 550	STA.1+830
Bridge 2	STA.4+705	STA.5+95
Bridge 3	STA.6+660	STA.7+15
Bridge 4	STA.7+805	STA.8+164
Bridge 5	STA.11+670	STA.12+105

Source: JICA Study Team

2) Bridge Length

From the location of abutment A and abutment B, the bridge length of other bridges are listed in Table 18.4-10.

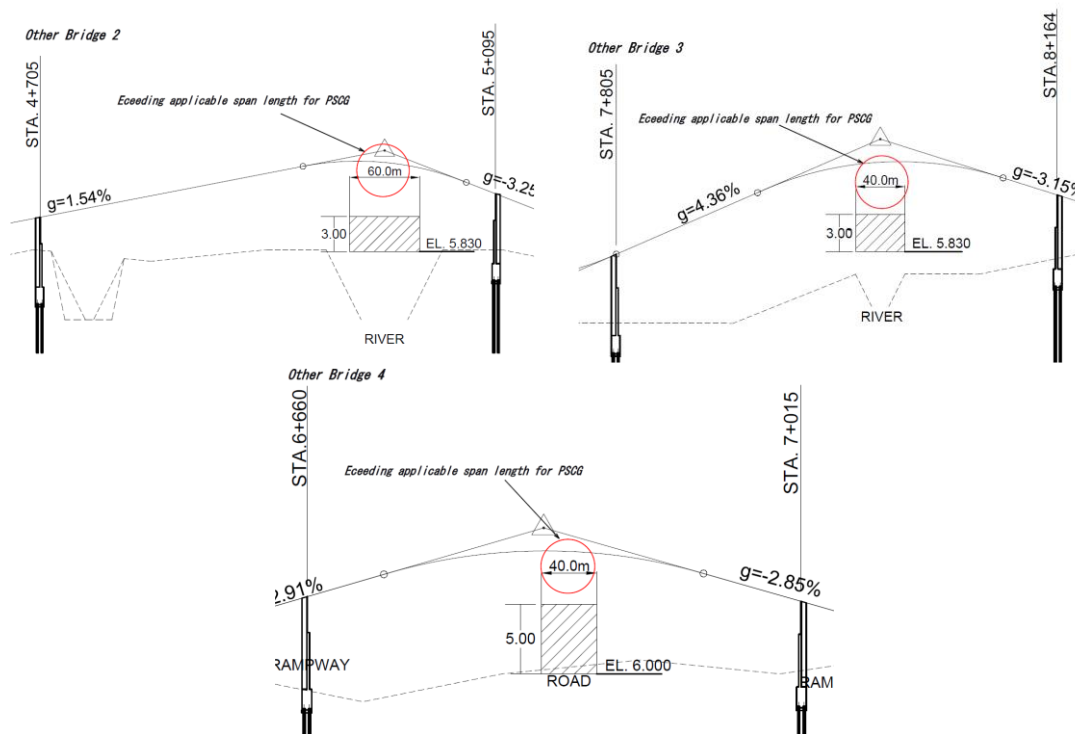
Table 18.4-10 Bridge Length

	Bridge Length
Bridge 1	280.0m
Bridge 2	390.0m
Bridge 3	355.0m
Bridge 4	359.0m
Bridge 5	435.0m

Source: JICA Study Team

(2) Span Arrangement

Basically, the girder type of other bridges 1 to 5 shall adapt PSCG being the most generally used bridge type in the Philippines and the cost is cheaper. However, with regards to partial span of bridges 2, 3 and 4, some cannot adopt a PSCG from the pier installation conditions due to exceeding applicable span length for PSCG.



Source: JICA Study Team

Figure 18.4-14 Exceeding applicable span length for PSCG

Therefore, in these locations exceeding applicable span length for PSCG, the Steel Box Girder which correspond to these span lengths and is applicable to keep low girder height shall be adopted.

Based on the above, the Span arrangement and bridge type of other bridges are shown in **Table 18.4-11**.

Table 18.4-11 Span Arrangement and Bridge Type

Span Arrangement and Bridge Type	
Bridge 1	<p>280.0m</p> <p>4x32.5m=130.0m AASHTO PC-I GIRDER TYPE V GIRDER HEIGHT = 1600mm</p> <p>4x37.5m=150.0m AASHTO PC-I GIRDER TYPE VI GIRDER HEIGHT = 1829mm</p> <p>Abutment A, Pier 1, Pier 2, Pier 3, Pier 4 (3.00m, EL. 5.830), Pier 5, Pier 6, Pier 7, Abutment B</p>

Span Arrangement and Bridge Type	
Bridge 2	
Bridge 3	
Bridge 4	
Bridge 5	

(3) Type of Substructure and Foundation

1) Substructure

Abutment type is a RC Type abutment. As for the pier in the river, in order to avoid disturbance of the river flow and cause local scouring at the pier and impact on the structural stability of the pier, an oval shape type pier is preferred. On the other hand, for the on land pier, rigid-frame structure which is light weight will be used because of the soft ground location.

2) Foundation

For soft ground which is widely distributed in this location, the use of a spread footing for the foundation is not applicable. Therefore, a cast-in-place pile will be used and is generally in the Philippines.

18.5 Design Drawings

Plan and profile (sheet No. 01 to 11) were prepared as the design drawings with scale of the design drawings as follows.

- Plan : S=1/5,000
- Profile : H=1/5,000 V=1/500

The drawing is in the **Appendix-18-1**.

18.6 Cost Estimation of the Project

The total construction cost was estimated as PhP 15,409 pesos. The rough construction cost was estimated as shown below:

The reference data for the construction unit cost is shown in **Appendix-18-2**.

Table 18.6-1 Summary of Construction Cost

Structure Type		Quantity	unit	Unit Cost		Construction Cost		
New Construction	Road	Embankment	13.25	km	195	mil. PHP/km	2,585	mil. PHP
		Cutting	0.35	km	334	mil. PHP/km	117	mil. PHP
	Bridge	Special Bridge	0.60	km	10,776	mil. PHP/km	6,465	mil. PHP
		Standard Bridge (PC)	1.45	km	1,678	mil. PHP/km	2,433	mil. PHP
		Standard Bridge (Steel)	0.30	km	3,090	mil. PHP/km	927	mil. PHP
	Soft Ground Treatment	Sand matt	9.0	km	45	mil. PHP/km	407	mil. PHP
		Plastic Vertical Drain (PVD)	1.0	km	24	mil. PHP/km	25	mil. PHP
		Deep mixing method (DMM)	0.4	km	286	mil. PHP/km	114	mil. PHP
	Interchanges	Diamond Type	1.00	location	188	mil. PHP/Loc.	188	mil. PHP
		Half Diamond Type	1.00	location	95	mil. PHP/Loc.	95	mil. PHP
	Intersection	Four legged intersection (5)	0.50	km	309	mil. PHP/km	155	mil. PHP
		Three legged intersection (3)	0.15	km	315	mil. PHP/km	47	mil. PHP
Utilization of Existing Road	Pavement Work for Utilization of Existing Road		3.30	km	307	mil. PHP/km	1,011	mil. PHP
	Relocation of Existing Road		0.92	km	308	mil. PHP/km	283	mil. PHP
	Widening of Connecting Road		1.81	km	307	mil. PHP/km	556	mil. PHP
Total Construction Cost							15,409	mil. PHP

Note: All items are inclusive of VAT

Source: JICA Study Team

Table 18.6-2 Summary of Land Acquisition and Relocation Cost

	Length(km)	Width(m)	Unit Cost		Cost	
ROW Acquisition Cost	17.2	60	26	PHP/mil.2	27	mil. PHP
	2.0	60	700	PHP/mil.2	84	mil. PHP
Total ROW Acquisition Cost					111	mil. PHP
Relocation Cost	No. houses		Unit Cost		Cost	
	175		0.3	mil..PHP/houses	53	mil. PHP
Total Relocation Cost					53	mil. PHP

Note: All items are inclusive of VAT

Source: JICA Study Team

18.7 Implementation Schedule

18.7.1 Construction Plan

Based on the result of the Preliminary Design, the JICA Survey Team prepared the construction plan. The Project site is located along the coastal area with major rivers and creeks and is susceptible to typhoons. The construction plan will consider such seasonal characteristics of the Project site.

18.7.2 Construction Casting Yard

Major construction activities for the project are producing numbers of Steel Box Girders, Steel Truss type bridge and PC-I AASHTO Girder within the casting yard. These manufactured steel box girder and steel truss bridge will be transported to the project construction site according to the implementation schedule using ship and land transport. The selection for the location of construction casting yard is nearby the construction site. Since the construction casting yard is only temporary but production activities need to produce large volume to prepare concrete materials by the concrete batching plant and assemble of Steel Bridge and also Asphalt Concrete Batching plant for pavement work is placed. The contractor will select proper location for the construction site and its scale during tender procedure.

18.7.3 Bridge Erection Method for Butuan Bridge and Other Bridge

(1) Butuan Bridge Erection System

- Super Barge and Jumbo Crane will be secured from Japan. Assembling of Steel Truss Space will be undertaken near the new bridge construction area. After assembling of the center span of arch bridge, this will be brought to the bridge construction site. Set up for position and lift up of Steel Truss of 150m Center Span needs to use the special 3,000 ton class Jumbo Crane as shown in **Figure 18.7-1**. This Special Erection System will be brought from Japan. Cost of this scheme is quite high but it has an advantage of having shorter construction period.
- Installation of the Center Span of the Steel Truss Bridge will use the Traveler Crane. This scheme is needed to protect the Truss from cantilever force during installation as shown in **Figure 18.7-2**. Cost of this scheme is not so high but entails a little bit longer construction period.

Traveler Crane System is recommended for this erection system for the time being.

(2) Erection Scheme for Side Span of Butuan Bridge and Other Bridge

- Assembling for steel box girder for one span should be undertaken beside of bridge construction area. After assembling of steel box girder is completed, erection will use the track crane.

- Preparation for PC-I girder at Casting Yard and transporting it to construction site by trailer. Erection PC-I girder will use the track crane

This scheme is standard construction scheme as shown in **Figure 18.7-3**.



Figure 18.7-1 One Span Election using Jumbo Crane Steel Box Girder



Figure 18.7-2 Traveler Crane Election PC-I Girder

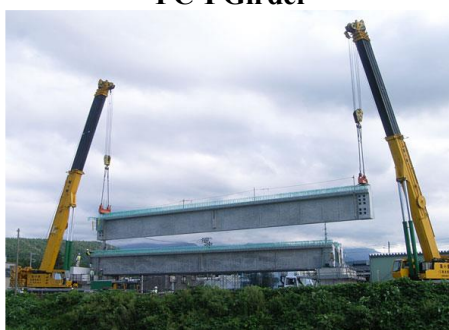


Figure 18.7-3 Track Crane Election for Steel Box Girder and PC-I Girder

Source: JICA Study Team

18.7.4 Construction Site and Access Road

This project construction site is located along Butuan coastal area. Access to from construction site will be from existing road to use temporary road to casting yard and construction site. Temporary road will be constructed along construction site to manage during construction. This temporary road will be used for delivery of construction material to construction site. Casting yard is the place for stockpiling materials as steel, formworks and scaffoldings for construction of piers and bridge. And also set up for Concrete Batching Plant and Asphalt concrete Batching Plant.

18.7.5 Construction Schedule

The construction schedule did not take into consideration ROW acquisition-related activities such as demolition and movement of houses and structures, which means that the construction schedule assumes that ROW acquisition for the Project has been completed and that each section has been cleaned up. Based on the above condition, total construction period for Construction Agusan del Norte - Butuan City Logistical Highway Project will be 30 months. Construction Schedule for Agusan del Norte - Butuan City Logistical Highway Project is shown in **Figure 18.7-4**.

18.7.6 Traffic Management and Safety during Construction

Traffic Management during construction for Agusan del Norte - Butuan City Logistical Highway Project would be coordinate with LGU and traffic police to manage for traffic control of road along the site during construction. Each LGU has Traffic control section and this project needs support from them.

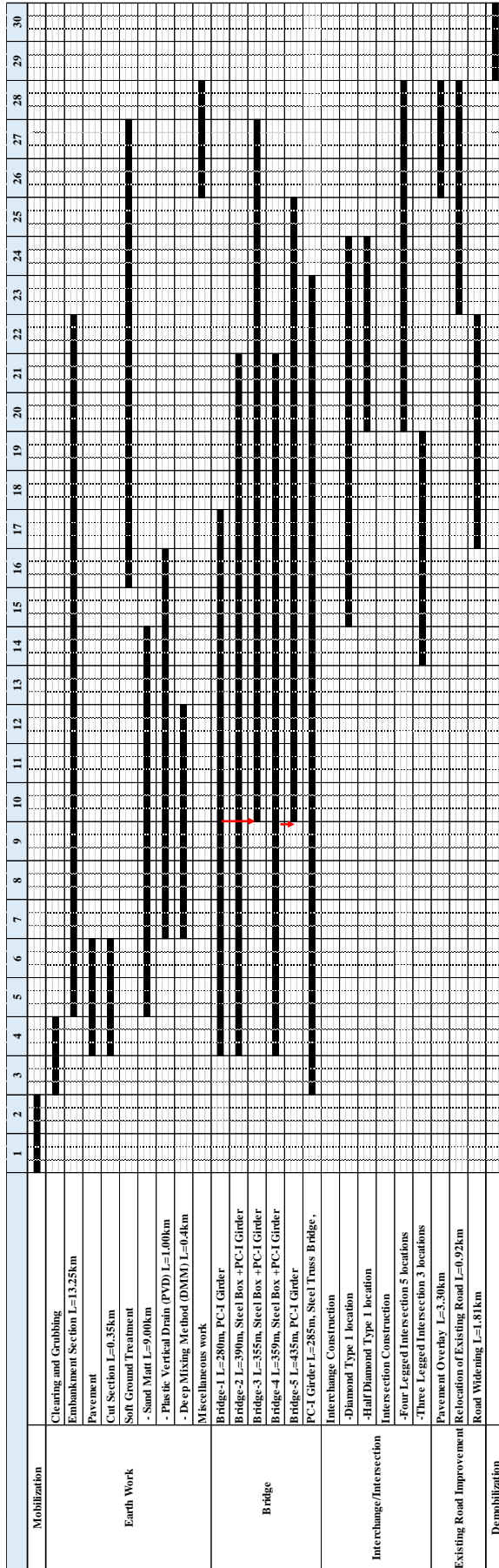


Figure 18.7-4 Construction Schedule for Butuan Coastal Road Project

Source: JICA Study Team

18.8 Environmental and Social Considerations

The level of environmental and social consideration for the project road (Relevant studies on Agusan del Norte - Butuan City Logistical Highway Project (ABLH)) as part of the HSH Masterplan is at "pre-feasibility study level" hence further study and evaluation shall be implemented during the Feasibility Study (F/S) stage in the future. Therefore, relevant studies in environmental and social considerations of this report are also pre-feasibility study level and shall be followed-up and updated by F/S.

18.8.1 Project Component and Impacts on Environment

ABLH is planned as a logistical road that connects Asian Highway No.26 to Masao International Port and Nasipit Port crossing the Agusan River on the way to Butuan City in Caraga region. Proposed project outline based on the survey with a map of the target area is elaborated in **Section 18.2**. Project component which will cause adverse impact is found as road construction, interchanges, and bridges as shown in **Section 18.4**.

This is a pre-feasibility study without fixed conditions such as associated projects by other proponents, relevant activities including soil borrow pits, quarry pits, construction roads, camp yards etc., and pre-acquired land for the project, therefore, further study and confirmation shall be implemented during next phase which is the F/S. As far as the Pre-F/S in this master plan survey is concerned, implementation timing is not decided, and other specific planned or reasonably defined developments are not found. Therefore, the survey focuses on direct impact caused by the project during Pre-F/S stage, and the possibility of cumulative impact will be considered during F/S.

In order to conduct initial environmental and social impact assessment at Pre F/S, LGUs in and around the proposed project area are selected as the study area. The Project will traverse the four municipalities as shown in Table 18.8-1. The study area for secondary data collection of environmental and social baseline covers two sections (Phase 1 and Phase 2 section). The study area involving site visit, public consultations and initial environmental and social impact assessment at Pre-F/S covers for Phase 1 section of the Project.

Table 18.8-1 LGUs in the Proposed Project Area

Island	Region	Province	Municipality/ City	Barangays	Project Phase	Length of the Project Alignment
Mindanao	Region XIII: Caraga	Agusan del Norte	Municipality of Mahallanes	Guiasan, Poblacion	Phase 1	19.5km
			Butuan City	Cabcabon, Lumbocan, Masao, Pagatpatan, Sumilihon, Taguibo		
			Municipality of Buenavista	Abilan, Manapa,	Phase 2	14.3km
				Matabao, Poblacion9, Poblacion10, Sacol		
Municipality of Nasipit	Ata-atahon, Barangay1,3,4,5,6 (Poblacion), Camagong, Cubi- Cubi, Kinabjangan, Punta, Talisay					
Total		1	4	25	2 Phases	33.8 km

Source: JICA Study Team

18.8.2 Baseline of Environmental and Social Conditions

The following descriptions are collected information on pollution items, natural environment, reserved areas of natural protection and cultural heritages, land use, living areas of indigenous people, and social conditions of land acquisition and involuntary resettlement.

(1) Socio-Economic Conditions

a) Population

Based on the 2015 statistical survey, the population total population of cities and municipalities in the influence area of the study is about 461,641 as shown in **Table 18.8-2**.

Table 18.8-2 Population of the Proposed Project Area

Municipality/ City	Area (km ²)	Population	Population Density (Person/km ²)
Municipality of Mahallanes	44.31	21,007	470
Butuan City	816.62	337,063	413
Municipality of Buenavista	475.61	61,614	130
Municipality of Nasipit	144.4	41,957	290

b) Education Opportunity

In the Municipality of Magallanes, around 95% of the population are literate and enrollment participation rate in elementary is 95.95%. However, only 63.33% go to high school. The competency level of the students is low. It is only 44.80% in elementary and 36.93% in high school. Similarly, among those in the productive age, only 8.14% have trade skills.

In Butuan City, the total number of pre-schools in the city is divided into two sectors, the private sector and public sector which compose of 61 and 89 respectively. Followed by the public and private elementary schools with a total of 107 and 45 institutions. There are 40 public and 33 private secondary schools, and 13 tertiary schools recorded in Butuan City as of 2018.

c) Health Status

The health services in the municipality of Magallanes are generally complete as required in the Philippine health service – nutrition, sanitation, preventive health care and care for the sick. Its facilities are also complete, including hospitals. By regular government standard, the physical facilities are already enough. Its personnel strength is also within standards. The limited supply of medicine and other materials also at times hamper it effectiveness and efficiency.

In Butuan City, hospitals are classified into three different categories: four tertiary hospitals with over 150 bed capacities located in the different parts of the city. Subsequently, there is only one secondary hospital with a 50-bed capability. And there were two primary hospitals with below 50 bed capacity as of 2018. Primary health services, also known as basic health services, consist of services available at city health centers, rural health units or barangay health stations. Secondary health services are those provided by some rural health units, infirmaries, district hospitals and out-patient departments of provincial hospitals. Tertiary health services include medical and surgical diagnostics, treatment and rehabilitative care undertaken usually by medical specialists in a hospital setting.

(2) Pollution Items

1) Air Quality

Based on the air quality monitoring in 2013 at Central Butuan District 1, Ground, A.D Curato St., all of the tested parameters for air quality (TSP) were within the National Ambient Air Quality Guideline Values (NAAQGV) of the DENR (**Table 18.8-3**).

Table 18.8-3 CY 2013 Total Suspended Particulate (TSP) Level

TSP Concentration (ug/Ncm)			DENR NAAQGV Standards (ug/Ncm)	WHO Air Quality guidelines for PM, ozone, nitrogen dioxide and sulfur dioxide
Min	Max	Annual Geo. Mean		
28	0	63	230	50µg/m ³ (24-hour mean)

Source: EMB-Caraga Annual Narrative Accomplishment Report, 2013

* Other necessary parameters such as NO₂ and NO_x shall be measured in the F/S phase.

2) Water Quality

Water quality sampling site in 2018 were tributaries of the Agusan River at two stations. The tested parameters, pH, BOD, and Total Dissolved Solids (TDS) were within the environmental guideline value for the Class C water (Fishery Water /Recreation Water Class II). Total Suspended Solids (TSS) and DO of Station 1, and Phosphates of Station 2 were above the prescribed guideline value for Class C water. Monitoring report described that these high concentrations might be attributed to surface run-off that occurred after the rainfall. Fecal coliform and ammonia of both stations exceed the guideline values due to the direct discharge of domestic and agriculture pollution on the river (**Table 18.8-4**).

Table 18.8-4 Water Quality Monitoring Results for the Water Quality Stations in Butuan City, 2018

Parameters	Unit	Results		Guidelines*	WHO's Global Overview of National Regulations and standards for Drinking-Water Quality (2018)
		(SW1)	(SW2)		
pH	-	8.00	8.20	6.5-9.0	6.5 - 8.5
DO	mg/L	3.60	5.50	minimum 5	
BOD	mg/L	2.00	4.00	7	
Total Suspended Solids (TSS)	mg/L	126.00	57	80	-
Total Dissolved Solids (TDS)	mg/L	211.00	329.00	-	-
Fecal coliform	MPN/100mL	2,700.00	7,900.00	200	Must not be detectable in any 100 ml sample (recommended median value – 0 per 100 ml)
Nitrates	mg/L	0.17	0.11	7	50 mg/l
Phosphates	mg/L	0.30	0.55	0.5	-
Surfactants as MBAS	mg/L	Less than 0.01**	0.06	1.5	-
Oil and Grease	mg/L	Less than 1**	2.00	2	Non set (recommended median value - 0.1 mg/l)
Ammonia	mg/L	0.11	2.27	0.05	Non set (recommended median value - 0.2 mg/l)

Notes: * DAO 2016-08 (Water Quality Guidelines and General Effluent Standards for Class C waters.

** Method Detection Limit

- No specified standards/values/unit

Bold font – Values are not consistent with the guidelines

3) Waste

Population of Butuan City is increasing and the amount of solid waste is also increasing. Also, due to stable and high economic growth in Butuan City, amount of solid waste is increasing. With such background, Butuan City and relevant LGUs are managing solid waste collection and disposal.

4) Noise and Vibration

According to the Ex-Post Evaluation of Japanese ODA Loan Project "Second Magsaysay Bridge and Butuan City Bypass Road Construction Project" (2008), local people expressed increase of noise problem due to operation of a new bridge. Monitoring data along the project sites are not measured at the time of Pre-F/S. National standard of NPCC and IFC/WB are as shown in the following tables.

Table 18.8-5 NPCC Noise Standard

Category	Maximum Allowable Noise (dBA) by time periods		
	Daytime (9:00 A.M. to 6:00 P.M).	Morning/Evening (5:00 A.M. to 9:00 AM/ 6:00 P.M. to 10:00 P.M.	Nighttime (10:00 P.M. to 5:00 A.M).
AA	50	45	40
A	55	50	45
B	65	60	55
C	70	65	60
D	75	70	65

- Class AA- a section of contiguous area which requires quietness, such as areas within 100 meters from school site, nursery schools, hospitals and special house for the aged
- Class A - a section of contiguous area which is primarily used for residential area
- Class B - a section of contiguous area which is primarily a commercial area
- Class C - a section of contiguous area reserved as light industrial area
- Class D-a section which is primarily reserved as heavy industrial area

Table 18.8-6 IFC/WB's EHS Standard (Noise)

Receptor	One Hour L _{Aeq} (dBA)	
	Daytime 07:00 - 22:00	Nighttime 22:00 - 07:00
Residential; institutional; educational ⁵⁵	55	45
Industrial; commercial	70	70

5) Ground Subsidence

The present water supply of project areas mainly comes from groundwater sources and surface water such as Taguibo River. The project areas are vulnerable for subsidence because of pumping well and soft ground.

6) Offensive Odor

There are observed offensive odor in the area close to existing dumping sites such as Doongan Garbage Dump Site.

7) Bottom Sedimentation

Because of incomplete drainage system and wastewater treatment system, both inland water and sea water is facing pollution. Therefore, bottom sedimentation in such areas might be degraded due to polluted water.

(3) Natural Environment

1) Protected Area

"The revised procedural manual for DENR Administrative Order (DAO) 2003-30: Implementing Rules and Regulations (IRR) for the Philippine Environmental Impact Statement (EIS) System specifies 12 Environmental Critical Areas (ECAs) categories, as listed in **Table**

18.8-7. DENR-EMB decide on the relevance of the ECA categories to the project location. ECA as defined is an area considered environmentally sensitive wherein the magnitude or impacts are easily recognized if proposed projects are built, developed, or implemented in it. It is expected that the Project area is within five (5) ECA categories namely:

[No. 6] Hard-Hit by Natural Calamities,

[No. 8] Prime Agricultural Lands,

[No.10] Water bodies for domestic and wildlife/fishery support,

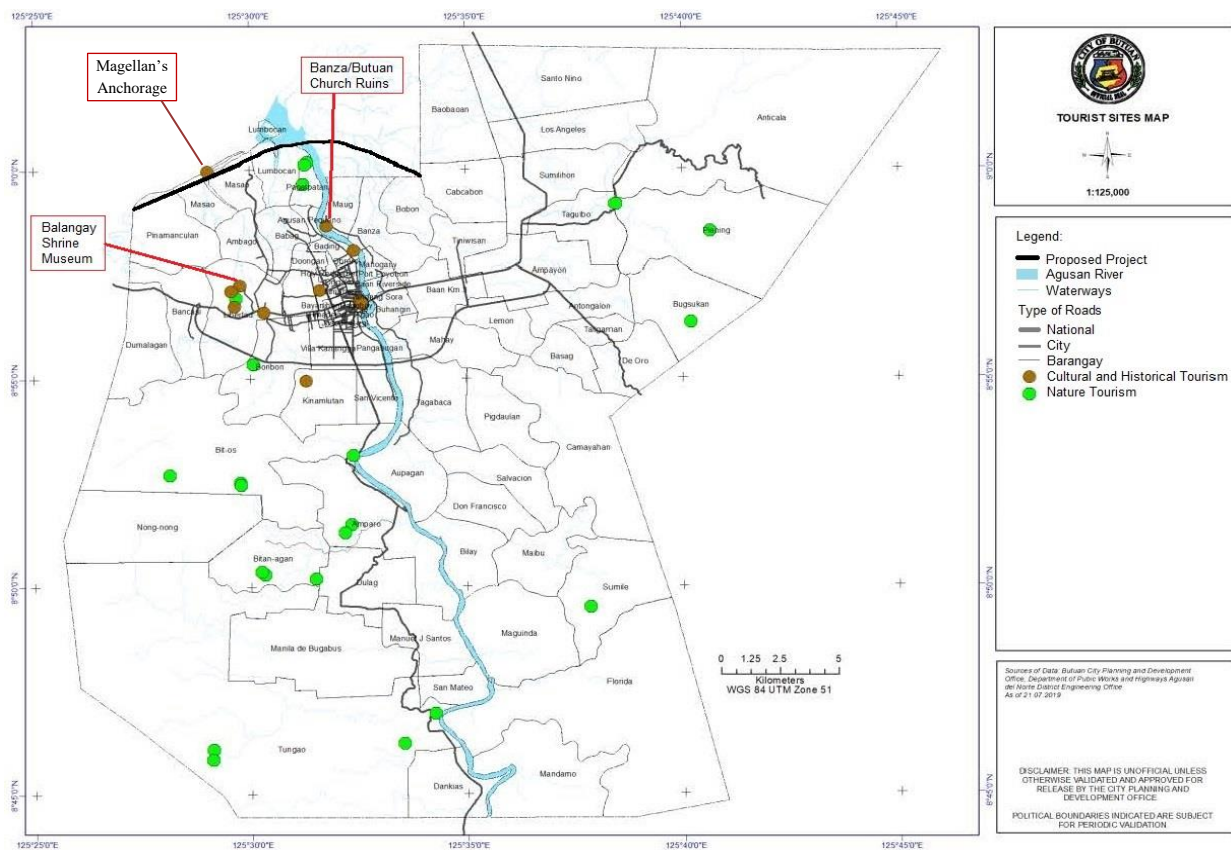
[No.11] Mangrove Areas, and;

[No.12] Coral Reefs

Table 18.8-7 Environmentally Critical Areas (ECAs) within or near the Project Site

No.	ECA Category	ECA within the proposed project	Remarks
1	Protected Areas (declared by National laws or local ordinances)	None	Carmen Critical Habitat is the nearest protected areas as declared by DAO 08-12 (approximately 5.9 km from proposed project -phase 2 section).
2	Aesthetic Potential Tourist Spots	None	Magellan's Anchorage in Butuan City is the nearest tourist spot in the proposed logistical highway (Approximately 0.66 km from the proposed project -phase 1 section) (see Figure 18.8-1)
3	Wildlife Habitat	None	Taguibo Watershed Forest Reserve is approximately 5.6 km away from the proposed project phase-1 section.
4	Unique Historic, Archaeological, Geological Site	None	Banza Ruins/Butuan Church Ruins is the nearest Historical site in the proposed alignment (approximately 3.7km from the proposed project -phase 1 section). (see Figure 18.8-1)
5	Ancestral Lands	None	No approved CADT in the proposed logistical highway
6	Hard-Hit by Natural Calamities	✓	Low to very High Susceptibility to flooding. High Susceptibility to liquefaction.
7	Critical Slope (>50% or >27°)	None	The proposed alignment is within 0-3% slope
8	Prime Agricultural Lands	✓	The proposed logistical highway will traverse agricultural land (Figure 18.8-4 and Figure 18.8-5)
9	Recharge Areas of Aquifers	None	Not applicable
10	Water Bodies (for domestic use, or support wildlife/fishery)	✓	The proposed logistical highway will traverse 11 rivers and creeks. (see Figure 18.8-3)
11	Mangrove Areas	✓	The proposed project -phase 1 will traverse mangrove areas (Figure 18.8-2). As per Presidential Decree 705, cutting of mangrove trees is prohibited. It is necessary to coordinate with the DENR and/or discuss alternatives to avoid mangrove areas.
12	Coral Reefs	✓	Butuan Bay is near the proposed logistical highway. The nearest coral reefs are approximately 1km away from the proposed project. (see Figure 18.8-2)

Source: JICA Study Team



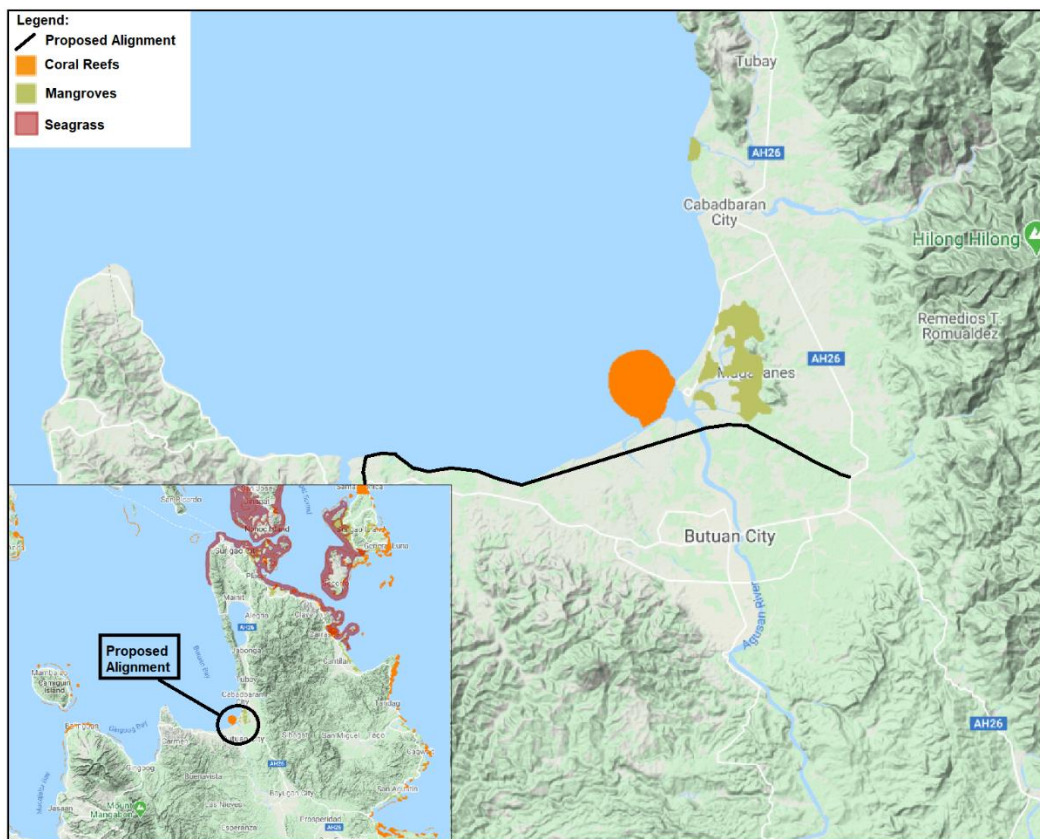
Source: DENR, 2015

Figure 18.8-1 Aesthetic Potential Tourist Spots in the Butuan City

2) Ecosystem

Taguibo River Watershed Forest Reserve is the nearest wildlife habitat in the proposed project (approximately 5.6 km). It is located in the Northeast side of Butuan City which covers an area of 4,367.44 hectares. The common flora species found in the watershed are red and white lauan, bagtikan, tanguile, almon, mayapis, narra, tindalo, almaciga, molave, kalingag, bahai, and balite. While tarsier, wild cat, python, wild pig, wild deer, flying lemur are the fauna species found in the Taguibo River Watershed Forest Reserve. The project road will traverse the coastal area of Butuan Bay, which is an extension of Bohol Sea. Mangroves are found near the river mouths (**Figure 18.8-2**).

In addition, impact on the coral reefs around the sea areas shall be confirmed further in the succeeding F/S-Study, although direct impact may not be expected at this pre-F/S stage.



Source: Coral Triangle Atlas

Figure 18.8-2 Coral reefs and Mangrove Area Distribution Map around the Study Area

3) Hydrology

The proposed project will be traversing seven (7) rivers and 4 (four) creek/canals including Kinabjangan River, Guihao-an River, Masao River, Agusan Pequeno River, Ambago River, Agusan River and Banza River. Agusan River is the main river in north-eastern Mindanao which is the third largest river in the Philippines with an estimated length of 349 km. River network around the project areas are shown in **Figure 18.8-3**.



Source: JICA Study Team

Figure 18.8-3 River Network Map in and around the Study Area

Almost the entire area of Butuan City has relatively low groundwater resource potential index (GRPI) value where most areas of the municipalities of Magallanes and Tubay have relatively high GRPI value. The main source of potable water is surface water from Taguibo River and other lesser-known springs. Groundwater is main source of potable and irrigation water in the municipalities of Remedios T. Romualdez, Magallanes, Tubay and Cabadbaran City (Source: Characterization of Groundwater Development Potential of Agusan del Norte, Philippines, 2010).

4) Topography and Geology

The topography of Caraga includes mountain ranges, flat farmlands, lakes, beaches, waterfalls, rivers, and wetlands. The project area is located in the coastal area, whose ground level is essentially flat or has a small variation in elevation. Based on the land slope map provided by Butuan City and Municipality of Magallanes, the project area is within the 0-3% slope which defined as level to gently sloping area (Source: Comprehensive Land Use Plan (CLUP) of Butuan City, 2018).

(4) Social Environment

1) Land Acquisition and Resettlement

There have been many experiences of land acquisition and resettlement in and around the project areas including projects under safeguard policies of Asian Development Bank (ADB) and JICA's Environmental and Social Considerations. Procedures of land acquisition and resettlement follows the country system of the Philippines.

2) Poverty

The full year 2018 poverty incidence among population for Caraga Region including in the project areas displays an improvement of 9.0% compared to 39.5% figure in 2015. Caraga region also experienced improvement in terms of subsistence incidence among population or proportion of Caraganons, whose income is not enough to meet even the basic food needs, which registered at 10.2% increase in 2018.

3) Ethnic Minority and Indigenous People

26 Certificate of Ancestral Domain Titles (CADT) are approved in Region 13, as of December 2019, in accordance with the national distribution maps of CADTs provided by the National Commission on Indigenous Peoples (NCIP). The Project will not traverse any approved or declared CADTs (NCIP 2019). The nearest CADT is more than 15km far from the project alignment.

4) Local Economy such as Employment and Livelihood

Based on the 2015 statistical data, i) Population ii) Household, iii) Area, and iv) Population density are;

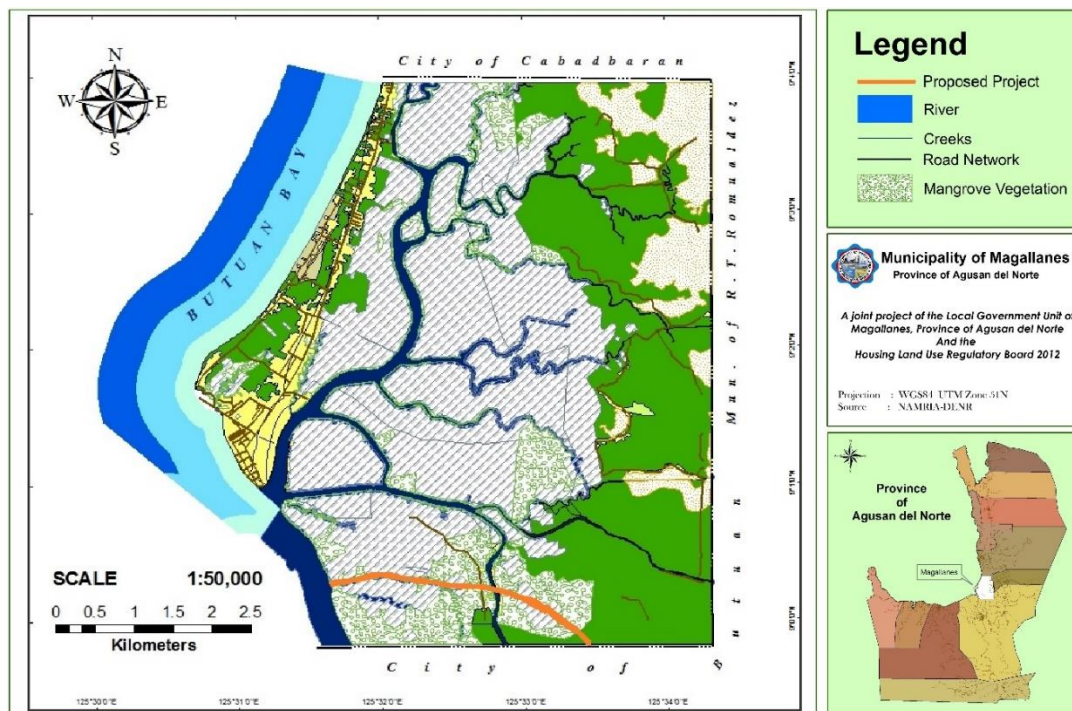
[Butuan City] i)337,063 persons, ii) 76,212 households, iii)816,612 km², and iv) 413 persons/km²

[Municipality of Magallanes] i)19,895 persons, ii)3,640 households, iii)49.91 km², and iv)399 persons/ km². (2015 Public Service Announcements, 2000 Census of Population and Housing, National Statistics Office)

Services remains to account for the largest share in the region’s economy in 2018 with 51.1 percent. This is followed by Industry with 32.7 percent and Agriculture, Hunting, Forestry and Fishing with 16.2 percent.

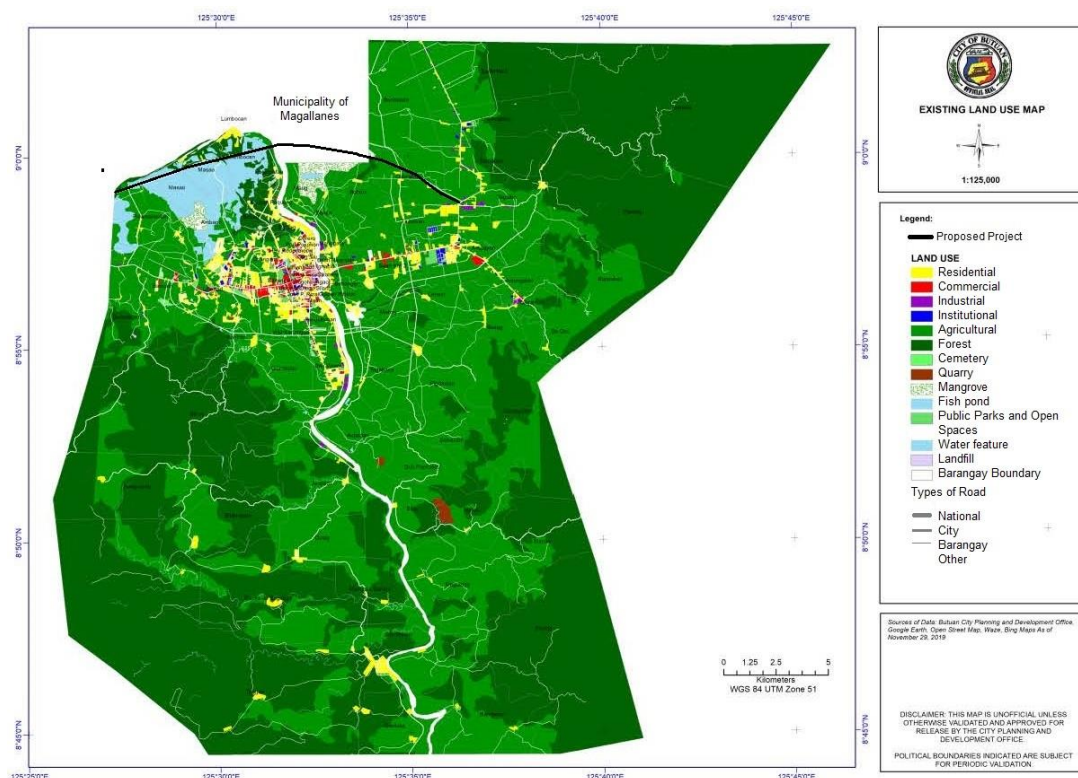
5) Land use and Usage of Local Resources

Based on the land use classification of Butuan City, agricultural land covers 52.08 % of city, followed by forest area with 32.79%. In front of the Butuan Bay area is used as mangrove areas or fishpond area. As for the land use of Municipality of Magallanes, agricultural land covers 63.12 %, followed by residential area with 28.22% (Source: Comprehensive Land Use Plan (CLUP) of Butuan City, 2018, Comprehensive Land Use Plan (CLUP) of Magallanes Municipality 2018). **Figure 18.8-4** and **Figure 18.8-5** shows land use status of the project areas.



Source: Magallanes Municipality CLUP, 2018

Figure 18.8-4 Existing Land Use Map of the Magallanes Municipality



Source: Butuan City CLUP, 2018

Figure 18.8-5 Existing Land Use Map of the Butuan City

6) Water Usage

Both surface/river water and groundwater are used for portable water. Irrigation water originated from natural river networks along the project sites.

7) Existing Social Infrastructures and Services

The project area of ABLH has many rural communities with existing social infrastructures including school, hospital, public/social service buildings and infrastructure such as rural road networks.

8) Social Institution such as Socially Related Capital and Decision-making Organizations

There is different level of local government entities such as municipality, barangay, village, etc. as social institution. Also, there are different kinds of public and private organizations in the field of specific industry/occupation, gender, NGO, etc.

9) Gender

The Philippines is one of the most developed countries in the field of gender equality.

10) Children's Rights

Child labor cases in the Philippines are commonly reported and it may occur in the survey area. Children's rights in the survey area may related to poverty.

11) Infectious Diseases such as HIV/AIDS

HIV/AIDS cases in Philippines are usually connected to prostitution workers and it may be common in the study area.

(5) **Others**

1) **Transboundary Impact and Climate Change**

There are internationally common recognitions on transboundary impact and climate change such as greenhouse effect gas emission in industry, transportation, and other relevant sectors in the survey areas.

18.8.3 Legal and Institutional Framework of Environmental and Social Considerations

Laws and Regulations related to environmental and social issues in the Philippines are summarized in the **Chapter 13** of this report. Based on both legal frameworks in Philippines and the JICA Guidelines for Environmental and Social Considerations, April 2010 (hereinafter, “JICA Environmental Guidelines”), Categorization of ABLH is estimated as follows.

(1) **Categorization of EIA in line with PEISS**

Environmental Compliance Certificate (ECC) will be acquired as a requirement by the DENR before the project implementation. Based on the ECA categories, the proposed Agusan del Norte-Butuan City Logistical Highway is considered as ECA project because it will traverse in the areas which is hard-hit by natural calamities, prime agricultural lands, water bodies for domestic and wildlife/fishery support, mangrove and coral reefs.

In addition, based on the project threshold for coverage screening and categorization, the proposed 33.8 km proposed logistical highway falls under Category A which is required to secure an ECC. An Environmental Impact Statement Report shall be prepared and submitted to DENR-EMB for evaluation. Public consultation and baseline social and environmental studies are required to be conducted within the affected areas as requirements in the preparation of EIS report.

(2) **Categorization of the Project in accordance with the JICA Environmental Guidelines**

Category A defined by the JICA Guidelines for Environmental and Social Considerations, April 2010 (hereinafter, “JICA Environmental Guidelines”) generally includes i) projects in sensitive sectors, ii) projects that have characteristics that are liable to cause adverse environmental impact, and iii) projects located in or around environmental sensitive areas. Moreover, a project causing large-scale involuntary resettlement and or a project area inhabited by indigenous people are classified under Category A. Projects are classified as Category B if potential adverse impacts on the environment and society are less adverse than those in Category A.

Based on the above guidelines, the Project is seemed to be classified as Category A by JICA because the project is considered as a large-scale road and bridges project, as a project located in or around environmental sensitive areas (mangrove area for habitats with important ecological value) and/or large scale involuntary resettlement under the JICA Environmental Guidelines. The categorization shall be reviewed during feasibility study based on the detail data such as the scale of mangrove area to be developed, and the number of affected persons in ROW.

18.8.4 Alternative Comparison

Discussion of alternative comparison for ABLH, bridge types, is described in **Section 18.4.3** of this chapter.

18.8.5 Scoping and ToR for Environmental and Social Considerations Surveys

(1) **Scoping**

Scoping means choosing alternatives for analysis, a range of significant and potentially significant impacts, and study methods. ✓ mark is applied for environmental items which will be affected by the project or cannot be decided without additional surveys. Scoping is

executed for different phases of pre-construction/construction and operation in each environmental item. Items without ✓ in both two phases are not the target of following survey and evaluation if there are enough reasons that the items will not be affected by the project. Following table shows the result of scoping of ABLH.

Table 18.8-8 Result of Scoping of ABLH

No	Item	Selection Status		Reasons for Selection
		PCS/CS	OS	
1	Air Quality	✓	✓	[CS] Construction vehicles may cause air pollution temporarily. [OS] Negative impact on air quality is expected due to exhaust gas from vehicles.
2	Water Quality	✓	✓	[CS] Construction activities (such as cutting/filling works with surface erosion), construction vehicles, camp yards may cause water pollution through drainage water. [OS] Drainage from road structure may cause water pollution in water bodies along the road.
3	Waste	✓		[CS] Construction waste including concrete, asphalt, cut trees and soil may be generated through construction activities. [OS] No serious impacts are expected, because there is no plan of service / parking area which generate waste.
4	Soil Contamination	✓		[CS] There is a possibility of soil contaminant by oil leakage from construction vehicles and soil generated by the project. [OS] Operation of roads may not cause soil contamination both directly and indirectly.
5	Noise and Vibration	✓	✓	[CS] Construction vehicles may cause noise and vibration temporarily. [OS] Ambient noise and vibration along ABLH may cause negative impact on sensitive receivers such as residential area, school, and hospital.
6	Ground Subsidence	✓	✓	[CS/OS] Landfilling may cause ground subsidence in the area of soft soil and other specific conditions.
7	Offensive Odor	✓		[CS] There is a possibility of offensive odor by construction activities. [OS] Operation of roads may not cause offensive odor both directly and indirectly.
8	Bottom Sediment	✓		[CS] There is a possibility of impact on the river bottom sediment by leaked oil from construction vehicles and flown soil caused by earthwork. [OS] Operation of roads may not cause bottom sediment both directly and indirectly.
9	Protected Area	✓	✓	[CS/OS] The project may not cause impact to protected areas nearby.
10	Ecosystem	✓	✓	[CS/OS] The project may cause impact such as tree-cutting activities on ecosystem including indicator species and mangrove forest along the project site.
11	Hydrology	✓	✓	[CS/OS] There is a possibility of changes to hydrology because the project across some rivers.
12	Topography and Geology	✓		[CS] Topography might change by land cutting and filling works. There are possibilities of land slide and soil erosion due to slope cutting and/or land filling works. [OS] Operation of roads may not cause geographical and topographical changes both directly and indirectly.
13	Land Acquisition and Resettlement	✓		[PCS] Land acquisition and resettlement with more than hundreds are required to secure land for road and other facilities/structures of ABLH. [CS/OS] No additional resettlement is expected.
14	Poverty	✓		[PCS/CS] Vulnerable groups including poor households may be targets of resettlement. Some of them may get or lose their livelihood during construction phase. [OS] No additional impact on poverty groups.

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No	Item	Selection Status		Reasons for Selection
		PCS/CS	OS	
15	Ethnic Minority and Indigenous People	✓	✓	[PCS/CS/OS] Ethnic minority and/or indigenous people may live along the project area.
16	Local Economy such as Employment and Livelihood	✓		[CS] Employment opportunity can be created due to the project construction. On the other hand, construction activities may cause temporal inconvenience such as access hinderance to the local economy. Employment and livelihood including fishery of project affected households are also affected by resettlement activities. [OS] No additional impact is expected during operation stage.
17	Land Use and Usage of Local Resources	✓	✓	[CS] Loss of farmland and forests for new roads are expected. Land and local resources such as trees of project affected households are also affected by resettlement activities. [OS] ABLH may pause some negative impact on land use such as development of forest areas and using of water resources.
18	Water Usage	✓	✓	[CS] River water may be affected by earthworks. Water usage of the affected area may be affected by resettlement activities. [OS] Operation of roads may cause impact on water usage both directly and indirectly.
19	Existing Social Infrastructure and Services	✓		[PCS/CS] Existing social infrastructure may be affected by land acquisition and construction. [OS] Highway may bring positive impact on exiting road networks around the area.
20	Social Institutions such as Socially Related Capital and Decision-making Organizations	✓		[CS] There is a possibility of the temporary physical community division by construction. [OS] No additional impact is expected.
21	Misdistribution of Benefit and Damage			Misdistribution of benefit and damage caused by the road construction is not expected.
22	Local Conflicts of Interest		✓	[CS] No serious impacts are expected. [OS] Community separation by newly constructed highway may cause conflicts of interest.
23	Cultural Heritage			Banza Ruins /Butuan Church Ruins is the nearest Historical site in the proposed alignment (approximately 3.7km from the proposed project - phase 1 section). No serious impacts are expected because there are no outstanding cultural heritages around the area.
24	Landscape	✓		[CS] There is a possibility of disturbance of landscape by the road structures including bridges. [OS] Operation of roads may not cause impact on landscape both directly and indirectly.
25	Gender	✓		[CS] Women may be affected when they commute to working places during the construction period. There might be gaps on working conditions such as wage between men and women when local employment is considered. [OS] Improved access by the project may cause positive impact on gender.
26	Children's Right	✓		[CS] There is a possibility of occurrence of child labor [OS] Due to the improvement of traffic congestion of existing road, traveling time to school and hospital will become faster and safer.
27	Infectious Diseases such as HIV/AIDS	✓		[CS] Infectious diseases are possible to be spread due to inflow of construction workers. [OS] Operation of roads may not cause impact on infectious diseases both directly and indirectly.

No	Item	Selection Status		Reasons for Selection
		PCS/ CS	OS	
28	Labor Environment including Safety	✓		[CS] Due to construction activities, labor environment may be affected. [OS] Operation of roads may not cause impact on labor environment diseases both directly and indirectly.
29	Accident	✓	✓	[CS] Traffic accident related to construction vehicles and accident in construction sites are expected. [OS] Traffic accident may increase due to increased traffic volume.
30	Transboundary Impact and Climate Change	✓	✓	[CS] and [OS] Greenhouse Effect Gasses may increase due to construction machinery / vehicles and newly generated traffic.

Note) Project stage: PCS: Pre-construction stage, CS: Construction stage, OS: Operation stage

Source: JICA Study Team

(2) ToR for Environmental and Social Considerations Surveys

Based on the scoping results in the previous section, terms of references (ToR) for surveys of necessary environmental items are developed to determine project induced impacts. Possible impact to be caused by project implementation will be evaluated qualitatively based on existing secondary data, interview to concerned parties and examining project design. **Table 18.8-9** shows the ToR for environmental and social considerations survey.

Table 18.8-9 ToR for Surveys of Environmental and Social Considerations

No.	Item	Survey Item	Survey Method
1	Air Quality	(1) Relevant standards on Environment (Domestic, Japanese, WHO's, etc.) (2) Status of air quality items	(1) Existing material (2) Secondary data/information from past projects nearby (3) Qualitative evaluation based on expected traffic volume and construction vehicles
2	Water Quality	(1) Relevant standards on Environment (Domestic, Japanese, WHO's, etc.) (2) Status of water quality items	(1) Existing material (2) Secondary data/information from past projects nearby (3) Qualitative evaluation based on expected construction methods
3	Waste	(1) Waste management process	(1) Secondary data/information from past projects nearby (2) Qualitative evaluation based on expected construction methods and facilities
4	Soil Contamination	(1) Protection method against oil leakage	(1) Confirmation on implementation plan of construction vehicles (2) Qualitative evaluation based on expected construction methods
5	Noise and Vibration	(1) Relevant standards on Environment (Domestic, Japanese, WHO's, etc.) (2) Status of water noise and vibration	(1) Existing material (2) Secondary data/information from past projects nearby (3) Qualitative evaluation based on expected traffic volume and construction vehicles
6	Ground Subsidence	(1) Soil conditions	(1) Past study around the area (2) Qualitative evaluation based on expected construction methods
7	Offensive Odor	(1) Possible events causing odor	(1) Collection of necessary information on construction method

No.	Item	Survey Item	Survey Method
			(2) Qualitative evaluation based on expected construction methods
8	Bottom Sediment	(1) Construction method causing sedimentation	(1) Collection of necessary information on construction method (2) Qualitative evaluation based on expected construction methods
9	Protected Areas	(1) Situation of registration (2) Outline of the protected areas	(1) Relevant laws and regulations (2) Past study around the area (3) Qualitative evaluation based on expected construction methods
10	Ecosystem	(1) Situation of general ecosystem (2) IUCN listed species	(1) Past field surveys on occurrences of fauna and flora (2) IUCN Website etc. (3) Qualitative evaluation based on expected construction methods
11	Hydrology	(1) Situation of surface water such as river and lake (2) Impact during construction	(1) Past field surveys (2) Confirmation of construction methods (3) Qualitative evaluation based on expected construction methods
12	Topography and Geology	(1) Construction method causing changes of topography and geology	(1) Collection of necessary information on construction method (2) Qualitative evaluation based on expected construction methods
13	Land Acquisition and Resettlement	(1) Size of impact (area, structure, etc.) (2) Compensation policy	(1) Aerial photos, design, etc. (2) Existing surveys including resettlement action plan (RAP) (3) Qualitative evaluation based on expected project effects
14	Poverty	(1) Distribution of poverty groups	(1) Existing surveys and Statistics (2) Qualitative evaluation based on expected project effects
15	Ethnic Minority and Indigenous People	(1) Distribution of ethnic minority and indigenous people	(1) Existing surveys and Statistics (2) Qualitative evaluation based on expected project effects
16	Local Economy such as Employment and Livelihood	(1) Local economic status	(1) Existing surveys and Statistics (2) Qualitative evaluation based on expected project effects
17	Land Use and Usage of Local Resources	(1) Land use status	(1) Existing surveys and existing maps (2) Qualitative evaluation based on expected project effects
18	Water Usage	(1) Water usage status in rivers and other resources (2) Impact during construction	(1) Existing surveys and literature material (2) Confirmation of construction methods (3) Qualitative evaluation based on expected impact on water use
19	Existing Social Infrastructure and Services	(1) Distribution of residential areas, school, hospital, and etc.	(1) Existing surveys and literature material (2) Qualitative evaluation based on expected project effects

No.	Item	Survey Item	Survey Method
20	Social Institutions such as Socially Related Capital and Decision-making Organizations	(1) Social institutions and possible impact	(1) Existing surveys and literature material (2) Qualitative evaluation based on expected project effects
21	Local Conflicts of Interest	(1) Expected conflicts	(1) Project design and distribution of interest (2) Qualitative evaluation based on expected project effects
22	Landscape	(1) Scenic areas	(1) Existing surveys and literature material (2) Qualitative evaluation based on expected structures and topographical changes
23	Gender	(1) Impact on gender	(1) Existing surveys and literature material (2) Qualitative evaluation based on expected project effects
24	Children's Right	(1) General situation/possibility of child labor	(1) Existing surveys and literature material (2) Qualitative evaluation based on expected project effects
25	Infectious Diseases such as HIV/AIDS	(1) General situation/possibility of infectious diseases	(1) Existing surveys and literature material (2) Qualitative evaluation based on expected project effects
26	Labor Environment including Safety	(1) General situation/possibility of labor environment	(1) Existing surveys and literature material (2) Qualitative evaluation based on expected project effects
27	Accident	(1) Expected increases of accident	(1) Existing surveys and literature material (2) Qualitative evaluation based on expected project effects
28	Transboundary Impact and Climate Change	(1) Elements related to cross boundary impacts, cumulative impacts, and climate change	(1) Collect information based on highway construction and management (2) Qualitative evaluation based on expected project effects

18.8.6 Results of Surveys

(1) Air Quality

There are residential areas including school and church near the proposed alignment (Manapa, Abilan, Cabcabon, Sumilihon and Taguibo). In general, the large-scale project will require many heavy construction vehicles/ equipment.

[Construction Stage]

Air quality around the construction areas and relevant locations will be degraded due to exhaust gas from construction machineries and vehicles. Also, earthworks may generate particulate matters such as PM10 and PM2.5. Level of air pollution may depend on locations, therefore, further monitoring (baseline) surveys are required during F/S.

[Operation stage]

Increased traffic may cause air pollution along the project areas on typical elements such as NO₂, SO₂, CO and particulate matters. In some sections, unpaved road will be improved and particulate matters may decrease as a result. It may cause higher level of pollution on specific elements such as SO₂ and NO_{CO} which might be under domestic standard as baseline data. Level of air pollution may depend on locations, therefore further monitoring (baseline) surveys with forecasting analysis are required during F/S.

(2) Water Quality

The Project will traverse about seven (7) rivers and creeks, including Kinabjangan River, Guihao-an River, Masao River, Agusan Pequeno River, Ambago River, Agusan River and Banza River. The project area is located in the area of water bodies for domestic defined as the ECA (**Table 18.8-7**).

[Construction Stage]

Water quality around the construction areas and relevant locations including camp yards will be degraded if wastewater is discharged inadequately, especially oil leakage from consecution machineries. Earth works also cause turbid water to the surrounding environment. Level of water pollution may depend on locations, therefore, further monitoring (baseline) surveys are required during F/S.

[Operation stage]

There is no construction plan of service areas which may discharge domestic wastewater, therefore, severe water pollution may not occur during the operational phase.

(3) Waste

The Project will include soil excavation and land filling activities. The proposed project will traverse forest area.

[Construction Stage]

Construction waste which is generated by the project will be excavated soil and debris, cut trees, asphalt mass and etc. Also, domestic waste from construction yards is expected.

(4) Soil Contamination

The Project will include soil excavation and land filling activities and construction of bridges piers in the coastal area.

[Construction Stage]

Wastewater from construction areas may cause soil contamination, if wastewater is not treated appropriately. Furthermore, there is a possibility of soil contamination due to the unexpected leakage/ mishandling of oil and other chemicals, in the all earthwork area including the main road area and borrowing pit, etc. In case that on-site soil had already polluted, dumping soils also have possibility of soil contamination when they are dumped other places.

(5) Noise and Vibration

There are residential areas including school and church near the proposed alignment. (Manapa, Abilan, Cabcabon, Sumilihon and Taguibo). In general, the large-scale project will require many heavy construction vehicles/ equipment.

[Construction Stage]

Construction machineries and vehicles may cause certain level of noise and vibration around the construction area. Background noise level along the planned alignment is not so high because most of the area is rural regions. Level of noise and vibration may depend on locations, therefore, further monitoring (baseline) surveys are required during F/S.

[Operation stage]

Both new alignment section and widening/improvement of existing road section will be affected by noise and vibration during operation phase. Due to increased vehicles and attracted new demand of traffic, some areas may exceed national standard in the future. Level of noise and vibration may depend on locations, therefore, further monitoring (baseline) surveys are required during F/S.

(6) Ground Subsidence

Based on the secondary data, the soil in Butuan City is loam. Some of its soil is prone to slight to moderate erosion and is soft, must be limited to low-story construction and must adopt stronger structural interventions. The Project will traverse coastal area which are used as fishponds and is in the liquefaction hazard area.

[Construction Stage] & [Operation stage]

It is difficult to forecast ground subsidence caused by project activities, however, it can be said that there is possibility of ground subsidence based on construction methods and natural conditions of the project. Changes of overweight on ground and underground flow may cause ground subsidence. Potential and risk of ground subsidence should be discussed further with geological data and basic designs in following study phases such as F/S.

(7) Offensive Odor

Large scale project will require many workers and prepare the labors camp in general.

[Construction Stage]

As long as appropriate waste management and equipment maintenance are implemented, sever offensive odor cases are not expected. However, construction camp yards may cause offensive odor from its waste and wastewater.

(8) Bottom Sediment

The Project phase1 will traverse about 7 rivers. Working in the river might be occurred.

[Construction Stage]

River crossing points may be affected on bottom sediment by construction activities. Earth works and other works inside rivers can cause direct sedimentation as well as turbid water. In case that crossing river bottom sediment had already polluted, dumping soils in the riverbed also have possibility of soil contamination when they are dumped other places.

(9) Protected Area

The nearest protected area (Carmen Critical Habitat) is approximately 5.9 km far from proposed project -phase 2 section.

[Construction Stage] & [Operation stage]

Based on literature survey on legally designated areas, ABLH project may not affect any protected areas directly. The alignment runs along developed areas, therefore, project areas are already developed with certain degree.

(10) Ecosystem

The land along the proposed alignment is mostly used as fishponds and forest area including mangroves, palm trees and mango plantations. The distance of nearest coral reefs is approximately 1km away from the proposed road. Butuan Bay is an extension of Bohol Sea which is rich in marine biodiversity. There is a possibility on decreasing of biodiversity and habitat around the mangrove areas where variety of sea and land species are using as nesting, feeding and breeding due to the implementation activities of the project depending on the final design and construction process. In addition, coral reefs along the sea shore might be affected by polluted water (turbid water) and sedimentation from rivers

[Construction Stage]

Construction activities and existence of road structures may have impact (such as damage of trees and vegetation, loss of nest/feeding area/breeding area, and migration inhibition, division of the habitation area, road killing, noise/vibration due to the new traffic flow, etc.) on surrounding ecosystem along the project alignment. Construction activities may hinder ecosystem including Mangrove forests along the project alignment. For example, there might not be nests of IUCN's listed bird species, however, further information and field surveys on birds and other key species confirmed in the project area should be discussed. To understand information of habitat and key species based on actual project sites, further monitoring (baseline) surveys are required during F/S.

[Operation stage]

Operation of vehicles on the newly installed roads may not cause outstanding impact on existing ecosystem along the project alignment.

(11) Hydrology

The Project phase1 will traverse about 7 rivers mouths.

[Construction Stage]

Works inside river such as piers for bridges and sheet piles may cause hydrological changes.

[Operation stage]

No sever impact on hydrology during the operation is expected.

(12) Topography and Geology

The Project will include soil excavation and land filling activities. The Project is in the liquefaction hazard area. The project area is located in the area of high susceptibility to flooding area defined as the ECA (Table 18.8-7).

[Construction stage]

Cut and fill works, slope, and road construction may change topography and geology. To estimate size, location and impact, further design and related surveys on geology and topography are required in following phases such as F/S. Following table and figures show observation results of general situation of topography with information of structures and typical photos.

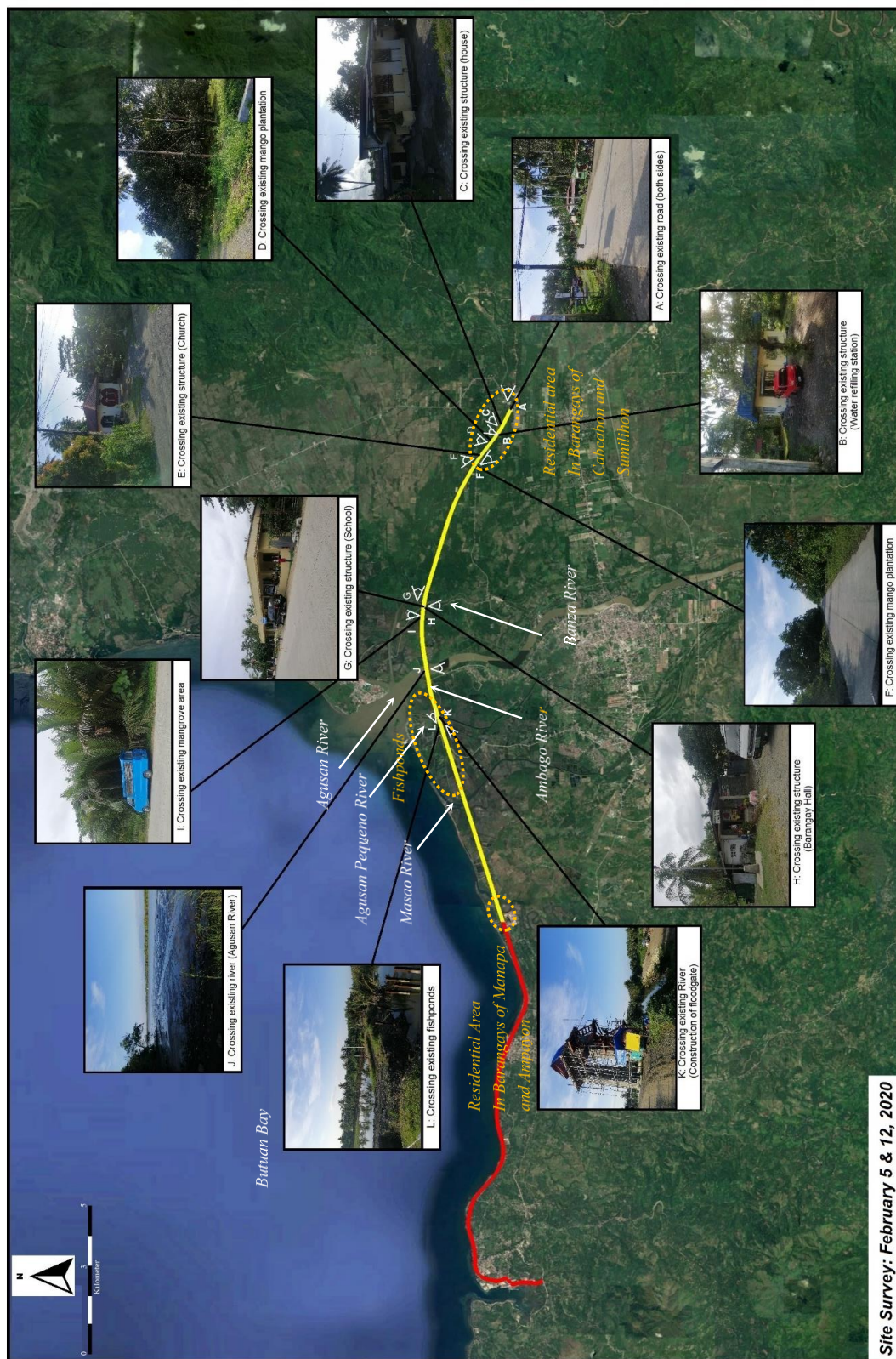
Table 18.8-10 Site Observations

Location (from east to west)	Observations
A: Taguibo, Butuan City	A number of house structures and few vegetation will be affected by the alignment on both sides.
B: Sumilihon, Butuan City	The proposed alignment might traverse the water refilling station and few vegetation areas.
C: Sumilihon, Butuan City	A house structure will be affected by the proposed alignment.
D: Cabcabon, Butuan City	The alignment will cross in a small portion of mango plantation.
E: Cabcabon, Butuan City	Small church and few vegetation might be affected by the alignment.
F: Cabcabon, Butuan City	The alignment will cross mango plantation.
G: Guiasan, Magallanes Municipality	The alignment might traverse the existing structure (school).

Location (from east to west)	Observations
H: Guiasan, Magallanes Municipality	The proposed alignment might traverse in barangay hall.
I: Guiasan, Magallanes Municipality	Mangrove area will be affected by the proposed alignment. These mangroves are species of palm.
J: Pagatpatan, Butuan City	The proposed bridge will be crossed in Agusan River and few mangrove trees will be affected.
K: Lumbocan, Butuan City	There is an ongoing construction of floodgate, which might be affected by the alignment. A few vegetation will be affected.
L: Lumbocan, Butuan City	There are fishponds to be affected by the proposed alignment.

Note: Stations (A-K) in this table are shown in **Figure 18.8-6**

Source: JICA Study Team



Site Survey: February 5 & 12, 2020

Figure 18.8-6 Proposed Project Site MAP

Source: JICA Study Team

(13) Land Acquisition and Resettlement

The proposed project will traverse residential areas (Manapa, Abilan, Cabcabon, Sumilihon and Taguibo).

[Pre-Construction Stage]

Based on rough counting survey by using satellite photos, approximately 190 structures may be affected by the project. Presumed form of impact is physical relocation, partial slice of structure, loss of secondary assets such as gate, fruit trees, as well as private land ownership. Exact size and characteristics of land acquisition and resettlement require further survey such as socio-economic survey, census, inventory of loss, etc. to develop resettlement action plan (RAP) in following phases such as F/S.

(14) Poverty

[Pre-Construction and Construction Stage]

Based on statistical situation elaborated in the part of baseline data, there might be poverty groups in the project sites. Some households including informal settlers family (ISF) may become direct project affected household (PAH) and some may be affected their secondary properties such as crops and/or their livelihood. On the other hand, they will have opportunities to obtain new income through construction activities. Exact size and characteristics of impact on poverty requires further survey such as socio-economic survey, census, inventory of loss, etc. to develop resettlement action plan (RAP) and EIA/EIS in following phases such as F/S.

(15) Ethnic Minority and Indigenous People

26 CADTs are approved in Region 13, as of December 2019. The Project area will not traverse any approved or declared CADTs.

[Pre-Construction and Construction, Construction, and Operation Stage]

Even there is not observed exact existing of ethnic minority and indigenous people along the project site, there are possibility of their communities and/or living.

To confirm current status and the actual boundary of ancestral domain area, communication with relevant authorities and further field surveys such as RAP related surveys and literature examination are required in following phases such as F/S.

In case that the possibility of impact (e.g. involuntary resettlement, direct land acquisition of ancestral domain, communication disturbance, damage of livelihood, etc.) on the IPs is high, the impact and necessary mitigation measures shall be studied during F/S through the communication with NCIP in consideration of on-site ancestral domain condition.

(16) Local Economy such as Employment and Livelihood

There might be some owners, who manage the fishponds and plantations in the proposed project area.

[Construction Stage]

Employment opportunity can be created by construction activities and local economy will be improved temporally. On the other hand, overall construction activities and traffic restriction would affect local economy activities including vendors and shop owner to some extent temporary inconvenience due to disturbance in smooth operation of commercial/public transportation. Resettlement also may cause lost or degradation of local economy through their livelihood including fishery.

(17) Land Use and Usage of Local Resources

The land along the proposed alignment is mostly used as fishponds and forest including mangroves and palm trees. The project area is located in the prime agricultural land defined as the ECA (**Table 18.8-7**).

[Construction Stage]

Outline of land use along the project alignment is shown in **Table 18.8-11**. The Project will traverse the coastal area of Butuan Bay. The east starting section of the proposed alignment phase 1 (Barangays of Manapa and Abilan, Municipality of Buenavista) and the end section of the proposed alignment phase 1 (Barangays of Cabcabon, Sumilihon, and Taguibo, Butuan City) are designed along the existing road in the residential area. The main land use in the coastal area along the proposed alignment are fishponds and forest area including mangroves, palm trees and mango plantations. The proposed alignment will traverse several river mouths and creeks including Masao River, Masao River, Agusan Pequeno River, Ambago River, Agusan River and Banza River.

It is expected that about 190 existing structures including houses are affected due to the implementation of the Project, in accordance with the satellite image interpretation. Almost of these affected structures are located in the starting section and the end section of proposed project.

Table 18.8-11 Land Use along the Project Site

Land use classification	Distribution Rate
Cultivated area/ Farm/ Bare area	22.6%
Forest/Trees/Palm/Mangroves	33.3%
Residence / Infrastructures	8.4%
River	5.8%

Source: JICA Study Team

Since the proposed alignment will cross existing community roads and rivers, the Project components include bridges, underpass/over pass roads and box culverts to avoid intercepting the existing transportation and/or water flow, as shown in **Table 18.8-12**.

Table 18.8-12 Existing Crossing Roads and Rivers

Existing Roads and Rivers	Number of Crossing Points
Road	8
River and Creeks	7

Source: JICA Study Team

[Operation Stage]

As secondary impact of the project, development along the project area may cause adverse impact on land use and local resources such as forestry and water.

(18) Water Usage

[Construction and Operation Stage]

Generally, landfill and construction in rivers may change water regimes especially underground water and construction method itself can also influence water resources including streams, wells, and springs around the construction sites.

(19) Existing Social Infrastructure and Services

[Pre-Construction and Construction Stage]

ABLH requires existing social infrastructures in the rural areas such as roads, telecommunication lines, electricity networks, and water supply networks. These existing infrastructures are target of relocation during pre-construction and construction stages. Both private and public owners of these infrastructures will be affected and some services may be degraded due to construction.

[Operation Stage]

There is a possibility of physical community diversion in case a new road traverses in a community.

(20) Social Institutions such as Socially Related Capital and Decision-Making Organizations

The proposed alignment will cross many existing community roads and rivers. The Project components include bridges, underpass/over pass roads and box culvert to avoid intercepting the existing transportation

[Construction Stage]

Construction may cause division of communities along the road temporally. Therefore, there are some potential of impact on social institutions in terms of accessibility.

(21) Local Conflicts of Interest

[Operation Stage]

New alignment of road may hinder existing access between residents and social services in case that no measures are considered to solve these issues. It may cause a kind of conflict among local communities.

(22) Landscape

Current landscape along the proposed alignment are fishponds and forest land. The Project will develop the new landscape of bridges and land filling structures.

[Construction Stage]

Cut and fill works may cause change of landscape. However, it is difficult to determine location and degree of changes without further designs. So, continuous discussion and assessment is required in following phases such as F/S.

(23) Gender

[Construction Stage]

Women as commuter or daily working for their families may be affected by the construction activities. On the other hand, project can provide opportunities of works and commercial in the area and it may bring positive impact on gender balance. However, there might be gaps on working conditions such as wage between men and women when local employment is considered.

(24) Children's Right

[Construction Stage]

There are possibilities of child labor in construction yard and related activities.

(25) Infectious Diseases such as HIV/AIDS

[Construction Stage]

Construction workers coming from outside the community / island may cause HIV/AIDS cases during construction time.

(26) Labor Environment Including Safety

[Construction Stage]

Accident and inappropriate occupational condition during the construction may cause negative impact on labor environment and occupational safety as well as health.

(27) Accident

[Construction Stage]

Traffic accident due to construction vehicles may occur without appropriate measures and education.

[Operation Stage]

Traffic accident due to increased traffic may occur along the road and vicinity connecting to the project section.

(28) Transboundary Impact and Climate Change

[Construction Stage]

Greenhouse effect gas is increase by operation of machineries and vehicles in the construction sites.

[Operation Stage]

Increased traffic based on newly created demands may produce much greenhouse effect gas.

18.8.7 Impact Assessment

(1) Preliminary Impact Assessment

The result of potential negative environmental and social impact assessment at pre-F/S is shown in the following table. In consideration of survey results, the impacts were evaluated qualitatively in each of the three stages separately, namely: pre-construction stage [PCS], construction stage [CS], and operation stage [OS]. The impacts of pollution, natural environment, and social environment were classified as A to D in accordance with the following criteria, assuming no specific measures toward the impacts are taken:

- | | |
|--|---------------------------------|
| A: Significant Negative Impact | A+: Significant Positive Impact |
| B: Some Negative Impact | B+: Some Positive Impact |
| C: Impacts are not clear, need more investigation | |
| D: No impacts or impacts are negligible, no further study required | |

Table 18.8-13 Result of ESIA at pre-F/S

No	Item	Assessment at Scoping		Assessment Result based on surveys		Reasons for Assessment
		PCS /CS	OS	PCS/ CS	OS	
1	Air Quality	✓	✓	B-	B-	[CS] In consideration of current residential land use, temporary negative impacts are expected on air quality due to exhaust gas and dust generated from construction activities. The exhaust gas such as NOx, SOx, CO TSP, PM10, PM2.5 will be generated from construction machines, equipment and traffic congestion around the construction yard due to the temporary traffic restriction. And dust will be generated by earth work including foundation excavation for piers, transporting of earth-and-sand, etc. [OS] Ambient air quality along existing road is already impacted by current traffic exhaust gas. Since it is expected that traffic flow will be smoother by shifting vehicles from existing road to new highway, air quality along the road will be improved. On the other hand, there is a possibility of increasing of vehicles. In that case, air quality along the road might get worse than the current condition.
2	Water Quality	✓	✓	B-	D	[CS] The project area is located in the area of water bodies for domestic use defined as the ECA, since the Project will traverse several rivers. Turbid water may be generated from excavation areas due to surface run-off. Improper stockpiling of construction materials in low -lying areas could affect the water quality of nearby bodies of water bodies. Furthermore, there is a possibility of inadequate treatment and/or mishandling of wastewater, suspended matter, waste oil, and other chemicals, in the all earthwork area including the main road area and borrowing pit, etc. Additionally, domestic wastewater may be discharged from the labor camp. [OS] No serious impacts are expected, because there is no plan of service / parking area.
3	Waste	✓		B-	N/A	[CS] Construction waste including waste soil, asphalt mass and cutting trees are expected at the construction site. Additionally, domestic waste (garbage) may be generated from the labor camp, if any.
4	Soil Contamination	✓		B-	N/A	[CS] There is a possibility of soil contaminant by wastewater from tunneling work/piling construction/excavation process, if wastewater is discharged without adequate treatment and/or miss handing. Dumping soil and muck also can cause soil contamination if they have specific chemicals. Furthermore, there is a possibility of soil contamination due to the unexpected leakage/ mishandling of oil and other chemicals, in the all earthwork area including the main road area and borrowing pit, etc. Dumping soil and muck also can cause soil contamination if they have specific chemicals.
5	Noise and Vibration	✓	✓	B-	B-	[CS] In consideration of current land use temporary negative impacts are expected on ambient noise due to higher noise generated from construction machines and equipment. [OS] Ambient noise and vibration along existing road is already impacted by current vehicle traveling. Though it is expected that traffic flow is smooth by shifting from existing road to new highway, noise and vibration level might increase because of the increase in traffic and travelling speed of vehicles.
6	Ground Subsidence	✓	✓	B-	B-	[CS/OS] The extent of impact is unknown, because there is no detail amount of ground water and geographical test data, and no decided proposed ROW and tunnel excavation methodology at this moment. In case of large amount of discharge water and/or worse ground foundation than expectations, there is a possibility of ground subsidence in the

No	Item	Assessment at Scoping		Assessment Result based on surveys		Reasons for Assessment
		PCS /CS	OS	PCS/CS	OS	
						mountain area, due to the tunnel construction. To clarify the baseline condition of geographic mechanism including ground water level and geological test shall be conducted along the proposed alignment during the feasibility study.
7	Offensive Odor	✓		B-	N/A	[CS] There are no direct project-related activities that can generate offensive odor due to the general road construction, however impact of construction basecamp operations may have temporary impact.
8	Bottom Sediment	✓		B-	N/A	[CS] There is a possibility of impact on the river bottom sediment by flown soil caused by earthwork in the river, depending on the construction methodology. In case that crossing river bottom sediment had already polluted, dumping soils in the riverbed also have possibility of soil contamination when they are dumped other places.
9	Protected Area	✓	✓	D	D	Basically, no impacts are expected at this moment, since there is no protected area within the project area.
10	Ecosystem	✓	✓	B-	D	[CS] Mangroves are growing in the coastal area of Butuan Bay. Most of existing trees including mangroves within ROW will be cut down or replanted. Construction activities and existence of road structures may have some impact (such as damage of trees and vegetation, loss of nest/feeding area/breeding area, and migration inhibition, division of the habitation area, road killing, noise/vibration due to the new traffic flow, etc.) on surrounding ecosystem along the project alignment. There is a possibility on decreasing of biodiversity and habitat around the mangrove areas where variety of sea and land species are using as nesting, feeding and breeding due to the implementation activities of the project depending on the final design and construction process. To evaluate the impact, seasonal flora and fauna survey and tree inventory survey shall be conducted during the feasibility survey. In addition, coral reefs along the sea shore might be affected by polluted water (turbid water) and sedimentation from rivers. [OS] Operation of roads may not cause any severe impact on ecosystem along the road.
11	Hydrology	✓	✓	B-	B-	[CS/OS] To clarify the baseline condition of geographic mechanism including groundwater level and flow, geological tests shall be conducted along the proposed alignment during the feasibility study. The amount of water use and source during construction, construction methodology and road structures shall be clarified during the feasibility study. And also, there is a possibility of disturbance of water flow by construction of bridge pier in the river and preventing /changing water flow by concrete structures.
12	Topography and Geology	✓		B-	N/A	[CS] The project area is located in the area of high susceptibility to flooding area defined as the ECA. Topography might change by land cutting in the valley and tunnel construction. There is a possibility of topsoil erosion in the construction site during rainy season (May-October).
13	Land Acquisition and Resettlement	✓		A-	N/A	[PCS] It is expected that about 190 existing structures including houses are affected due to the implementation of the Project, in accordance with the satellite image interpretation. To clear the project affected people, their assets and compensation, identification of landowner, socio-economic survey, inventory survey and market value survey for preparation of the Resettlement Action Plan shall be conducted during the feasibility survey.

No	Item	Assessment at Scoping		Assessment Result based on surveys		Reasons for Assessment
		PCS/CS	OS	PCS/CS	OS	
14	Poverty	✓		B+/-	N/A	[PCS/CS] The project may bring positive impact on local economy through construction activities and rural development. Some poor groups may be negatively affected by the project if their properties are acquired and/or their livelihood is lost by the project.
15	Ethnic Minority and Indigenous People	✓	✓	B-	B-	There might be ethnic minority and/or indigenous people in and around the project site and they might be affected by the project. The location and relation between CADTs and the Project site shall be verified through the feasibility study.
16	Local Economy such as Employment and Livelihood	✓		B+/-	N/A	[CS] Employment opportunity can be created due to the project construction. On the other hand, overall construction activities and traffic restriction would affect local economy activities including vendors and shop owner to some extent temporary inconvenience due to disturbance in smooth operation of commercial/public transportation. Employment and livelihood including fishery of project affected households are also affected by resettlement activities.
17	Land Use and Usage of Local Resources	✓	✓	B-	B+/-	[CS] The project area is located in the prime agricultural land defined as the ECA. Loss of farmland and forests for new roads are expected and land use may be changed along the road. Land and local resources such as trees of project affected households are also affected by resettlement activities. [OS] Effective use of lands and local resources due to high accessibility are expected. At the same time, project-induced development may affect local resources adversely.
18	Water Usage	✓	✓	B-	B-	[CS/OS] To clarify the baseline condition of underground water use around the project area, inventory survey for wells shall be conducted during the during the feasibility study. Though water source during construction is not decided at this moment, water use permission in line with regulation shall be approved from relevant agencies prior to the construction to avoid conflict with water users. The amount of water use and source during construction shall be clear during the feasibility study. Water usage of project affected households are also affected by resettlement activities.
19	Existing Social Infrastructure and Services	✓		B-	B-	[PCS/CS] There are many existing utilities (transmission lines, telecom lines, water lines, etc.) along the existing road. These infrastructures shall be protected and/or diverted before construction work. Inconvenient access to services due to traffic congestion by work vehicles. [OS] There is a possibility of physical community diversion in case a new road traverses in a community.
20	Social Institutions such as Socially Related Capital and Decision-making Organizations	✓		B-	N/A	[CS] There is a possibility of the temporary physical community division by construction yard during construction.

No	Item	Assessment at Scoping		Assessment Result based on surveys		Reasons for Assessment
		PCS /CS	OS	PCS/CS	OS	
21	Local Conflicts of Interest		✓	N/A	B-	[OS] New alignment may separate access of existing communities and their interest may cause local conflicts without any measures.
22	Landscape	✓		B-	N/A	[CS] There is a possibility of disturbance of landscape by the road structures such as bridges.
23	Gender	✓		B+/ B-	N/A	[CS]: Temporary inconvenience to residents, commuters, and pedestrians because of construction activities is expected. On the one hand, the Project can provide additional employment opportunities during this phase, which women can take advantage of. However, there might be gaps on working conditions such as wage between men and women when local employment is considered.
24	Children's Right	✓		B-	N/A	[CS] There is a possibility of occurrence of child labor
25	Infectious Diseases such as HIV/AIDS	✓		B-	N/A	[CS] Infectious diseases such as HIV/AIDS are possible to be spread due to inflow of construction workers. Furthermore, alteration to the ground by cutting, soil excavation and land filling may lead to the creation of habitats for mosquitos that possibly transmit dengue fever.
26	Labor Environment including Safety	✓		B-	N/A	[CS] Accident and harm to health for workers in the construction area for bridge section; however, it will be secured in accordance with the domestic laws and regulations during construction.
27	Accident	✓	✓	B-	B-	[CS] Traffic accident related to construction vehicles and accident in construction sites are expected. [OS] Traffic accident may increase due to increased traffic volume.
28	Transboundary Impact and Climate Change	✓	✓	B-	B-	[CS] Significant deforestation is not expected on this project and construction period is limited. [OS] Increase of Greenhouse Effect Gas is anticipated but the level is still unknown

Note:

Project stage: PCS: Pre-construction stage, CS: Construction stage, OS: Operation stage

Impact:

A+/-: Significant positive/negative impact is expected.

B+/-: Positive/negative impact is expected to some extent.

D: No impact is expected.

N/A: Impact assessment isn't conducted because the items was not checked ✓ in scoping phase.

Source: JICA Study Team

18.8.8 Mitigation Measures

Items rated as A- and B- in the table of impact assessment are the target of mitigation measures. Mitigation measures should be feasible and practical. **Table 18.8-14** shows mitigation measures for ABLH classified into construction and operation phases.

Table 18.8-14 Mitigation Measures

No.	Items (Impacts)	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost (Php)
Construction Stage					
1	Air Quality	<ul style="list-style-type: none"> - Water sprinkling to reduce particulate matter - Routine / periodic maintenance and washing of construction machineries and vehicles to minimize air pollutants -Announcement of construction work to surround resident - In the event of complaint from resident, review the additional mitigation measures including the construction schedule or location of heavy vehicles through the communication with local people 	Contractor	DPWH	TBD
2	Water Quality	<ul style="list-style-type: none"> - Installing sedimentation tank to reduce discharged turbid water - Cover exposed earth especially before heavy rains are expected.- Installing septic tanks for origin of polluted water such as camp yard - Appropriate wastewater treatment such as connecting drainage system to existing sewage systems 	Contractor	DPWH	TBD
3	Waste	<ul style="list-style-type: none"> -Prepare detailed waste management program in consideration with LGU's waste management system - Education on waste treatment for workers - Separation of hazardous waste and bring out to appropriate treatment facilities - 3Rs promotion to reduce waste 	Contractor	DPWH	TBD
4	Soil Contamination	<ul style="list-style-type: none"> - Necessary laboratory test to identify contaminated soil and mock for special cares - Find feasible treatment facilities or filling area in earlier stage of the project such as F/S 	Contractor	DPWH	TBD
5	Noise and Vibration	<ul style="list-style-type: none"> - To avoid disturbance of daily life, construction time shall be set within day time, especially residential areas. - Apply low-noise and vibration machineries as much as possible nearby -Provide the temporary noise barrier and/or fence around the construction yard near residential area, if necessary -Announcement of construction work to surround resident - In the event of complaint from resident, review the additional mitigation measures including the construction schedule or location of heavy vehicles through the communication with local people 	Contractor	DPWH	TBD
6	Ground Subsidence	<ul style="list-style-type: none"> - Avoid extraction of ground water for construction 	Contractor	DPWH	TBD

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No.	Items (Impacts)	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost (Php)
		- Applying replacement methods for soft soil areas and prevention measures for liquefaction based on further studies and discussion in F/S. - Monitoring to identify early symptoms of subsidence			
7	Offensive Odor	- Education and instruction of rules in camp yards to keep good hygiene	Contractor	DPWH	TBD
8	Bottom Sediment	- Installing sedimentation tank to reduce discharged turbid water	Contractor	DPWH	TBD
9	Ecosystem	- Avoid tree cutting to reduce impact on habitat -Relocation/replant of trees - Consider construction season and time if specific rare species' breeding points / nests / important feeding ground are confirmed in the affected areas. -Conduct awareness campaign to all relevant construction workers about the careful consideration for ecosystem -Adoption of lower noise and vibration construction method and machines - Adoption of adequate pass route, based on the field survey, estimated impact and advices from biological expert, if necessary	Contractor	DPWH / DENR	TBD
10	Hydrology	- Avoid large amount of extraction of ground water	Contractor	DPWH	TBD
11	Topography and Geology	- Slope protection is required after cutting slopes especially in the period of rainy season	Contractor	DPWH	TBD
12	Land Acquisition and Resettlement	- Alignment discussion should be carefully done during F/S study to avoid and minimize resettlement - Appropriate RAP must be prepared consistent with domestic and development partner's policies.	Consultant, Contractor, DPWH, LGUs, NHA	DPWH	TBD
13	Poverty	- Appropriate RAP must be prepared consistent with domestic and development partner's policies.	Consultant, Contractor, DPWH, LGUs, NHA	DPWH	TBD
14	Ethnic Minority and Indigenous People	- Appropriate RAP must be prepared consistent with domestic and development partner's policies. - If there are indigenous people in and around the project areas, Indigenous People Plan (IPP) must be prepared with cares	Consultant, Contractor, DPWH, LGUs, NHA	DPWH	TBD
15	Local Economy such as Employment and Livelihood	- Appropriate RAP must be prepared consistent with domestic and development partner's policies with assistance for business disturbances. - In case that fishery along the project areas is affected, compensation and/or assistance are considered as well as necessary hard-measures such as slope protection and turbid water protection.	Consultant, Contractor, DPWH, LGUs, NHA	DPWH	TBD
16	Land Use and Usage of Local Resources	- Appropriate RAP must be prepared consistent with domestic and development partner's policies.	LGUs	LGUs	TBD
17	Water Usage	- Avoid large amount of extraction of ground water	Contractor	DPWH	TBD

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No.	Items (Impacts)	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost (Php)
18	Existing Social Infrastructure and Services	- Appropriate / agreed compensation for owners of infrastructures to recover, divert, and replace.	DPWH, LGUs	DPWH	TBD
19	Social Institutions such as Socially Related Capital and Decision-making Organizations	- Detour for securing reasonable accessibility to social institutions. - Road-crossing measures such as over path / under path should be considered for possible community diversion cases.	Contractor	DPWH	TBD
20	Landscape	- Minimize cutting trees and slopes - Consider earth color for temporal works and fences - Installation of slope seeding / planting to recover construction areas	Contractor	DPWH	TBD
21	Gender	- Positive employment of women for light works in construction activities such as cleaning with fair salary and other conditions - Prepare toilet and dressing spaces for women workers - Education on gender equality for workers	Contractor	DPWH	TBD
22	Children's Right	- Restrict child labor (workers under 14 years old) in contract with punishment - Report list of workers with their age information	Contractor	DPWH	TBD
23	Infectious Diseases such as HIV/AIDS	- Education on infectious diseases for workers	Contractor	DPWH	TBD
24	Labor Environment including Safety	- Education on occupational safety for workers - Safety patrol - Sign boards	Contractor	DPWH	TBD
25	Accident	- Periodic maintenance of machineries and vehicles - Sign boards - Employ enough number of traffic guards	Contractor	DPWH	TBD
26	Transboundary Impact and Climate Change	- Periodic maintenance of machineries and vehicles - Recommendation of idling stop activities	Contractor	DPWH	TBD
Operational Stage					
1	Air Quality	- Strengthening of vehicle inspection	DPWH	DPWH	TBD
2	Noise and Vibration	- Noise barriers if the level significantly exceeds the standard - Restriction of maximum speed	DPWH	DPWH	TBD
3	Ground Subsidence	- Periodic observation of level changes	DPWH	DPWH	TBD
4	Hydrology	- Avoid large amount of extraction of ground water - Periodic observation of water flow / level	DPWH	DPWH	TBD
5	Ethnic Minority and Indigenous People	- If there are indigenous people in and around the project areas, Indigenous People Plan (IPP) must be prepared with cares.	DPWH, LGUs	DPWH	TBD
6	Land Use and Usage of Local Resources	- Controlled rural development under legal framework and masterplans by LGUs	LGUs	LGUs	TBD

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No.	Items (Impacts)	Proposed Mitigation Measures	Implementing Organization	Responsible Organization	Cost (Php)
7	Water Usage	- Avoid large amount of extraction of ground water - Periodic observation of water flow / level	DPWH, LGUs	DPWH	TBD
8	Local Conflicts of Interest	- Design box culvert or any other crossing structure to secure accessibility	DPWH, LGUs	DPWH	TBD
9	Accident	- Sign boards - Traffic violation crackdown by police - Road safety education at schools and other appropriate facilities	DPWH, LGUs, Police	DPWH	TBD
10	Transboundary Impact and Climate Change	- Strengthening of vehicle inspection	DPWH	DPWH	TBD
Total Cost					TBD

Source: JICA Study Team

18.8.9 Monitoring Plan

(1) Proposed EMoP

Table 18.8-15 presents general/typical proposed Environmental Management Plan (EMP) and Environmental Monitoring Plan (EMoP) for mitigating the negative impact. Feasible and specific EMP and EMoP shall be studied during the Feasibility Study.

Table 18.8-15 Monitoring Plan

No	Environmental Item	Items	Location	Frequency	Responsible agent	Supervisor	Cost (Php)
Construction Stage							
1	Air Quality	PM10, PM2.5, SO2, CO, NO2	Construction sites, major access routes to the construction sites	Once a month	Contractor	DPWH	TBD
2	Water Quality	BOD5, COD, Oil and Grease, pH, Total Coliform, Total Nitrogen, Total Phosphorous, Total suspended solids, Turbidity, Arsenic, Iron, Sulphate	Rivers, drainages, camp yards, wells, springs	Once every three-month	Contractor	DPWH	TBD
3	Waste	Types and amount of waste	Temporal waste storage	Once every three-month	Contractor	DPWH	TBD
4	Soil Contamination	Soil quality test in accordance with the baseline survey and existing land use, Monitoring accident, maintenance record of machineries and vehicles, site observation	Construction sites and camp yards	Once a month	Contractor	DPWH	TBD
5	Noise and Vibration	Sound level and vibration.	Construction sites, major access routes to the construction sites	Once a month	Contractor	DPWH	TBD

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No	Environmental Item	Items	Location	Frequency	Responsible agent	Supervisor	Cost (Php)
6	Ground Subsidence	Visible observation on markers and gauges	Surrounding structures of construction sites	Once a week	Contractor	DPWH	TBD
7	Offensive Odor	Types and amount of waste, other specific cases such as oil leakage	Temporal waste storage	Once every three-month	Contractor	DPWH	TBD
8	Bottom Sediment	Visible observation of rivers and drainage from construction sites	Construction sites and rivers	Once every three-month	Contractor	DPWH	TBD
9	Ecosystem	Field confirmation by experts, number of cutting mangrove trees	Construction sites and surrounding areas	Once a year	Contractor	DPWH	TBD
10	Hydrology	Visible observation, interview, measurement of water volume	River, spring, well, etc.	Once every three-month	Contractor	DPWH	TBD
11	Topography and Geology	Visible observation, reviewing of cut and fill plan, tree cutting plan with certification	Forest, hilly areas	Once every three-month	Contractor	DPWH	TBD
12	Land Acquisition and Resettlement	Internal / External monitoring report defined in RAP, grievance records	Project Areas	Following RAP	LGUs, NHA, other relevant bodies	DPWH	TBD
13	Poverty	Internal / External monitoring report defined in RAP, grievance records	Project Areas	Following RAP	LGUs, NHA, other relevant bodies	DPWH	TBD
14	Ethnic Minority and Indigenous People	Internal / External monitoring report defined in RAP, grievance records, IPP, if any	Project Areas	Following RAP and IPP	LGUs, NHA, other relevant bodies	DPWH	TBD
15	Local Economy such as Employment and Livelihood	Internal / External monitoring report defined in RAP, grievance records, income restoration program (IRP)	Project Areas	Following RAP, IRP	LGUs, NHA, other relevant bodies	DPWH	TBD
16	Land Use and Usage of Local Resources	Construction plan including lease land, grievance records	Project Areas	Once every three-month	Contractor	DPWH	TBD
17	Water Usage	Water volume, visible observation, interview, grievance records	Water usage areas	Once a month	Contractor	DPWH	TBD
18	Existing Social Infrastructure and Services	Visible observation, interview, grievance records	Project Areas	Once every three-month	Contractor	DPWH	TBD
19	Social Institutions such as Socially Related Capital and Decision-making Organizations	Visible observation, interview, grievance records	Project Areas	Once every three-month	Contractor	DPWH	TBD
20	Landscape	Visible observation, interview, grievance records	Project Areas	Once every three-month	Contractor	DPWH	TBD

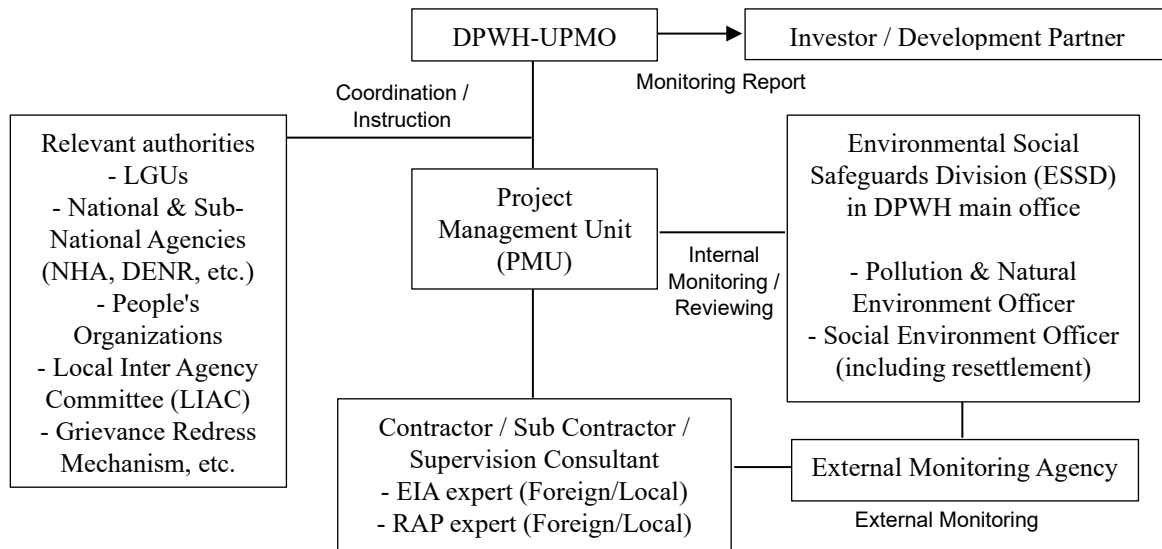
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No	Environmental Item	Items	Location	Frequency	Responsible agent	Supervisor	Cost (Php)
21	Gender	Visible observation, interview, grievance records, list of construction worker, record of education, number of facilities for women in construction site and camp yard	Project Areas	Once a month	Contractor	DPWH	TBD
22	Children's Right	Visible observation, interview, grievance records, list of construction worker, record of education	Construction sites	Once a month	Contractor	DPWH	TBD
23	Infectious Diseases such as HIV/AIDS	Visible observation, interview, grievance records, record of education	Construction sites	Once a month	Contractor	DPWH	TBD
24	Labor Environment including Safety	Visible observation, interview, grievance records, record of education, record of safety patrol, sign boards	Construction sites	Once a month	Contractor	DPWH	TBD
25	Accident	Record of accident, record of education, sign boards	Construction sites and surrounding areas	Once a month, on demand	Contractor	DPWH	TBD
26	Transboundary Impact and Climate Change	Record of maintenance of machinery and vehicles, sign boards	Construction sites	Once a year	Contractor	DPWH	TBD
Operational Stage							
1	Air Quality	PM10, PM2.5, SO ₂ , CO, NO ₂	Residential area, junctions, etc.	Once a year	Regional Office (RO) - DPWH	DPWH	TBD
2	Noise and Vibration	Sound level and vibration.	Junctions and residential areas	Once a year	RO	DPWH	TBD
3	Ground Subsidence	Visible observation on markers and gauges	Surrounding structures of construction sites	Once a year	RO	DPWH	TBD
4	Hydrology	Visible observation, interview, measurement of water volume	River, spring, well, etc.	Once a year	RO	DPWH	TBD
5	Ethnic Minority and Indigenous People	Interview, observation, socio-economic survey, if needed	Project Areas	Once a year	RO	DPWH	TBD
6	Land Use and Usage of Local Resources	Regional development plan, visible observation	Project Areas	Once a year	LGUs	DPWH	TBD
7	Water Usage	Water volume, visible observation, interview, grievance records	Water usage areas	Once a year	RO	DPWH	TBD
8	Local Conflicts of Interest	Interview, observation	Project Areas	Once a year	LGUs	DPWH	TBD
9	Accident	Record of accident, record of education, sign boards	Project road and surrounding areas	Once a year	RO	DPWH	TBD
10	Transboundary Impact and Climate Change	Record of maintenance of machinery and vehicles, sign boards	Project road and surrounding areas	Once a year	RO	DPWH	TBD

Source: JICA Study Team

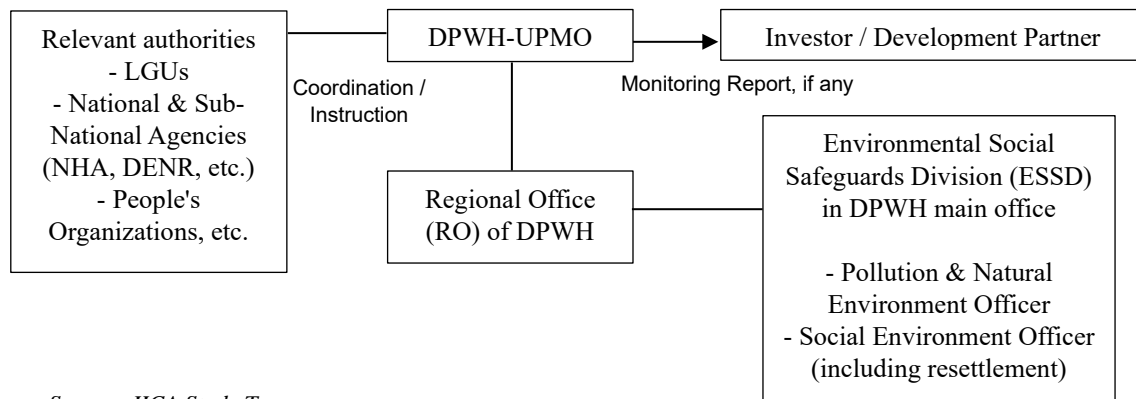
18.8.10 Implementation Structure

Implementation structure for ABLH will be established based on local legal frameworks with reporting/discussion channels to investors/development partners. Based on project implementation structure of other projects through JICA’s cooperation such as Cebu-Mactan Bridge Construction Project, the proposed implementation structure of environmental and social consideration is illustrated in **Figure 18.8-7** and **Figure 18.8-8**.



Source: JICA Study Team

Figure 18.8-7 Implementation Structure of Environmental and Social Considerations During Construction Stage



Source: JICA Study Team

Figure 18.8-8 Implementation Structure of Environmental and Social Considerations During Operation Stage

18.8.11 Stakeholder Meetings

(1) Key Informant Interview (KII)

Key Informant Interviews (KIIs) were conducted at the Regional Office of DENR Region 13 and at the Municipality of Magallanes and Butuan City on 5 February 2020. The agenda is to brief the stakeholders about the project including its environmental and social aspects, as well as to ask their perception on the project. The JICA Study Team interviewed representatives from DENR and NCIP Region 13 and the Municipal Secretaries of the affected areas.

Based on the KII results, both DENR and NCIP Region 13 requested for the coordinates and an endorsement letter from DPWH to gather information on the alignment of the proposed project. Additional concerns and opinions about the proposed project are the following:

- In Butuan City, the proposed project alignment is already reflected to their CLUP;
- The only concern of the officials in the Municipality of Magallanes is the project alignment might affect the livelihood because most of the residents own fishponds.

The Municipality of Magallanes and Butuan City both support the proposed project for it might increase trade and industry, more job opportunities, and it might increase accessibility to schools and hospitals.



KII with NCIP Region 13



KII with DENR Region 13

(2) Focus Group Discussion (FGD)

The summary of FGD for the Project is shown in **Table 18.8-16**. Focus Group Discussion (FGD) activities were initiated in the Municipality of Magallanes and Butuan City with the aim of eliciting their issues and concerns (**Table 18.8-17**) regarding the development and construction of the proposed Project in their respective areas. Participants made answers and showed concerns to specific fields such as gender, social and environmental aspects given at the FGD. The Study Team responded that their comment and concerns are to be reflected into on-going survey and the succeeding F/S. The activity tackled issues on environment, social aspect, economy, and gender sensitivity.

The participants were asked about their positive and negative perceptions regarding the proposed Project. The result of the FGD shows that the majority of the stakeholders support the project, both in Magallanes and Butuan. They perceived that the project will have a set of positive and beneficial effects to their communities. Ultimately, the project can generate employment opportunities during its construction. Through this, the travel time to other municipalities will be reduced.

On the other hand, apprehensions about the decrease in fish production were expressed during the discussion as they feared that some of the possible affected residents are fishpond owners. In addition, they were concerned of the possible displacement of housing and farmland.

Other issues tackled are the possibility that there are mangrove areas which might be affected by the Project. In addition, they fear the increase in population.

Table 18.8-16 Summary of FGDs

Items	Magallanes Municipality	Magallanes Municipality
Venue	Conference Room, Magallanes Municipal Hall	Conference Room, Office of the Mayor, Butuan City
Time & Date	Time 2:00 PM – 2:54 PM Date 11 February 2020	Time 9:24 AM – 12:13 PM Date 12 February 2020
Participants	11 persons (4 females and 7 males) -Representatives from different municipal offices	28 persons (14 females and 14 males) -Different heads of the municipal departments -DENR-EMB Region 8 -1st district DPWH Leyte
Agenda	<ol style="list-style-type: none"> 1. Presentation of the project outline 2. Presentation of the general impact of Project 3. Group Discussion 4. Presentation by group 5. Question and Answer session 	

Source: JICA Study Team

Table 18.8-17 Issues and Concerns

Given Fields	Issues / Concerns from Participants
• Economic	<ul style="list-style-type: none"> • Through collaboration with the Local Government Unit (LGU) and implementing agency, and will increase accessibility to schools, hospitals, malls, fire and police stations, and will decrease travel time between cities and municipalities. • The logistical highway shall serve as storm surge protection because the city is below sea level and an aircraft landing/runway if it will be upgraded into 8 lanes in case of emergencies, that is why it was planned to be a redundant highway.
• Gender	<ul style="list-style-type: none"> • the problem face by women especially those with husbands is that the husband tends to stay in the city due to accessibility. Also, men are preferred especially in construction works, and this creates a judgment of inequality from the women.
• Social	<ul style="list-style-type: none"> • It is very important to obtain information about the project because it is necessary and affects some of their businesses such as fishponds. • Majority supports the project and can proceed as long as everyone that will be affected will receive reasonable compensation. • The project will probably affect the fishponds and other households in the area. They must be given compensations. • The problem that may be encountered by the males is their increased proneness to road accidents since it will be a highway where speed is relatively high.
• Environmental	<ul style="list-style-type: none"> • N/A



Mr. Matias and Engr. Suarez explaining the project alignment – Magallanes Municipality



Focused Group Discussion – Magallanes Municipality



Study Team giving his presentation of project details in Butuan City



Participants of the FGD in Butuan City

Source: JICA Study Team

(3) Stakeholders Meeting (SHM)

Stakeholders meeting (SHM) during the pre-F/S was carried out on 23 February 2021. The SHM was held via online taking into account the situation of COVID-19. For those who were not able to access to the internet, the venues on the sites where people could participate to the Zoom meeting were arranged.

A total of 62 persons (male 33 and female 29) including affected barangay people (resident, barangay caption) and representatives of Central/Regional/Local Government officers joined the meeting. The agenda was to present the project description of Pre-F/S including the proposed alignment, alternatives, outline of legal framework regarding environmental and social considerations, and potential environmental and social impact due to the project implementation. The detailed program of SHM is described in **Section 13.8.4. Table 18.8-18** shows the summary of comments, questions and suggestions raised in the open forum. Some of the reactions of the residents are positive for their local economy and accessibility, and they are looking forward on this Project. The major concerns of participants were the design of the bridge, the elevation of the road, harmonization with LGUs plan, and the relocation site of the people affected. DPWH and the JICA Study Team replied that their comment and concerns are to be reflected in the report and into the succeeding F/S and would be studied further through coordination with LGUs. Regarding the resettlement issues, DPWH explained the policy about the resettlement action plan (ROW Action Plan of DPWH) and the detail survey for resettlement would be conducted in the following F/S.

Table 18.8-18 Opinions and Answers at the Open Forum of SHM

No.	Comment, Questions and Suggestion	Answers
1	<p>Question, Comment and Suggestion</p> <p>We would like to ask if there is an alternative bridge type such as long span steel box girder type aside from the recommended steel truss bridge, since the proposed alignment of the bridge is along the shoreline or Butuan Bay which is prone to erosion.</p> <p>All of the road portion has been approved by the DPWH National Office based on their F/S design. Actually, the construction of the road section on the east side is already ongoing.</p> <p>We propose to the JICA Study Team that it should be considered in the total project cost.</p> <p>(Mayor of Butuan City)</p>	<p>The proposed bridge type is not yet definite, and the ideas shared by the Stakeholders is important and your comment and suggestion will be considered on the next Feasibility Study stage.</p> <p>(JICA Study Team)</p>
2	<p>Question and Comment</p> <p>Regarding the ongoing construction of the road section, what is the type of road whether it is designed based on the design criteria of a high standard highway or just a general standard highway?</p> <p>The project is very important in promoting the regional and urban development of Butuan City especially that there are only two (2) bridges in Agusan del Norte.</p> <p>(JICA Study Team)</p>	<p>The road design is practically the same with what the JICA Study Team have presented. We would like to design a 6 to 8-lane road and that they are preparing for the possible long-term projects such as railways. The city is on the planning stage that the JICA Study team could coordinate with the DPWH being the lead agency, and who already have the design of the proposed logistic highway.</p> <p>(Mayor of Butuan City)</p>
3	<p>Suggestion</p> <p>We want to know the design elevation of the road. We also suggest that the road should be elevated, because there is a possibility of rising of the sea level due to climate change.</p> <p>(Mayor of Butuan City)</p>	<p>The elevation of the road is very important and should be considered on the Feasibility Study stage. And that they will address such concerns on the next stage.</p> <p>(JICA Study Team)</p>
4	<p>Question</p> <p>Butuan City is known as an ancient river kingdom where ancient balangay boats have been discovered in the area. How is it considered in the master plan so that possible heritage and archeological artifacts may be protected from the construction excavations?</p> <p>(Mayor's Office of Butuan City/ Male)</p>	<p>The archeological artifacts have been mapped out and identified. The River Kingdom is very far away from the project but considering that there could still be artifacts there is very low due to the distance of the proposed project. It is safe to construct on that areas, there are excavation activities there, but it is for the embankment. That areas are already removed from the list of the Protected areas. The city has an updated City Land Use Plan (CLUP) where heritage sites are indicated.</p> <p>(Mayor of Butuan City)</p> <p>There are mitigating measures to prevent damage of what is called, "chance finds", as there might be an archeological artifact discovered during the excavation process. Furthermore, before the project implementation, there will be an archeological/cultural protocol plan. It is a detailed report wherein the possibilities of calling the National Museum of the local archeological office is indicated so that they will know what to do with those "chance finds".</p> <p>(JICA Study Team)</p>

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No.	Comment, Questions and Suggestion	Answers
5	<p>Suggestion The exit and entry access roads at particular ports should be considered on the design of masterplan since the city plan is to develop a logistical port near the highway. (Mayor of Butuan City)</p>	<p>The suggestion is very important in the road network. (JICA Study Team)</p>
6	<p>Question How is the city taking care of the displaced population based on experience in planning and implementation of this magnitude of endeavor? (Representative of Butuan City Social Welfare and Development /Female)</p>	<p>Social preparations have also been addressed in their Pre-F/S and that they consider the alignment with lesser people will be affected, but in other projects, housing units were prepared. For this specific project, there will be lesser affected people because there are no developments yet on the proposed alignment. (Mayor of Butuan City) For this particular project, a preliminary RAP will be prepared, wherein the number of the project-affected people will be determined. It is a separate report which includes the mitigating measures to the project-affected people. During the Feasibility Study stage, a RAP report based on a detailed survey will be prepared. (DPWH-ESSD/JICA Study Team)</p>
7	<p>Comment and Question There is an existing construction of the coastal road along Brgy. Manapa, Buenavista. We would like to ask if this project is connected with or if it is a different alignment. (Local people from Buenavista Municipal)</p>	<p>The portion of the logistical highway will pass through Buenavista and it is not the same alignment but there will be an access road going to the proposed logistical highway. Some of the road sections mentioned by the LGU is under DOT-DWPH Convergence project that's why the land acquisition is the responsibility of the LGU. (DPWH Region 13)</p>
8	<p>Considering the implementation will take about 20 years from 2021 to 2040 (based on the presentation of the JST), the masterplan, cost including the arrangement for the affected population and other environmental consideration should be factored in the strategic plans of the LGUs. Since the local government plan is only limited to a 5-year planning, there is a need to shift perspective so that the LGUs or even the national implementing agencies will be able to project the costing in a span of 20 years. It should be put into consideration in planning. (Representative of Butuan City Social Welfare and Development /Female)</p>	<p>Despite the limitation of a 6-year plan being mandated by the national government, Butuan City pursued to come up with plan of 15-25 years included in the City Development Plan. The city already talked with NEDA which provided access to F/S of infrastructure fund done last year. The project is already incorporated in the City Planning and Development Office (CPDO) and the Comprehensive Land Use Plan (CLUP), since short-term plans doesn't work and that long-term plans are better. (Mayor of Butuan City)</p>
9	<p>Question We would like to ask if the relocation site of the people affected in their barangay is included in the proposal. (Local people from Barangay Guiasan, Magallanes)</p>	<p>If there will be 300 affected families, it is mandatory to provide a relocation site. However, for this particular project, only a few houses will be affected as the areas traversed by the logistical highway is not yet developed. Structures affected will be paid the current market price as replacement cost as compensation. (DPWH Region 13) Based on the satellite map, there are approximately 200 structures affected, thus, the alignment should be carefully discussed to avoid or minimize the negative impact.</p>

No.	Comment, Questions and Suggestion	Answers
		(JICA Study Team)
10	<p>Comment</p> <p>Considering the challenge of having a massive volume of filling materials, if the designer considers using a viaduct for the design to minimize the volume of filling materials and to minimize the cost in acquiring the low-lying areas that might be affected.</p> <p>(Representative of the Butuan City Engineers Office)</p>	<p>During the initial stage conducted, the purpose of the highway is the logistical route and it will act as a sea wall in preparation for the rising sea level. 50 years from now, it will act as a protection to the city from possible tidal waves and storm surges in the future</p> <p>(Mayor of Butuan City)</p>
11	<p>Comment and Question</p> <p>We highly appreciate and welcome the project. We want to check the project alignment and ask if it is the identified 4th bridge crossing the Agusan River, and ask if this will connect the newly constructed road bridge from Brgy. Banza to Brgy. Guiasan to Brgy. Poblacion, Magallanes.</p> <p>(Representative of MPDC Magallanes /Male)</p>	<p>Your understanding is correct and that the proposal is the 4th bridge crossing the Agusan River.</p> <p>(JICA Study Team)</p>
12	<p>We would like to ask if the navigational clearance for the boat-building industry was considered during the planning stage of this project.</p> <p>(Representative of Butuan barangay official /Male)</p>	<p>The navigational clearance was considered in the planning stage to set up the bridge design.</p> <p>(JICA Study Team)</p>

Source: JICA Study Team

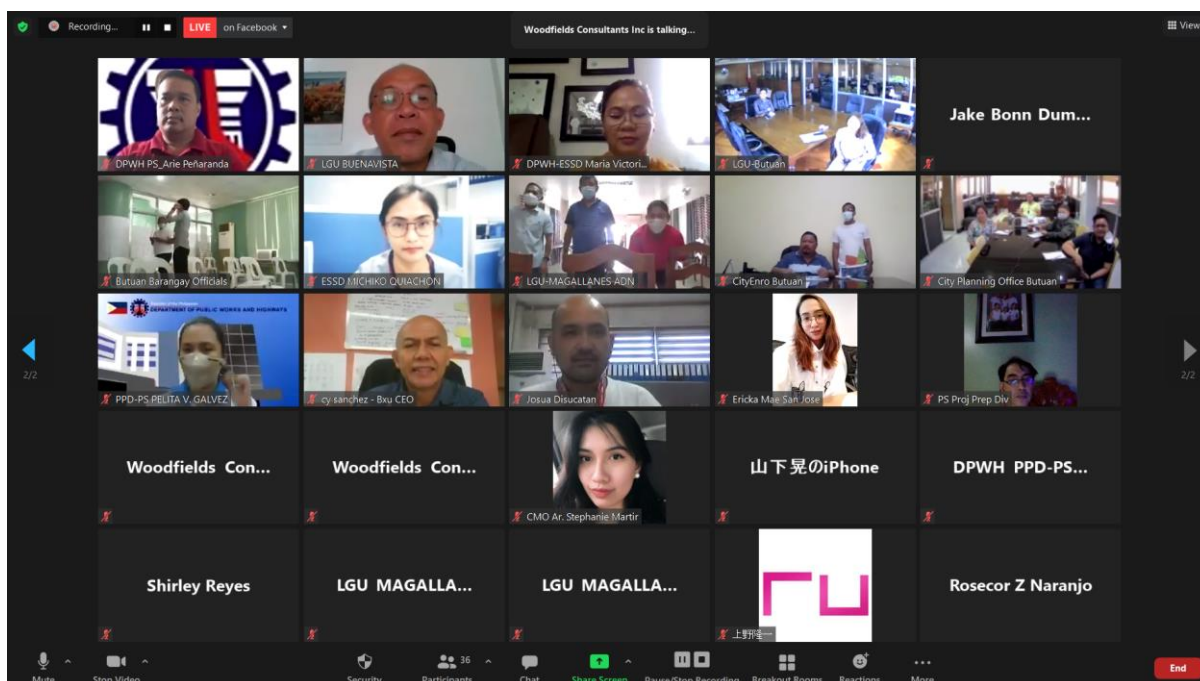


Figure 18.8-9 On-line Zoom Meeting



Butuan City



Figure 18.8-10 Participants from Local Venue

18.9 Land Acquisition and Resettlement

Actual impact on land acquisition and resettlement can't be firmly determine during this Pre F/S stage hence necessary discussions in this chapter are based on rough estimation and there is a need to continuously discussed and study in the succeeding F/S stage.

18.9.1 Requirement of Land Acquisition and Resettlement

ABLH will connect industrial zones along coastal areas of Butuan City. Proposed project outline based on the survey with a map of the target area is elaborated in **Section 18.2**. Project component which will cause adverse impact is found as road construction, interchanges, and bridges as shown in **Section 18.4**. In addition, **Section 18.8.1** elaborates further information.

Based on above-mentioned project outlines, ABLH requires land acquisition and resettlement to construct roads and related facilities including bridges.

18.9.2 Legal Frameworks on Land Acquisition and Resettlement

Laws and Regulations related to environmental and social issues in the Philippines are summarized in the **Chapter 13** of this report. The chapter also includes JICA's policy and gap analysis.

(1) JICA's Policy on Resettlement

Following is JICA's policy on resettlement (as a reference).

The key principle of JICA policies on involuntary resettlement is summarized below.

I. Involuntary resettlement and loss of means of livelihood are to be avoided when feasible by exploring all viable alternatives.

II. When, after such an examination, 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.

III. People who must be resettled involuntarily and people whose means of livelihood will be hindered or lost must be sufficiently compensated and supported, so that they can improve or at

least restore their standard of living, income opportunities and production levels to pre-project levels.

IV. Compensation must be based on the full replacement cost¹ as much as possible.

V. Compensation and other kinds of assistance must be provided prior to displacement.

VI. For projects that entail large-scale involuntary resettlement, resettlement action plans must be prepared and made available to the public. It is desirable that the resettlement action plan include elements laid out in the World Bank Safeguard Policy, OP 4.12, Annex A.

VII. 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. When consultations are held, explanations must be given in a form, manner, and language that are understandable to the affected people.

VIII. Appropriate participation of affected people must be promoted in planning, implementation, and monitoring of resettlement action plans.

IX. Appropriate and accessible grievance mechanisms must be established for the affected people and their communities.

Above principles are complemented by World Bank OP 4.12, since it is stated in JICA Guideline that “JICA confirms that projects do not deviate significantly from the World Bank’s Safeguard Policies”. Additional key principle based on World Bank OP 4.12 is as follows.

X. Affected people are to be identified and recorded as early as possible in order to establish their eligibility through an initial baseline survey (including population census that serves as an eligibility cut-off date, asset inventory, and socioeconomic survey), preferably at the project identification stage, to prevent a subsequent influx of encroachers of others who wish to take advance of such benefits.

XI. Eligibility of Benefits include, the PAPs who have formal legal rights to land (including customary and traditional land rights recognized under law), the PAPs who don't have formal legal rights to land at the time of census but have a claim to such land or assets and the PAPs who have no recognizable legal right to the land they are occupying.

XII. Preference should be given to land-based resettlement strategies for displaced persons whose livelihoods are land-based.

XIII. Provide support for the transition period (between displacement and livelihood restoration.

¹ Description of “replacement cost” is as follows.

Land	Agricultural Land	The pre-project or pre-displacement, whichever is higher, market value of land of equal productive potential or use located in the vicinity of the affected land, plus the cost of preparing the land to levels similar to those of the affected land, plus the cost of any registration and transfer taxes.
	Land in Urban Areas	The pre-displacement market value of land of equal size and use, with similar or improved public infrastructure facilities and services and located in the vicinity of the affected land, plus the cost of any registration and transfer taxes.
Structure	Houses and Other Structures	The market cost of the materials to build a replacement structure with an area and quality similar or better than those of the affected structure, or to repair a partially affected structure, plus the cost of transporting building materials to the construction site, plus the cost of any labor and contractors’ fees, plus the cost of any registration and transfer taxes.

XIV. Particular attention must be paid to the needs of the vulnerable groups among those displaced, especially those below the poverty line, landless, elderly, women and children, ethnic minorities etc.
XV. For projects that entail land acquisition or involuntary resettlement of fewer than 200 people, abbreviated resettlement plan is to be prepared.

In addition to the above core principles on the JICA policy, it also laid emphasis on a detailed resettlement policy inclusive of all the above points; project specific resettlement plan; institutional framework for implementation; monitoring and evaluation mechanism; time schedule for implementation; and, detailed Financial Plan etc.

(2) Policy for Land Acquisition and Resettlement of the Project

Following is draft policy on land acquisition and resettlement of the project.

I. The Government of Philippines will use the Project Resettlement Policy (the Project Policy) for the Agusan del Norte - Butuan City Logistical Highway Project (Temporal) specifically because existing national laws and regulations have not been designed to address involuntary resettlement according to international practice, including JICA's policy. The Project Policy is aimed at filling-in any gaps in what local laws and regulations cannot provide in order to help ensure that PAPs are able to rehabilitate themselves to at least their pre-project condition. This section discusses the principles of the Project Policy and the entitlements of the PAPs based on the type and degree of their losses. Where there are gaps between the Philippines legal framework for resettlement and JICA's Policy on Involuntary Resettlement, practicable mutually agreeable approaches will be designed consistent with Government practices and JICA's Policy.

II. Land acquisition and involuntary resettlement will be avoided where feasible, or minimized, by identifying possible alternative project designs that have the least adverse impact on the communities in the project area.

III. Where displacement of households is unavoidable, all PAPs (including communities) losing assets, livelihoods or resources will be fully compensated and assisted so that they can improve, or at least restore, their former economic and social conditions.

IV. Compensation and rehabilitation support will be provided to any PAPs, that is, any person or household or business which on account of project implementation would have his, her or their:

- Standard of living adversely affected;
- Right, title or interest in any house, interest in, or right to use, any land (including premises, agricultural and grazing land, commercial properties, tenancy, or right in annual or perennial crops and trees or any other fixed or moveable assets, acquired or possessed, temporarily or permanently;
- Income earning opportunities, business, occupation, work or place of residence or habitat adversely affected temporarily or permanently; or
- Social and cultural activities and relationships affected or any other losses that may be identified during the process of resettlement planning.

- V. All affected people will be eligible for compensation and rehabilitation assistance, irrespective of tenure status, social or economic standing and any such factors that may discriminate against achievement of the objectives outlined above. Lack of legal rights to the assets lost or adversely affected tenure status and social or economic status will not bar the PAPs from entitlements to such compensation and rehabilitation measures or resettlement objectives. All PAPs residing, working, doing business and/or cultivating land within the project impacted areas as of the date of the latest census and inventory of lost assets(IOL), are entitled to compensation for their lost assets (land and/or non-land assets), at replacement cost, if available and restoration of incomes and businesses, and will be provided with rehabilitation measures sufficient to assist them to improve or at least maintain their pre-project living standards, income-earning capacity and production levels.
- VI. PAPs that lose only part of their physical assets will not be left with a portion that will be inadequate to sustain their current standard of living. The minimum size of remaining land and structures will be agreed during the resettlement planning process.
- VII. People temporarily affected are to be considered PAPs and resettlement plans address the issue of temporary acquisition.
- VIII. Where a host community is affected by the development of a resettlement site in that community, the host community shall be involved in any resettlement planning and decision-making. All attempts shall be made to minimize the adverse impacts of resettlement upon host communities.
- IX. The resettlement plans will be designed in accordance with Philippines' Domestic Resettlement Policies and JICA's Policy on Involuntary Resettlement.
- X. The Resettlement Plan will be translated into local languages and disclosed for the reference of PAPs as well as other interested groups.
- XI. Payment for land and/or non-land assets will be based on the principle of replacement cost.
- XII. Compensation for PAPs dependent on agricultural activities will be land-based wherever possible. Land-based strategies may include provision of replacement land, ensuring greater security of tenure, and upgrading livelihoods of people without legal land titles. If replacement land is not available, other strategies may be built around opportunities for re-training, skill development, wage employment, or self-employment, including access to credit. Solely cash compensation will be avoided as an option if possible, as this may not address losses that are not easily quantified, such as access to services and traditional rights, and may eventually lead to those populations being worse off than without the project.
- XIII. Replacement lands, if the preferred option of PAPs, should be within the immediate vicinity of the affected lands wherever possible and be of comparable productive capacity and potential. As a second option, sites should be identified that minimize the social disruption of those affected; such lands should also have access to services and facilities similar to those available in the lands affected.

XIV. Resettlement assistance will be provided not only for immediate loss, but also for a transition period needed to restore livelihood and standards of living of PAPs. Such support could take the form of short-term jobs, subsistence support, salary maintenance, or similar arrangements.

XV. The resettlement plan must consider the needs of those most vulnerable to the adverse impacts of resettlement (including the poor, those without legal title to land, ethnic minorities, women, children, elderly and disabled) and ensure they are considered in resettlement planning and mitigation measures identified. Assistance should be provided to help them improve their socio-economic status.

XVI. PAPs will be involved in the process of developing and implementing resettlement plans.

XVII. PAPs and their communities will be consulted about the project, the rights and options available to them, and proposed mitigation measures for adverse effects, and to the extent possible be involved in the decisions that are made concerning their resettlement.

XVIII. Adequate budgetary support will be fully committed and made available to cover the costs of land acquisition (including compensation and income restoration measures) within the agreed implementation period. The funds for all resettlement activities will come from the Government.

XIX. Displacement does not occur before provision of compensation and of other assistance required for relocation. Sufficient civic infrastructure must be provided in resettlement site prior to relocation. Acquisition of assets, payment of compensation, and the resettlement and start of the livelihood rehabilitation activities of PAPs, will be completed prior to any construction activities, except when a court of law orders so in expropriation cases. (Livelihood restoration measures must also be in place but not necessarily completed prior to construction activities, as these may be ongoing activities.)

XX. Organization and administrative arrangements for the effective preparation and implementation of the resettlement plan will be identified and in place prior to the commencement of the process; this will include the provision of adequate human resources for supervision, consultation, and monitoring of land acquisition and rehabilitation activities.

XXI. Appropriate reporting (including auditing and redress functions), monitoring and evaluation mechanisms, will be identified and set in place as part of the resettlement management system. An external monitoring group will be hired by the project and will evaluate the resettlement process and final outcome. Such groups may include qualified NGOs, research institutions or universities.

Cut-off-date of Eligibility

The cut-off-date of eligibility refers to the date prior to which the occupation or use of the project area makes residents/users of the same eligible to be categorized as PAPs and be eligible to Project entitlements. In the Project, Cut-off-date will be declared during F/S phase.

Principle of Replacement Cost

All compensation for land and non-land assets owned by households/shop owners who meet the cut-off-date will be based on the principle of replacement cost. Replacement cost is the amount calculated before displacement which is needed to replace an affected asset without depreciation

and without deduction for taxes and/or costs of transaction. Further discussion will be implemented during resettlement action plan (RAP) development.

18.9.3 Size and Areas of Land Acquisition and Resettlement

ABLH requires land acquisition and resettlement for construction of approximately 14 km road sections (embankment and high-cut), and approximately 2.35 km of bridges (6 bridges) as well as 2 interchanges as shown in **Table 18.3-4**. Rough estimation of necessary land acquisition areas and counted affected structures are shown in **Table 18.9-1**.

Table 18.9-1 Rough Estimation of Land Acquisition and Resettlement of ABLH

Component	Approx. Length	Number	Land acquisition	Affected Structures	Remarks
1. Road Sections	13.6 km	-	81.6 ha	190	Estimation with fixed width of 60m
2. Bridge	2.35 km	3	Small amount		Limited around portals and surface lights, if needed
3. Intersection	0.65 km	8	3.9 ha		Estimation with fixed width of 60m
4. Interchange	-	2	10 ha		Estimation with fixed area of 5 ha per one interchange
Total	-	-	95.5 ha	190	

Source: JICA Study Team

18.9.4 Policies of Compensation and Assistance

Entitlement matrix as a policy of compensation and assistance for land acquisition and resettlement should be further discussed and elaborated in RAP which will be developed in succeeding phases. This pre-feasibility study assumes possible form of impacts with practical mitigation measures. **Table 18.9-2** shows initial entitlement matrix of the project.

Table 18.9-2 Temporal Entitlement Matrix

Type of Loss	Application	Entitled Persons	Entitlement
1. Land			
Classified as Agricultural, Residential, Commercial, or Institutional	Severely Affected	PAFs with Original Certificate of Title (OCT), Transfer Certificate of the Title (TCT) or Tax Declaration (TD) showing 30 or more years of continuous possession (Tax Declaration may be legalized to full title)	<ul style="list-style-type: none"> • Cash Compensation for loss of entire land based on the current market value free of taxes. • Transaction costs (e.g. administrative charges and registration or title fees) . • If feasible, land for land will be provided in terms of a new parcel of land of equivalent value or productivity, at a location acceptable to PAFs • Rehabilitation Assistance in the form of Skills Training equivalent to PhP 15,000 per family, if the present means of livelihood is no longer viable and the affected family will have to engage in a new income activity.
		Holders of Certificates of Land Ownership Award (CLOA) Granted under the Comprehensive Agrarian Reform Act	<ul style="list-style-type: none"> • Cash Compensation for loss of entire land at the current market value free of taxes. • Transaction costs (e.g. administrative charges and registration or title fees) • If feasible, land for land will be provided in terms of a new parcel of land of equivalent value or productivity, at a location acceptable to PAF's.

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Type of Loss	Application	Entitled Persons	Entitlement
			<ul style="list-style-type: none"> Rehabilitation Assistance in the form of Skills Training equivalent to Php. 15,000 per family, if the present means of livelihood is no longer viable and the affected family will have to engage in a new income activity.
		<p>Holders of Free or Homesteads Patents and CLOA under CA 141</p>	<p>No compensation for land up to 20 m width if patent was granted prior to 1975 or up to 60 m width for patents granted thereafter, but compensation on land improvement only. For area in excess of government lien, same as PAPs with OCT</p>
		<p>PAP's without OCT, TCT or Tax Declaration</p>	<ul style="list-style-type: none"> Compensation on land improvement only
		<p>Holders of Free or Homesteads Patents and CLOA under Public Land's Act</p>	<ul style="list-style-type: none"> Compensation on land improvements only Disturbance compensation equivalent to five times the average of the gross harvest for the past 5 years but not less than PhP 15,000
		<p>Lessees of Agricultural Land</p>	<ul style="list-style-type: none"> Disturbance compensation equivalent to 5 times the average gross harvest during the last 5 years contrary to the statement of only 3 years but not less than PhP 15,000
		<p>Agricultural Tenant/Settlers/ Occupants</p>	<ul style="list-style-type: none"> Financial assistance equivalent to the average gross harvest for the last 3 years but not less than PhP 15,000 per hectare
	Marginally Affected	<p>PAF with TCT or TD (Tax declaration may be legalized to full title)</p>	<ul style="list-style-type: none"> Cash compensation for affected land at the current market value of land free of taxes Transaction costs (e.g. administrative charges and registration or title fees)
		<p>Holders of CLOA granted under the Comprehensive Agrarian Reform Act</p>	
		<p>Holders of Free or Homesteads Patents CLOA under CA 141 Public Lands Act</p>	<ul style="list-style-type: none"> Compensation on land improvements only
	2. Structure		
(1) Residential	Severely Affected	<p>Owners with or without TCT or TD (Tax Declaration may be legalized to full title)</p>	<ul style="list-style-type: none"> Cash compensation for the entire structure at 100 % Replacement Cost (compliant with RA 10752) including transaction costs without deduction for depreciation or salvaged materials. Inconvenience Allowance in the amount of Php 10,000 for relocation and new construction Transportation Assistance
		<p>Homeless, landless, underprivileged, informal occupants of public land, except professional squatters and squatting Syndicates) as defined in RA 7279</p>	<ul style="list-style-type: none"> If qualified, apply for housing in LGU or NHA Resettlement sites Transportation Assistance to transfer to Resettlement Site or return to original province
	Marginally Affected	<p>Owners with or without TCT or TD (Tax Declaration may be legalized to full title)</p>	<ul style="list-style-type: none"> Cash compensation for affected portion of the structure at 100 % replacement cost

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Type of Loss	Application	Entitled Persons	Entitlement
	Severely Affected	Renters and Rent-Free Occupants of Dwelling Structures	<ul style="list-style-type: none"> • Provide sufficient time (i.e. at least 3 months) for moving • If renters or rent-free occupants of dwelling structures do not own any real property whether in the urban or rural areas as defined in RA 7279, may apply for housing in LGU or NHA Resettlement Sites only if they are qualified.
(2) Commercial	Severely Affected	Owners with or without TCT or TD (Tax Declaration may be legalized to full title)	<ul style="list-style-type: none"> • Cash compensation for the entire structure at 100 % Replacement Cost compliant with RA 10752) including transaction costs without deduction for depreciation or salvaged materials. • Transportation Assistance
	Marginally Affected	Owners with or without TCT or TD (Tax Declaration may be legalized to full title)	<ul style="list-style-type: none"> • Cash compensation for affected portion of the structure at 100 % Replacement Cost
(3) Industrial	Severely affected	Owners with or without TCT or TD (Tax Declaration may be legalized to full title)	<ul style="list-style-type: none"> • Cash compensation for the entire structure at 100% Replacement Cost compliant with RA 10752) including transaction costs without deduction for depreciation or salvaged materials. • Transportation Assistance
	Marginally affected	Owners with or without TCT or TD (Tax Declaration may be legalized to full title)	<ul style="list-style-type: none"> • Cash compensation for affected portion of the structure at 100% Replacement Cost
3. Commercial Activity			
(1) Business	Severely Affected	Business Owner	<ul style="list-style-type: none"> • Rehabilitation assistance in the form of livelihood and skills training • Administrative support to apply capital for small business in cooperation with concerned LGUs • Income Rehabilitation Assistance for the period to the stoppage of business according to business/ income level based on tax record, income statement and/or business permit for small scale business commercial establishments only if business owners continue their business at the remaining area or another area. Appropriateness of the period of business stoppage shall be validated with concerned parties.
	Marginally Affected	Business owners	<ul style="list-style-type: none"> • Income Rehabilitation Assistance for the period to the stoppage of business according to business/ income level based on tax record, income statement and/or business permit for small scale business commercial establishments only if business owners continue their business at the remaining area or another area. Appropriateness of the period of business stoppage shall be validated with concerned parties.
		Employees in displaced establishments and lose jobs for reasons of reasonably attributable to the damages caused by the project	<ul style="list-style-type: none"> • Rehabilitation assistance in the form of livelihood and skills training • One month or longer prior notice to the establishments • Priority in employment during construction and operation stage of projects • Rehabilitation assistance in the form of skill trainings and other development activities

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Type of Loss	Application	Entitled Persons	Entitlement
4. Improvements			
(1) Other Non-Dwelling Structures	Severely or Marginally Affected	PAFs with or without TCT or TD	<ul style="list-style-type: none"> Cash Compensation for the affected improvements at 100% Replacement Cost
5. Crops, Trees, Perennials			
	Severely or Marginally Affected	Owners of crops, trees, perennials	<ul style="list-style-type: none"> Cash Compensation for crops, trees, and perennials in full replacement cost¹
6. Graves			
		Owners of graves	<ul style="list-style-type: none"> Compensate for the transfer/relocation cost of graves in coordination with LGUs and relevant Government Agencies. Ensure observance of practices/beliefs.
7. Vulnerable Households			
(1) Additional Support to Nos. 1 to 6 above		Households with poor, solo households, households headed by elderly (over 60 years old) or a disabled person	<ul style="list-style-type: none"> Cash allowance if it is justified as necessary Administrative support for applying respective governmental social welfare program based on household conditions in cooperation with concerned LGUs Provide priority for jobs related to the project based on capability of PAFs Rehabilitation assistance in the form of skill trainings and other development activities
		Homeless, landless, underprivileged, informal occupants of public land, except professional squatters and squatting Syndicates) as defined in RA 7279	<ul style="list-style-type: none"> If qualified, apply for housing in LGU or NHA Resettlement sites Transportation Assistance to transfer to Resettlement Site or return to original province
8. Loss of Community or Public Structures			
	Severely or marginally affected	Community or public structure owners/ administrators	<ul style="list-style-type: none"> Cash Compensation for entire or affected portion of the structure at 100% Replacement Cost.

1. According to World Bank OP 4.12, the replacement cost for fruit and trees are defined below:

For fruit: Where markets exist, the value of a tree of a specified age and use can be used to determine compensation rates. Where markets do not exist, surrogate values must be determined. For timber trees, the value of a tree equals that of the lumber. For fruit or fodder trees, the value is equal to the cumulative value of the fruit crop for its productive life (and any timber value). If replacement trees are provided, good practice indicates that compensation be based on the value of the harvests lost until the replacement trees come into full production (typically, 7-10 years). In the case of immature trees, a less costly alternative may be to directly supply seedlings as a replacement and provide compensation for the resulting delay in reaching fruit-bearing capacity.

For crops: When arrangements cannot be made to allow for harvest, the market value for lost cash crops is paid. In some countries the value of the harvest is determined by the average market value of crops for the previous three years. Whatever the multiplier, if food supplies are sold in the area enough cash compensation is paid to purchase equivalent supplies, taking into account the possibility of price increases caused by heightened demand from DPs. In areas of predominantly subsistence production, good practice recommends that in-kind compensation be made for subsistence crops.

Source: JICA Study Team

18.9.5 Grievance Redress Mechanism

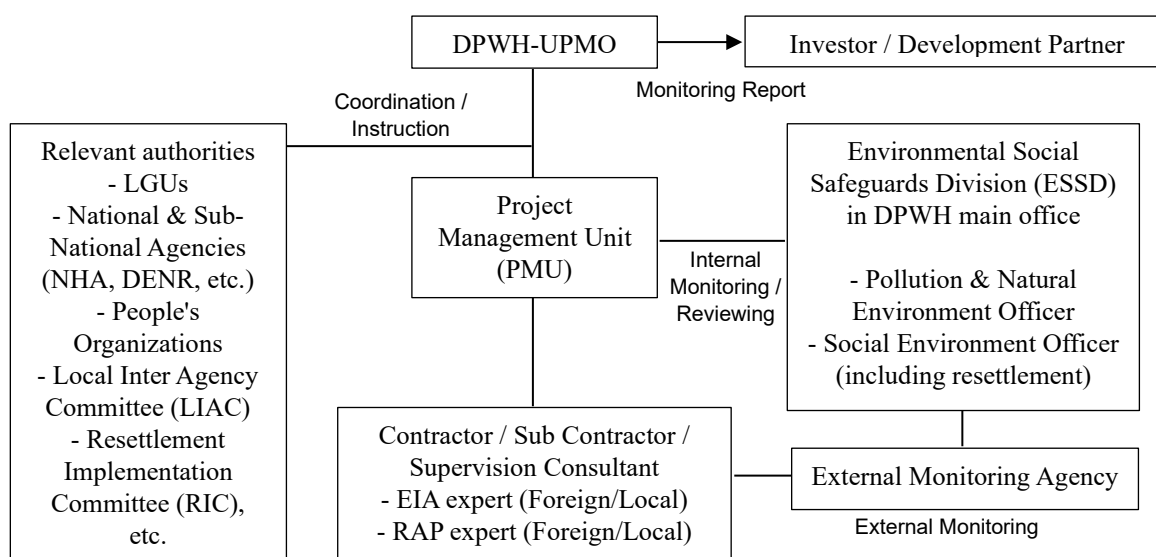
Grievance Redress Mechanism (GRM) is an indispensable part of RAP and defined in LARRIPP (2017). Usually, a responsible body called Grievance Redress Committee is organized to manage GRM appropriately. Generally, Resettlement Implementation Committee (RIC) and LIAC (Local Inter-Agency Committee) that consist of LGUs and other relevant authorities play a role of GRC in the Philippines. Similarly, ESSD of the DPWH functions as internal monitoring agency to monitor and follow up GRM. GRM for ABLH shall be discussed further in the succeeding phases such as F/S when RAP is developed.

As a reference, outlines of GRM in the case of "RAP from Cebu-Mactan Bridge Project (2019)" is summarized as follows.

- RIC's responsibilities is to receive and record the voices, complaints opinions and suggestions provided by the PAPs, except complaints and grievances that specifically pertain to the valuation of affected assets since such will be decided upon by the proper courts, and to address them as the first stage of the decision-making body.
- If the response to the complaint is deemed inadequate in the view of the PAPs, they may elevate their grievance to the ROW Task Force that consists of higher-level officials of DPWH Central Office before resorting the case finally to the court. Under this project, grievances from the PAPs would be handled in the following manner.
- Grievance shall be filed by the PAP with the RIC who will act within 15 days upon receipt, except complaints and grievances that specifically pertain to the valuation of affected assets, since such will be decided upon by the proper courts.
- If no understanding or amicable solution can be reached, or if the PAP does not receive a response from the RIC within 15 days of registry of the complaint, he or she can appeal to the ROW Task Force, which should act on the complaint or grievance within 15 days from the day of its filing
- If the PAP is not satisfied with the decision made by the ROW Task Force, he/she, as a last resort, can submit the complaint to any court of law PAPs shall be exempted from all administrative and legal fees incurred pursuant to the grievance redress procedures as is guaranteed under LARRIPP (2007). All complaints received in writing (or written when received verbally) from the PAPs will be documented and shall be acted upon immediately

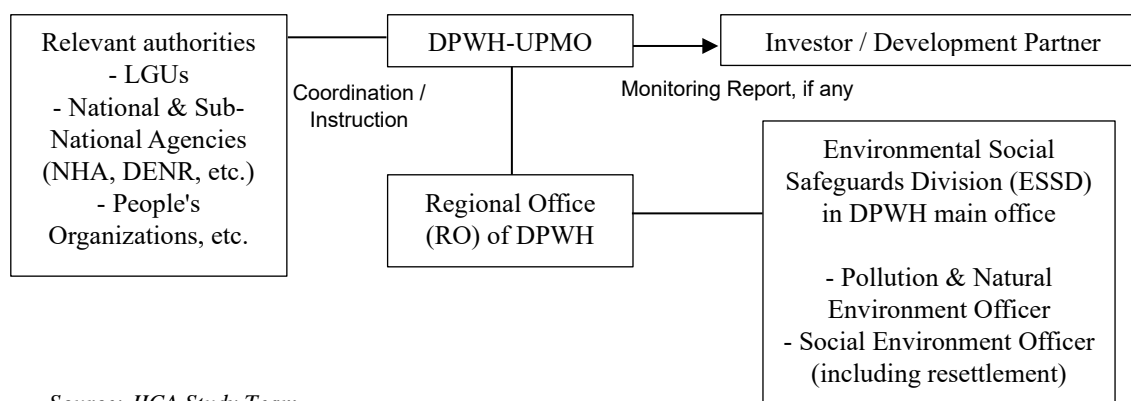
18.9.6 Implementation Structures

Implementation structure for ABLH will be established based on local legal frameworks with reporting/discussion channels to investors/development partners. Based on the project institutional plan of other projects through JICA's cooperation such as Cebu-Mactan Bridge Construction Project, proposed implementation structure is shown in **Figure 18.9-1** and **Figure 18.9-2**.



Source: JICA Study Team

Figure 18.9-1 Implementation Structure of Environmental and Social Considerations During Operation Stage



Source: JICA Study Team

Figure 18.9-2 Implementation Structure of Environmental and Social Considerations During Operation Stage

18.9.7 Implementation Schedule

Implementation schedule cannot be determine with certainty during this pre-F/S stage without F/S, RAP, and other plans and activities during the civil works. However, it is roughly estimated that land clearance requires at least two years after RAP is authorized. During that time, final parcellary survey with census are required to determine eligible PAPs and other preparation and processes such as negotiation, payment, preparation of relocation sites, etc. will take certain time. These processes are discussed in RAP based on size of impact.

18.9.8 Cost and Budget

Cost and budget for land acquisition and resettlement shall be calculated with the results of RAP related field surveys such as census survey, parcellary survey, replacement cost survey, and so on in following study phases such as F/S. If roughly estimate such cost for 95.5 ha of land and 190 households with unit price of 100 USD (equal to 5,000 Php) per sqm and 5,000 USD (equal to 250,000 Php) per structure, total cost is estimated approx. 95,500,000 USD for land acquisition and 950,000 USD for structures (Totally around 96.45 million USD). This

rough calculation is not accurate because of uncertain unit price, areas including public land, and any other assumptions.

18.9.9 Monitoring by Implementing Agency and Monitoring Forms

Contents of internal and external monitoring shall be discussed during RAP development and that will provide monitoring forms.

18.9.10 Public Consultations

Public consultations for actual project affected persons (PAPs) will be implemented in following phases such as F/S when RAP is developed. Stakeholder meetings during master plan study invited representatives of residents, expected PAPs and outlines are described in separated materials (will be implemented in February 2021, and the results will be involved in FR of the master plan study.)

18.10 Economic Evaluation of the Project

18.10.1 General Methodology of Economic Evaluation

Economic viability of the project was evaluated by calculating economic benefits and costs “With” and “Without” the project. EIRR was calculated using the economic benefits and economic costs. Economic benefits were estimated by calculating the unit VOC, TTC and the demand forecast as explained in **Section 18.2**. Assumptions used for the economic evaluation is shown in **Table 18.10-1**.

Table 18.10-1 Assumptions of Economic Evaluation

Items	Assumptions	Remarks
Social Discount Rate	10%	
Project Period	2022-2057	2022-2027: Detailed Design (D/D), Right of Way (ROW) Acquisition, and Civil Work 2028-2057: Operation (30 years)
Price Level Year	2020	Inflation is not considered.
Physical Contingency	10%	1) 10% of Construction Cost 2) 10% of Consulting Service Cost

Source: Department of Finance and National Economic and Development Authority (NEDA) (2016) “Revisions on ICC Guidelines and Procedures Updated Social Discount Rate for the Philippines” for discount rate, NEDA (2004) “ICC PROJECT EVALUATION PROCEDURES AND GUIDELINES” for physical contingency.

18.10.2 Economic Cost for the Project

Economic cost includes construction cost, ROW cost, consulting service cost and administration cost of the projects. VAT (12%) was deducted from the financial cost of the project. Since this is an approximate cost, it needs to be discussed in detail in the F/S. Economic evaluation was analyzed based on two scenarios: Scenario 1 (50% progress of area development) and Scenario 2 (100% progress of area development).

- ROW cost: unit cost of land (Residence and Agriculture) and total ROW area
- Consulting service cost: 8% of construction cost (DED: 3%, CS:5%)
- Administration cost: 3% of construction cost

(1) Financial Cost to Economic Cost

Financial cost converted to economic cost are shown in **Table 18.10-2** and **Table 18.10-3**.

Table 18.10-2 Financial Cost

Unit: million PHP

Construction cost	ROW Cost	Consulting Service (D/D)	Consulting Service (C/S)	Administration Cost	Total
15,409	164	462	770	554	17,230

Source: JICA Study Team

Table 18.10-3 Converted to Economic Cost

Unit: million PHP

Construction cost	ROW Cost	Consulting Service (D/D)	Consulting Service (C/S)	Administration Cost	Total
13,758	153	413	688	495	15,506

Source: JICA Study Team

(2) O&M Cost

O&M cost is set at 1% of construction in this Pre-F/S. It is estimated at 328.6 million pesos/year.

18.10.3 Economic Benefit of the Project

Economic benefits were calculated by measuring the “Saving of TTC and VOC” since they are measurable in monetary value. The JST estimated the Unit TTC and VOC in 2020, as explained in **Section 12.4**. The economic benefit of the projects is shown in **Table 18.10-4**.

Table 18.10-4 Economic Benefit of the Projects

Unit: million PHP/Year

Economic Benefit (TTC+VOC Saving)		
Scenarios	2028	2040
Scenario 1	1,593	3,064
Scenario 2	4,899	9,422

Source: JICA Study Team

18.10.4 Results of Economic Evaluation

(1) Results of Base Case

The following economic indicators of this project was calculated: EIRR, B/C and ENPV. Calculation formula and remarks are explained in **Section 12.4**. Results of the economic evaluation are shown in **Table 18.10-5**. The result of EIRR for the two scenarios have exceeded by 10% and shown the feasible as the project.

Table 18.10-5 Results of Economic Evaluation

Indicators of Economic Analysis			
Scenarios	EIRR (%)	B/C	ENPV (million PHP)
Scenario 1	11.3%	1.15	1,672
Scenario 2	24.9%	3.55	27,724

Source: JICA Study Team

(2) Sensitivity Analysis

Sensitivity analysis of EIRR with regards to the economic cost and the economic benefit was conducted and results are shown in **Table 18.10-6** and **Table 18.10-7**.

Table 18.10-6 Sensitivity Analysis of EIRR for Scenario 1

EIRR		Cost		
		-10%	Base Case	+10%
Benefit	-10%	11.2%	10.3%	9.6%
	Base Case	12.2%	11.3%	10.5%
	+10%	13.1%	12.2%	11.3%

Source: JICA Study Team

Table 18.10-7 Sensitivity Analysis of EIRR for Scenario 2

EIRR		Cost		
		-10%	Base Case	+10%
Benefit	-10%	24.7%	23.3%	22.0%
	Base Case	26.4%	24.9%	23.6%
	+10%	28.1%	26.5%	25.1%

Source: JICA Study Team

18.11 Conclusion and Recommendation

The Pre-F/S studied the bridge location and bridge type for the new Butuan Bridge. A long-span bridge along the proposed alignment was recommended. Since the new Butuan bridge is located in a wetland area near the river mouth, it is required to implement the bridge plan by knowing the ground bearing capacity (soft ground). However, in this study, since the primary geological data gathering was not conducted and only a secondary data of one location was available, the bridge was planned based on an assumed geological condition. It is important to obtain accurate geological data for the next F/S stage. And the bridge plan should be studied carefully through the comparison of alternative bridge types.

The local governments of Butuan expects that the project will lead an industrial development along the project road. There are six (6) SEZs planned along the project road. Among these plans, the Taguibo Agro SEZ has been approved for development by the Philippines Government so far, and the port of Masao is expected to become a hub port for the processing and shipping of agricultural, forestry and fishery products produced in the CARAGA region. As of December 2020, a rice milling plant is already operating in this area. Also, the City Government of Butuan is planning to attract Japanese companies to the Taguibo Agro SEZ. Unfortunately, the other five SEZs are still on a conceptual stage and have not yet been concretely planned or commercialized. To ensure the feasibility of the project, the Butuan city have to proceed with certainly the development of SEZs.

As the Pre F/S shows that traffic demand along the project road will depend on progress of development of SEZ, F/S should seek phased development of the project in accordance with development of the SEZ. Therefore, DPWH should proceed with the project formulation considering the project feasibility that depends on the progress of the operation of SEZs. That is, it should be considered in time of the project commencement of the industrial park's development and operation. Therefore, the JICA Study Team recommends that during the F/S, the planning of the project road should consider a development by phase commensurate with the progress of SEZ development. That is, it should be considered to match the project commencement to the timing of industrial park development and operation. The technical recommendation forward to F/S stage are as follows.

18.11.1 Detailed Investigation and Study about Soft Ground Treatment

In this study, the soft ground treatment method was proposed based on a secondary geological information. The proper survey and study are essential for the Preliminary Design to accurately estimate the cost during the F/S stage.

Geological Investigation

Detailed geological investigation shall be executed for the determination of appropriate design. The location of the boring survey and the other items are proposed as shown in **Table 18.11-1**.

Table 18.11-1 Proposed Geological Investigation

Survey Items	Remarks
Boring survey	At least assumed depth: 50 m Borehole Location: 8 points, STA.1+600, STA.2+900, STA.3+700, STA.4+900, STA.6+700, STA.7+900, STA.9+500, STA.11+900
Standard Penetration Test	Every 1 m on boring survey
Laboratory survey	Physical tests: Specific gravity, Sieve analysis, water content, Atterberg limit Mechanical tests: Unconfined compression, Consolidation test

Source: JICA Study Team

Geotechnical Analysis

Geotechnical analysis based on the investigation results is required to determine the necessity and a reasonable planning of soft soil treatment. Methods of analysis to be done during the feasibility study stage are summarized in **Table 18.11-2**.

Table 18.11-2 Proposed Geotechnical Analysis

Method	Remarks
Sliding failure analysis	Factor of safety (Fs) (ref. more than 1.05~1.4 in general) shall be determined before execution of analysis
Consolidation settlement analysis	Allowance of residual settlement (ref. less than 10~30cm in general) shall be determined before execution of analysis
Liquefaction possibility analysis	Reference to Bridge Seismic Design Specifications, DPWH

Source: JICA Study Team

Planning of Soft Soil Treatment

Based on the investigation and technical analysis, preliminary design of soft soil treatment shall be studied carefully during F/S.

18.11.2 Environmental and Social Considerations

During the following F/S stage, a detailed survey and analysis of environmental and social considerations should be carried out with more accurate project design to understand the following impacts:

(1) General Issues

- Confirmation of construction methodology and necessary machinery and vehicles
- Confirmation of soil borrow pit, quarry, waste dumping site, etc.
- Necessary budget for mitigation and monitoring
- Confirmation of specific role and responsibility for mitigation, monitoring, and resettlement implementation
- Stakeholder Meetings and Public Consultations as F/S level

- F/S and RAP shall refer issues and concerns from FGDs and SHMs in **Table 18.8-17** and **Table 18.8-18** to develop their contents.
- Alternative route shall be discussed further in F/S to avoid and minimize negative impact on both natural and social environment.
- Phased road development (ef. Phase-1 4-lane road, Phase-2 widening 8-lane) shall be studied further in based on progress of SEZ development plan along the highway.
- Route selection in order to minimize impacts on natural and social environment is required in the F/S phase.

During the Stakeholder Meeting, the following items were raised, and it is necessary to study in F/S

- Road surface elevation to consider the navigation clearance at bridge and river level due to climate change.
- Rust prevention measurement for steel bridge since it is located near the sea.
- Protection measurement of costal erosion

(2) Pollution Control

- Measurement of necessary items of air, water, noise and vibration, etc. as baseline data, at appropriate locations in appropriate seasons (e.g., dry and wet season) are necessary.
- Survey for soil quality (possible contamination) and geological conditions based on boring survey, soft soil survey, and relevant surveys for tunnel sections for determining risks of subsidence and liquefaction of ground.
- Quantitative forecasting and evaluation for the future impact should be discussed including numerical simulation
- Further study for waste and waste water treatment status and possible impact is required
- Some important parameters such as NO₂ and NO_x in air quality shall be measured additionally in the F/S phase.

(3) Natural Environment

- Field surveys for fauna and flora at appropriate locations in appropriate seasons (e.g., dry and wet season)
- Impact on the ecosystem due to cutting mangroves in the swampy area based on detailed survey for living species including IUCN species
- Location of major habitat with specific location of nesting areas and feeding areas around the project area shall be confirmed.
- Impact due on coral reefs around the sea areas shall be confirmed further in following F/S, although direct impact may not be expected at this pre-F/S stage.
- Alternative discussion shall be done again to avoid protected areas (sensitive areas from development impact based on JICA's Guidelines for Environmental and Social Considerations) as many as possible.
- Impact on mangrove forest, wetland, and livelihood of the residents who is living in that area shall be studied further in F/S.

(4) Social Environment

- RAP-related surveys including Census, Socio-Economic Survey, Inventory of Loss, Replacement Cost Survey, and etc.
- Confirmation of status of vulnerable people including poor people and illegal resident around the project area
- Confirmation of status of ethnic minority and/or indigenous people
- Impact on livelihood of fishery such as fish cultivation and coastal fishery shall be surveyed and considered with appropriate compensation and assistance in RAP, if any
- Confirmation of public/social facilities around the project sites
- Impact on the existing water resources and water usage by resident due to the interception/changing of groundwater flow caused by the construction of road structures including soft ground treatment or liquefaction measures.
- Necessity of compensation for fishery activities, if any
- Surveys finding traffic-vulnerable people and relevant facilities including schools shall be implemented during F/S phase and road safety education might be considered as one of the mitigation measures of accidents.
- In case that livelihood of PAPs is likely to be affected based on socioeconomic survey and stakeholder meetings during F/S and/or monitoring processes during implementation, appropriate compensation and livelihood restoration program to PAPs shall be provided based on RAP.
- Land price along the project sites may increase after the completion of each project area. Therefore, actual unit prices for compensation shall be determined based on replacement cost surveys which reflect transaction prices of PAP's properties in and around the project areas so that PAPs can recover and keep their living environment.
- Further study of traffic volume, traffic characteristics, business along the existing road are required to determine indirect impacts including economic impact and necessity of mitigation measures due to bypass function by the new highway in F/S.
- Project-induced impact on business along existing road bypassed by the planned highway shall be discussed in the items of "Poverty" or "Local Economy such as Employment and Livelihood". In addition, appropriate mitigation measures shall be proposed if any such impact is expected based on the results from stakeholder meetings and any other surveys.
- JICA asks the project proponents to consider following conditions. In case that impact is expected on existing roads bypassed by the highway, relevant households and/or business bodies should be involved in public participation processes such as stakeholder meetings, and socioeconomic survey shall be implemented, if necessary.

PART G

DEVELOPMENT SCHEME

CHAPTER 19

DEVELOPMENT SCHEME OF HIGH STANDARD HIGHWAY

CHAPTER 19

DEVELOPMENT SCHEME OF HIGH STANDARD HIGHWAY

19.1 Introduction

In this Chapter 19, the expressway development schema in other countries is presented and summarized as examples or experiences for considering the development scheme of high standard highways in the Philippines.

Expressways as toll roads in the Philippines were developed mostly based on Public-Private Partnership (PPP) schemes such as the franchise and the JV approaches in the early stage of development, and the Build-Operate-Transfer (BOT) was adopted as the main approach after the BOT law was enacted in the 1990s. The projects were developed in the Metro Manila area where the traffic demand is huge. The upcoming expressway, High Standard Highway (HSH) Class I projects are being planned to form a nationwide expressway network.

To expedite the development of nationwide expressways network with low to medium traffic volume, government fund was utilized through the implementation by the DPWH rather than by private financing. The initiative of DPWH is becoming essential.

19.2 Expressway Development Scheme in Other Countries

19.2.1 Outline of Development Scheme for Expressway

The development method for expressway in terms of financial resources is roughly classified into three types as follows:

1) The development method as public works by funding with tax revenue. (The establishment of a dedicated fund of which revenue comes from road traffic-related taxes such as fuel duty, tonnage tax, and motor vehicle purchase tax has been applied as an effective policy to secure stable funds for road development. Utilization of ODA funds is also included.).

2) The development method as a toll road project by funding through income from road users toll fee. (Toll road project managed by a private corporation or a concessionaire).

3) The mixed development method by combining the above two methods. Various methods have been created for this type of scheme. For example, the application of viability gap funding, the road construction method of merging public works and toll-road projects such as STAR in Philippines, the public-built and private operate scheme under concession contract.

Looking at the development history of expressways in other countries, several countries have started construction of expressways as a public works project funded mainly by tax revenues. The toll road project system by the PPP scheme was introduced in the later.

In some countries, the expressway development was at first started as a toll road project under the PPP scheme or by the road agency like in Japan, and then the development of unprofitable routes have been done by public works using tax revenue.

In EU, a unique system was initiated. The use of expressway used to be free of charge, but charging systems have now been introduced for some types of vehicles. The toll revenue is used not only to construct new roads but also to develop other transportation system for a comprehensive transportation system development strategy.

As described above, various developments are being followed by different countries.

Countries that started the expressway development as a public works system.

In USA, UK and Germany, the main highway network is publicly funded, constructed and operated. Since the 1990s, the PPP schemes (e.g., BOT and DBTO) were applied for new construction or O&M.

Countries that started the expressway development as a toll expressway project system.

In Japan, France and South-Korea, the public corporation, under the umbrella of the central ministry that managed public works, planned, constructed and operated the national expressway network based on toll road project system. Later, privatization of public corporation (Japan, France), PPP schemes such as BOT (South Korea) were introduced.

However, the development of unprofitable routes is being implemented as a project under the direct control of the central government.

In China, the public corporation started the development of expressway in the early stage but later on, the PPP scheme was introduced.

In India, from the early stage, the expressway development was promoted by introducing a BOT scheme under NHAI (National Highway Authority of India). Currently, the government led the expressway projects by installing EPC (Engineering, Procurement and Construction) method.

Table 19.2-1 summaries the expressway development scheme of each country.

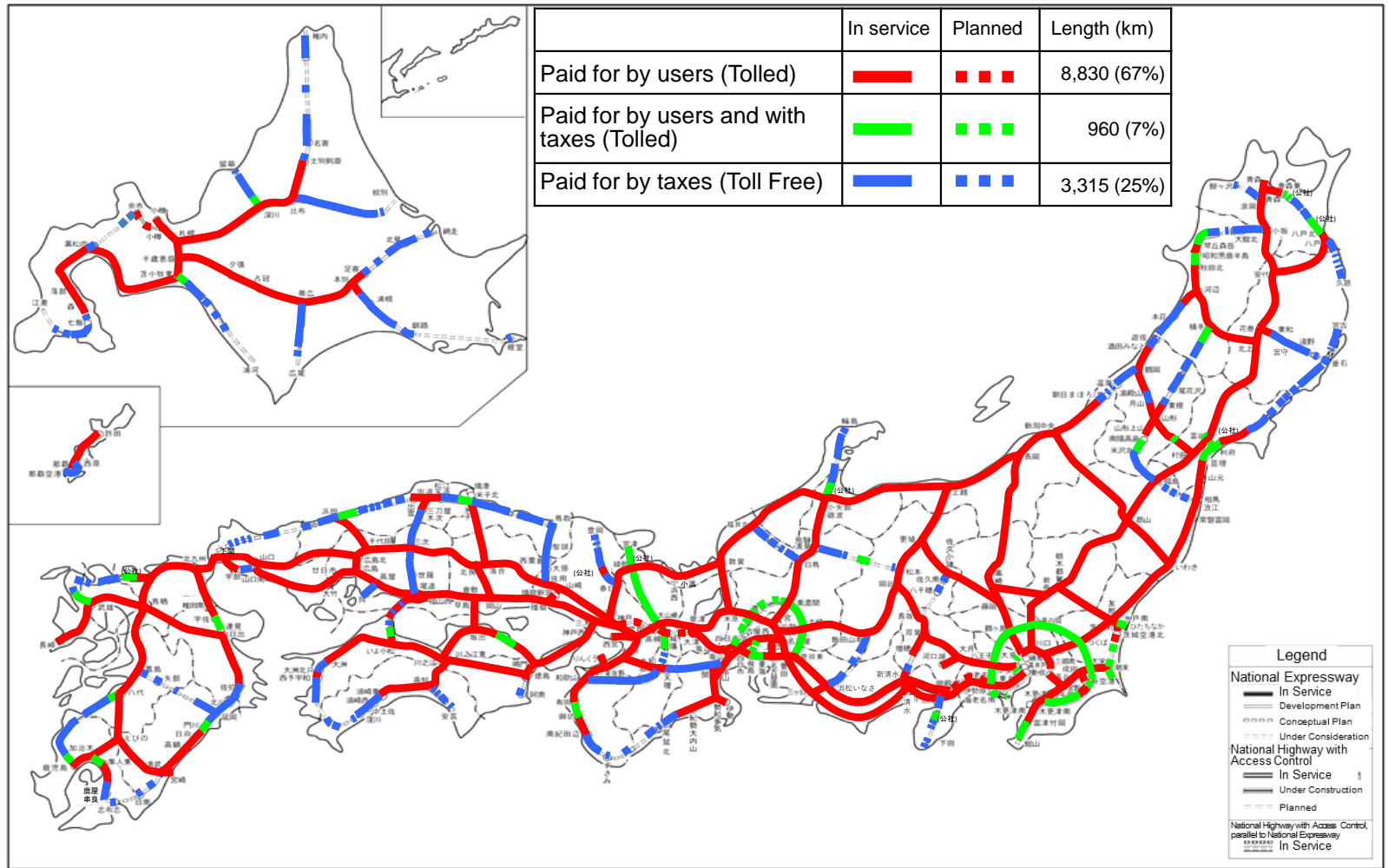
Table 19.2-1 Summary of Development Scheme of Expressways in Other Countries

	Expressway Development Method		Major characteristic	Remarks
	At beginning time	At present time		
Japan	<ul style="list-style-type: none"> ✓ Installation of Toll road project system. ✓ Establishment of Public corporation. 	<ul style="list-style-type: none"> ✓ Toll road project system ✓ Privatization public corporation. ✓ Public works by government. ✓ Mixed-method of public works and the toll road projects. 	<ul style="list-style-type: none"> ✓ Act on Special Measures concerning Road Construction and Improvement, the Act on the Japan Highway Public Corporation (Japan Highway Public Corporation founded) and the Act of National Expressway Law were established in 1950s. ✓ Nationwide expressway construction started by toll road project method organized by the public corporation, the Japan Highway Public Corporation, in 1960s, using the World Bank financial support. (For the development in metropolitan area, other public corporations were established: Metropolitan Expressway Public Corporation for Tokyo area, Hanshin Expressway Public Corporation for Osaka area). ✓ Cross-subsidization (the toll pool system) was adopted. (refer the Section 19.2.2(2)) ✓ The public corporation was privatized in 2005 and the scheme based on the so-called "scheme of separating infrastructure and operation", was adopted. ✓ Segment Dividing scheme :Paid for by users and with taxes as public works (Refer the green line section on the Figure 19.2-1). ✓ Pure public works scheme by Ministry of Land, Infrastructure, Transport and Tourism has been adopted to construct unprofitable routes in rural areas (Refer the blue line section on the Figure 19.2-1): 	Tolled No tolled (Section by the public worksproject).
U.S.A.	<ul style="list-style-type: none"> ✓ Public works. 	<ul style="list-style-type: none"> ✓ Public works. ✓ Toll road project system (DBTO method). ✓ Partial application of billing (High-occupancy toll lane (HOT lane)). 	<ul style="list-style-type: none"> ✓ Expressway was constructed as public works by the state governments. ✓ Recently, a toll road project by PPP scheme (e.g. DBTO method) is adopted for new construction project in certain States. ✓ O&M by the private consignment was started by the method where the public sector takes the revenue risk: Lease method, Availability payment method, Active management payment method: This method sets multiple indicators for service standards for infrastructure operation 	No tolled (Some sections are tolled).

	Expressway Development Method		Major characteristic	Remarks
	At beginning time	At present time		
			to decide the payment amount through complex multiple evaluations	
U.K.	Public works	Public works Application of billing (Heavy vehicle) *In 90'~00'', Concession system was applied under the PFI law, but it was suspended.	<ul style="list-style-type: none"> ✓ Expressway was constructed as public works by the central government. ✓ Concession system such as DBTO method under PFI law was adopted to accelerate the construction of the toll expressway. ✓ PPP system such as the shadow toll method, the availability payment method were implemented. ✓ But the Government decided to stop a new PFI project in 2018. Several reasons have been pointed out. The most significant reason was that the PFI method was more costly than conventional public works. ✓ Highways England was established through the privatization of the Road Agency in 2015, and this government company plans, designs, builds, operates and maintains England's motorways, 	No tolled (Some sections are tolled).
France	Toll road project system (Semi-Public Semi-private Corporation) Public works	Toll road project system (Private company: Privatization of public corporation). Public works by the government. Application of billing (Heavy vehicle)	<ul style="list-style-type: none"> ✓ SEMCA, Semi-Public Semi-private Corporation was established in 1950s-1960s and developed expressways network by toll road project system. Later, the organization for the construction and operation of the expressway changed form. Concession law was adopted and Expressway agency was established to coordinate the cross-subsidization (the toll pool system) between routes of expressways. ✓ In 1993, European Union directive (93/37/CEE) was promulgated to abolish the toll pool system in principal. In 1998, construction of major expressway route was almost completed. Under the situation above, the toll pool system was abolished, and public bidding was required for construction of new sections in 1993 based on the EU directive, and new operation companies were established for each expressway. the contract period of concession was lengthened (generally 60-70 years) ✓ In 2006, SEMCA was completely privatized to reduce the government's fiscal expenditure. 	Tolled (80% of total network) No tolled (20% of total network) * Heavy vehicle is tolled.

	Expressway Development Method		Major characteristic	Remarks
	At beginning time	At present time		
Germany	Public works	Public works by the government. Toll road project system (Application of PPP method)	<ul style="list-style-type: none"> ✓ Expressway in Germany known as Autobahn which is non-tolled expressway, was developed as pure public works based on the fund from fuel tax and was basically free until 1995. ✓ Due to EU policy that aim to make fair sharing of the cost of road construction and maintenance and to devise financial resources for transportation infrastructure development, heavy trucks with more than 12 ton had been charged since 1995 by Viniette billing method. From 2005, GPS-based closed toll system has been applied for heavy truck using Autobahn. The scope of the charge has been expanded to trucks over 7.5 tons from 2015, and to all federal roads since 2018. ✓ The development of expressway by PPP system: the availability payment method was partially applied. ✓ With the establishment of the Road Corporation in 2017, all expressways were managed by the government. 	No tolled (Only heavy vehicle is tolled, Viniette billing for passenger cars).
China	Toll road project system (Public corporation)	Toll road project system (Application of PPP method) *Consideration of application of public works method.	<ul style="list-style-type: none"> ✓ Expressway in China was developed as toll expressway project. ✓ Expressway project is classified as both government initiative type and private initiative type. ✓ Private initiative type project applying TOT or BOT method, increased in the middle of 1990s. Full-cost recovery principle by each route was applied. Since more than 20 independent private expressway companies were established, the standardization of toll fee and application of pool system had been difficult. ✓ Fund of the government initiative project consists of toll revenue and tax such as car acquisition tax and fuel tax. 	Tolled.

	Expressway Development Method		Major characteristic	Remarks
	At beginning time	At present time		
South Korea	Toll road project system (Public corporation)	Toll road project system (Application of PPP method)	<ul style="list-style-type: none"> ✓ The Korea Expressway Corporation, a state-owned enterprise, has been responsible for the development of the expressway network. Since the 1990s, PPP scheme has been applied to promote new expressway construction and O&M by proactively utilizing private funds. PPP law was established in 1994 and the name has now been changed to the PPI Act: The Act on Private Participation in Infrastructure. ✓ For road development, BTO scheme has been applied. MRG: Minimum Reverse Guarantee had introduced to encourage active private sector investment since 1999. ✓ Since the application of the MRG system, the number of projects and the scale of projects have expanded. However, with the financial crisis in 2008 and the abolition of the MGR in 2009, the number of deals has declined. ✓ The application of the MRG has generated huge loss compensation for the government. This is because the setting of MRG standard was based on the estimates of private bidders who proposed excessive demand. ✓ Also, the incentive to increase the number of expressway users did not work. ✓ In 2015, BOT-rs and BTO-a, which are mechanisms for sharing project risks between the public and private sectors, were introduced in order to stimulate the PPI market. 	Tolled.
India	Toll road project system (BOT)	EPC method Hybrid Annuity Model BOT method	<ul style="list-style-type: none"> ✓ With the initiative of NHAI, the expressway network has rapidly developed applying BOT method with VGF (Viability Gap Funding). ✓ The pace of implementation of the project dropped sharply due to the increasing unprofitable projects in 2012. ✓ The government then changed the policy of expressway project implementation from application of BOT scheme to application of EPC scheme. HAM was adopted since 2016: Hybrid Annuity Model that reduces the burden of securing funds for road operators compared to the existing BOT method. 	Mixed tolled section and No tolled.



Source: Ministry of Land, Infrastructure, Transport and Tourism, 2011

Figure 19.2-1 Development Status of Arterial High-standard Highway by Cost Burden Sharing

As is described in 1) and 2), tolled and non-tolled expressways as well as expressways financed by government fund and private sectors' fund coexist in a country. PPP-based expressway development scheme such as the BOT method seems to be effective in sections with low traffic demand risk and high profitability such as those in metropolitan areas. Otherwise, government fund or support should be considered.

In order to efficiently expand the expressway network nationwide, one of the three methods is required:

- Cross subsidization by toll pool system;
- Development by the public works funded by the national budget;
- Risk-sharing method of demand risk (Toll revenue risk) between the public sector and the private sector through PPP including a method like Viability Gap Funding

Cross-subsidization Mechanism by the toll pool system: unified financial system

This system is applied in Japan and other countries in order to promote toll road network development. It is needed to establish an organization that centrally takes charge of planning, construction, and operation and maintenance work like Japan Highway Corporation in Japan or the Korea Expressway Corporation in South Korea. Another example is the case in France, wherein the French government introduced a cross-subsidization mechanism by establishing a new organization to coordinate profits among existing private companies.

Public works method based on the national budget funded by tax revenues:

Expressway is constructed as direct public works by the Government in this scheme. Some countries such as USA and Japan introduce dedicated fund system for road development, of which sources come from vehicle related taxes such as fuel tax, tonnage tax and vehicle acquisition tax, to secure ample and stable budget.

Risk-sharing method of demand risk (Toll revenue risk) between the public sector and the private sector through PPP:

The scheme of risk-sharing of toll revenue risk by the Government has to be established to promote the development of an inter-regional expressway with no significant traffic demand.

The following schemes can be considered:

-Financing method funded by government loans and taxes such as Viability Gap Funding (VGF),

Minimum revenue guarantee where government undertake some portion of traffic demand risk of PPP concessionaire,

-Investment recovery methods such as Availability Payment (AP),

-Application of method combining VGF and AP such as Indian hybrid annuity method.

19.2.2 Presentation of Development Scheme in Other Countries

In this section, several development schemes or a new approach to the construction of high standard highway in Japan, which was requested during the C/P meeting, are introduced that will be useful in promoting the development of high standard roads in the Philippines in the future. Since the scheme based on BOT or VGF has already been applied in Philippines, these are not mentioned here.

(1) Toll Pool system: Cross-subsidization mechanism, Practice in Japan

The toll pool system is a method of applying a cross-subsidization mechanism in the wide area toll expressway network. The toll pool system is enabled to construct a low profitability expressway route such as an expressway route with tunnel section or low traffic demand.

In Japan, as initially conceived, toll rates were set individually for each route by route so as to redeem the full costs of each individual route. However, in 1972 the Japanese Government adopted a toll revenue pooling system for the entire national expressway system based on the recommendation of the Road Council.

Recommendation of Road Council in 1972

Expressways should be an arterial traffic network, connected to each other across the country. Each link is not necessarily consider,

Under the circumstance with development costs being affected largely by fluctuation of land prices and construction costs, cost differentiation due to project start time should be avoided. In addition, debt repayment should be carried out smoothly.

This system has been applied in order to speeding up the development of expressways in rural areas and in order to ensure fairness in expressway tolls in Japan. In fact, this system has contributed greatly to the development of the national expressway network.

On the other hand, there were criticisms about this cross-subsidization system, namely toll rate escalation, prolonged toll collection period, easy construction of law profitable routes and uncertainty of redemption debt owned by Japan Highway public corporations in 1980s. Therefore, as a discipline of cross subsidization, the basic condition has been set, where viability of a certain expressway route is admitted if toll revenue of the route recovers more than 50% of its construction and maintenance cost in 1985.

Along with reform of public financing scheme so called “Fiscal Investments and Loans Program”, in 2005, public expressway corporations were privatized and the Japan Expressway Holding and Debt Repayment Agency (JHA) was established. Under the reform, debt and asset of the expressway corporations have been transferred to JHA, the expressway corporations are to pay lease fees to JHA, and related financial information is to be disclosed. JHA is responsible for debt repayment in reliable and swift manner by utilizing lease fee. After the reform, the pooling system has been basically maintained and reinforced.

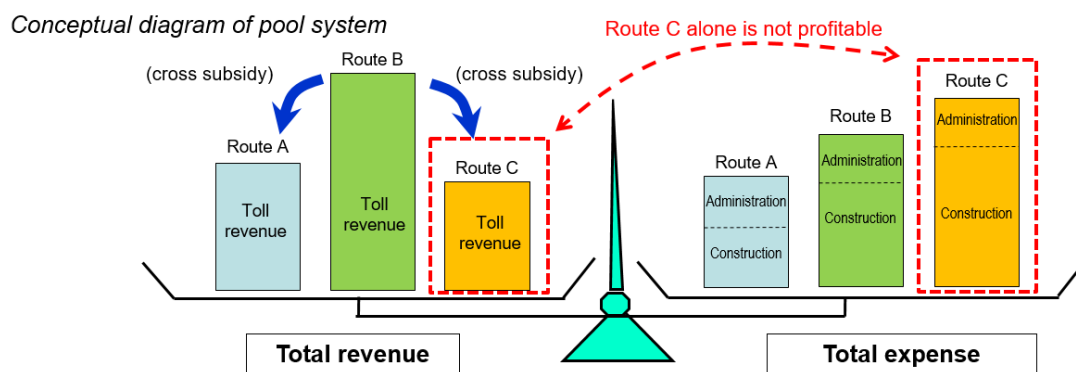


Figure 19.2-2 Conceptual Diagram of Pool System in Japan

(2) Land Value Capture: Interchange development scheme by developers, Practice in Japan)

In Japan, the application of the land value capture scheme in transport infrastructure is developed in railway development. In the context of the expressway development, the Development Interchange System was applied in the 1980s.

The development interchange system on expressway in Japan is a system whereby a third sector company set up by a local municipality and private firms bear funds and commission the Japan highway public corporation to build an interchange (IC) on an expressway.

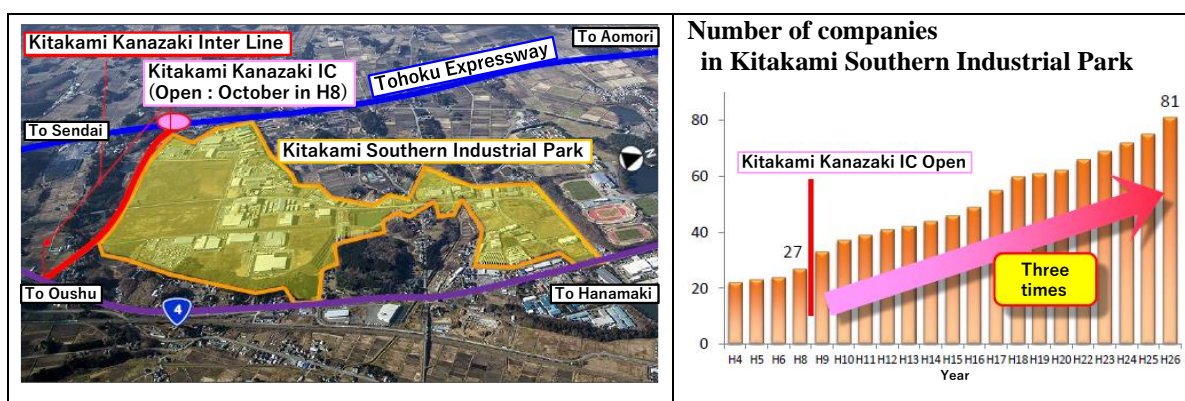
Basically, an interchange was developed by Japan highway public corporation as part of an expressway. This system like PPP scheme allows for local community and private sector company to construct an additional interchange that contributes to promote development of surrounding area such as urban development and industrial park development.

Interchange (IC) development by the private developers of urban development projects and the developers of industrial park development projects promote transportation network development around an IC area and the surrounding environs and contribute to regional development. As a result of area development, the land price around the IC area is increased. The development in turn increases the land price and added value to the developed area.

Around 47.5% of the project funds to construct the interchange was to be borne by the third sector company. The remaining 52.5% was to be funded by the government interest-free loans and redeemed in 20 years from the profits of the surrounding development.

. The 29 interchange was realized by this scheme.

By using the interchange development scheme, it created 2,000 jobs for Japan Post Co., Ltd. and 800 jobs for the food industry within the Kitakami Kanazaki IC.



Source of Photo and Figure: Department of Prefectural Land Development

(https://www.pref.iwate.jp/_res/projects/default_project/_page_/001/009/547/iwate_stock.pdf)

Figure 19.2-3 Example in Japan (Kitakami Kanegasaki Inter change)

(3) Availability Payments

Availability payments are a method of compensating a private concessionaire for its responsibility to design, construct, operate, and/or maintain infrastructures for a set period of time.

These payments are made by a public project sponsor based on particular project milestones or facility performance standards.

Project milestones can refer to the completion of the facility itself by a certain deadline, while performance standards can be measured operationally.

Examples in case of highway include lane closures for maintenance purposes, incident management, or snow removal. Level-of-service performance could also be used as the primary payment metric for availability payment concessions involving the implementation of express toll lanes.

Availability payments are often used for toll facilities that are not expected to generate adequate revenues to pay for their own construction and operation. In this case the project sponsor retains the underlying revenue risk associated with the toll facility rather than the private partner.

Availability payments can also be used for projects without tolls, as the mechanism still presents an attractive means to engage a private sector partner who will take on project risk,

such as construction, operations, and upfront financing, and then compensate the concessionaire on an established, performance-based schedule.

The desire to avoid encouraging traffic to use non-toll alternative routes may also make an availability payment project without tolls a preferred option.

A project financed with availability payments also presents less overall risk to the private entity than with a full concession. Rather than relying on achieving certain levels of traffic and revenue, the concessionaire receives a predictable, fixed set of payments over the life of the agreement. The concessionaire also can rely on the public agency's credit to secure financing rather than unpredictable toll revenue. Private financings involving availability payment concessions could include private equity, taxable debt, governmental credit assistance, and private activity bonds. The question of who sets the toll rates is also eliminated under an availability payment arrangement, making concessions with private companies more politically palatable.

Availability payments may be structured in a variety of ways. In certain cases, no payments may be made until after construction is complete. Alternatively, they may be predicated on particular construction milestones. Project sponsors may also define how the periodic payments are to be made and may also set a maximum payment cap based on agreed-to operating and maintenance performance standards.

The federal highway administration in USA mentioned advantages of the availability payment as followings:

The government can choose to make regular, scheduled payments to the concessionaire over the term of the PPP agreement, virtually eliminating the revenue risk that often poses the greatest hurdle to attracting project investors.

The government compensate the concessionaire based on performance, as measured by delivery date, incident response, state of good repair, etc.

Although larger payments may be scheduled in the early years, the long-term availability payment concession relieves much of the State's need for upfront capital.

The availability payment schedule locks in the maximum public costs (and private revenues) over the project's lifespan.

An availability payment concession model will spur innovation because the concessionaire will realize increased profits when it costs less to deliver a consistent level of performance.

(4) Hybrid Annuity Model

Hybrid Annuity Model (HAM) is one of the new PPP scheme for the road sector in India which started sometime in 2016 (Circular: No.NH-24028/14/2014-H Vol-II).

This model is a scheme that combines VGF during the construction phase with annuity payments during the operation and maintenance phase and is a scheme in which the government bears more risk than in conventional toll-based BOT schemes. VGF is a government support in the form of contribution of some of the construction cost, given in cash to a PPP project that do not a financial feasibility. Annuity payment model is one of PPP model like an Availability payment used in UK for OM of facility.

In the HAM in India, a substantial percentage of the project's cost, which is cash construction support of 40% of Bid project cost based on the circular in 2016 is paid at settled milestones during the construction period, while the balance of payments and maintenance payments would be paid proportionately over a period of 7-15 years (average operation period of 15 years is considered in India) post construction.

It is like an EPC (engineering, procurement, and construction) contract, but only about 40% of the milestone payments are being made during construction. This is to further reduce the revenue risk to the private sector, while keeping the design, implementation, and maintenance

risk transfer at significant levels. The balance of deferred construction payments, maintenance payments, and stipulated interest on capital investment would be paid in proportionate 6-monthly (annuity) payments over a period of 7-15 years post construction. The option to toll the roads was not treated as a direct revenue but attributed to about 10% of project cost. The basic principles of the HAM contract document are as follows:

- a) Design and construction risks are entirely passed on to concessionaire.
- b) Milestone payments are made, which the concessionaire only gets the part of capital cost incurred until that point;
- c) In case of delayed completion, there are liquidated damages for every day of delay. In addition, annuity revenues would also be delayed, and the concessionaire is effectively penalized. Conversely, on early completion, a bonus may be paid to the concessionaire and the annuity revenues can start faster; and,
- d) Balance of deferred capital payments, interest thereon, and O&M costs are paid as annuity (6-monthly) payments for a specific length of time subject to meeting performance metrics.

In HAM, the government of India and the road users have the following perceived benefits:

- a) The government keeps the deferred payment capital expenditure as “off balance sheet”. The deferred capital expenditure, plus interest, is paid back to the private sector by way of annuity payments over several years but is not directly booked as government borrowings.
- b) Timely project completion and on budget. This is because the private sector has an incentive to complete and start annuity revenues and contractual incentives.
- c) Best asset quality. Since the HAM contractor bears a risk for 7-10 years post construction, it is expected that the asset design and construction would be of higher quality. Premature deterioration is also minimized given the seamless arrangement from construction to maintenance, as can be observed in many roads under the traditional build, transfer, and maintenance scheme.
- d) A higher asset quality with HAM contractual provisions for performance-based maintenance for 7-10 years translates to a higher service levels for road users. Unlike a routine construction contract, where subsequent annual budgetary provisions and separate contracts are required for maintenance, the provisions of the HAM contract ensure fund flows related to maintenance obligations.

(5) Stage Construction Scheme: Practice in Japan

The stage construction scheme has been adapted often to reduce initial construction cost of relatively low traffic demand segments in construction of expressway Japan. It's called temporary two-lane expressway development.

When planning and designing a high standard highway, it is necessary to adopt a road structure that is appropriate with the local conditions. A high standard highway is an expressway that is necessary to provide a high-speed traffic service with a high standard highway structure depending on the importance of the route, necessary traffic functions must be provided that is adaptable to the local conditions.

(Road structures that provide high speed of service)

On roads that have high traffic demand and are particularly important to our country's economic activity, adopt a road structure with high standards based on the importance of the route to provide higher service speed and reliability.

(Road structure with low traffic volume)

To construct the road efficiently when expanding to 4-lane road in stages, a temporary two-lane road structure will be adopted in order to ensure safety and smooth flow of the current traffic demand while anticipating the future demand.

Also, in order to efficiently construct the temporary two-lane roads, at grade intersection structure or other methods can be adopted.

(Road structure for low traffic volumes on intersecting roads, etc.)

On high standard highways, access is normally fully restricted, but may also be partially restricted if the nature of the route and motor vehicle traffic conditions dictate that traffic on the intersecting roadway is low or if the topography of the roadway makes it unavoidable.

(Road structure for short trip traffic)

On roads that serve the function of short-trip traffic such as intra-city movement, it is desirable to shorten the interchange intervals to suit the characteristics of the road usage, like shortening the interchange intervals. In selecting routes, consideration should be given to ease of use, such as making sure that routes are not too far from the urban area.

In Japan, around 36% of total length of HSH is developed by temporary two-lane road.

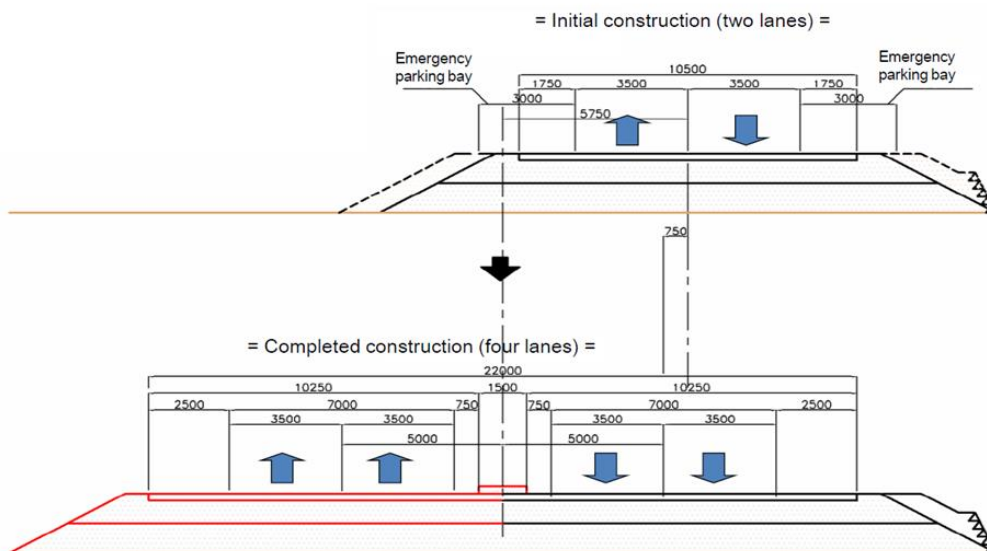
Table 19.2-2 Length of Temporary Two-lane HSH in Japan

	Total length of High Standard Highway	
		Temporary Two lane road
Total	11315 km	4112 km (36%)
Toll road	9322 km	2538 km (27%)
Non -Toll road	1993 km	1574 km (79%)

(The structure of temporary two-lane road)

Two-lane roads on high standard highways will adopt the following road structure as necessary to ensure that traffic functions are available to meet traffic demand and future operations.

The cross-sectional configuration of a temporary two-lane road can be constructed non-separately on one side of the finished cross section or at the center, etc., and then segmented for round-trip traffic with a lane divider such as a rubber ball or a broad roadway median, etc., as shown in the figure below.



Source: MLIT Ministry of Land, Infrastructure, Transport and Tourism, Japan

Figure 19.2-4 Concept of Stage Construction of Earthwork

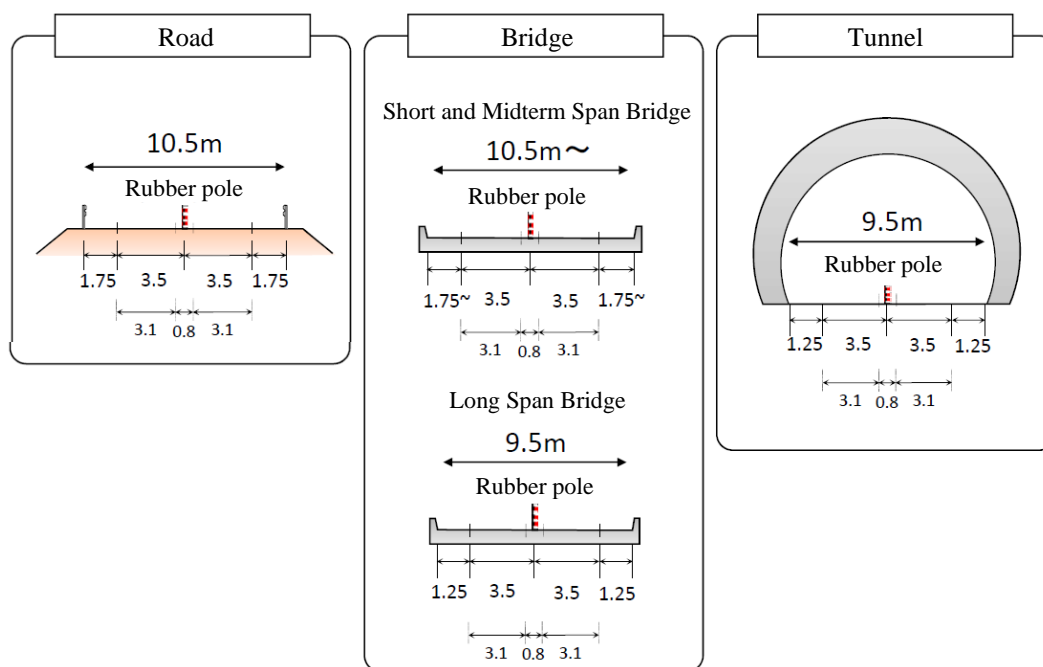
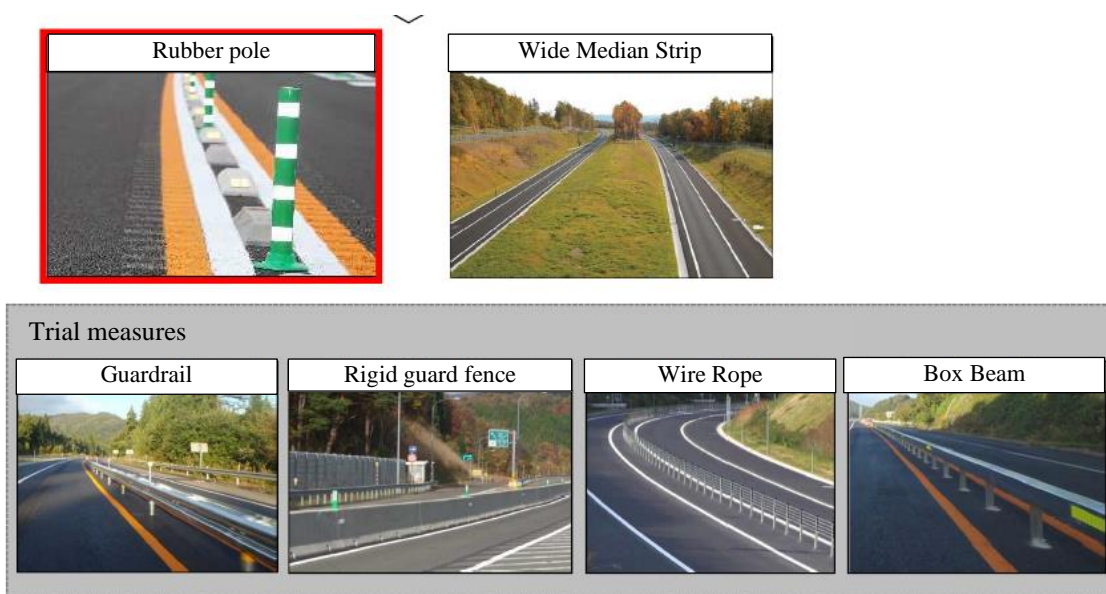


Figure 19.2-5 Standard Cross Section of Temporary Two-Lane



Source: MLIT Ministry of Land, Infrastructure, Transport and Tourism, Japan

Figure 19.2-6 Example of Structure of median strip

(Issue of Temporary Two-Lane Road Structure)

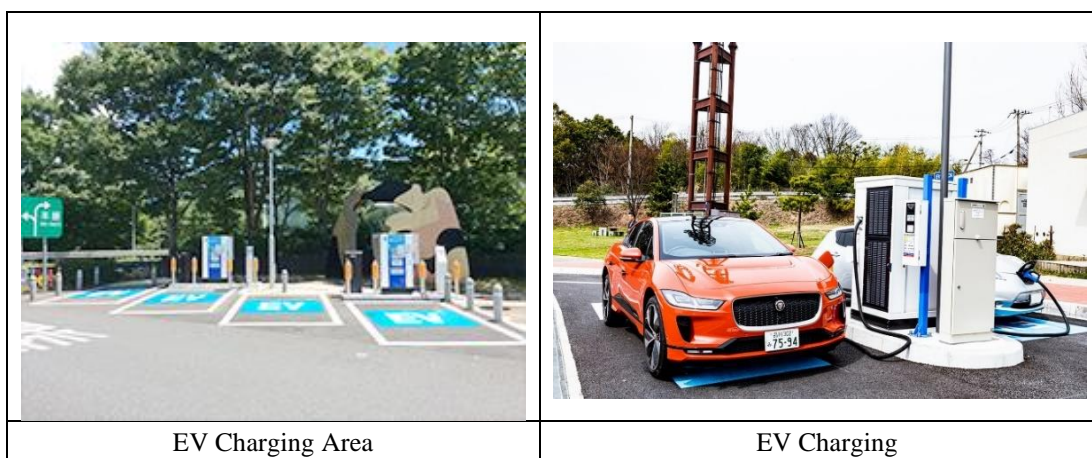
1. Runnability of two-way traffic:
 - Comparing with HSH more than 4 lanes, the speed limit is lower.
 - The speed limit is lower compared to HSH roads with more than 4 lanes. All vehicles should maintain lower speed as it is not possible to overtake in a two-lane road.
2. Safety and reliability of face-to-face traffic:

- The provisional two-lane section is a two-way traffic and is prone to serious vehicular accidents.

(6) Provision of Electric Vehicle (EV) Facilities

Utilization for EV is gradually increasing in developed countries (currently about 1% in Japan and 10% in Europe). For the convenience of EV users, high standard highway in Japan is providing electricity charging facilities for quick recharging at existing parking spaces in Service Areas (SAs) and Parking Areas (PAs).

At present, use of EV is not yet widespread in the Philippines and it may take some time to increase its use. Although it is not yet necessary to consider the installation of charging equipment in the design of SA and PA in high standard highways, it will be essential to consider the development of charging facilities to cope with the future use of EV. Since the possibility of EV usage in the Philippines may increase, it is recommended to consider provision of areas to install charging facilities in the parking spaces of the SA and PA.



Source: NEXCO Central

Figure 19.2-7 Example of EV Charging Facility

(7) Additional Functions of High Standard Highway

High Standard Highway does not only provide traffic conveyance function but also offer additional functions such as disaster prevention and green infrastructure features. Examples of Japan’s case for high standard highway functions will be introduced here. However, it is recommended that the design and construction of high standard highway in the Philippines likewise consider multiple functions. Thus, these functions are very effective in natural disaster countermeasures and should be incorporated in the design and construction stages in the future F/S.

<Disaster Prevention Function>

Items	Function
Expressway with sufficient road width and wide road ROW	Wider road width (more than 12m) provides buffer area that can prevent spread of fire in urban areas. Wider road width can secure passage of emergency vehicle in case of occurrence of slope failure and prevent total closure of the road.
SAs/PAs and Plazas with wide open spaces at Expressway	SAs/PAs can be utilized as disaster base for restoration and refuge place after large earthquakes and flood during typhoon. In Japan, emergency evacuation space is installed at high embankment section of the expressway for Flood/Tsunami evacuation.

<p><i>Source: MLIT, Han - Shin Awaji Earthquake disaster</i> Experience of Fire Spread Prevention during Han-Shin Awaji Earthquake Disaster</p>	<p><i>Source: Ibaraki Prefectural Government</i> Use of SAs/PAs as disaster restoration base for the Japanese Self-Defense Forces and Fire Department</p>
<p><i>Source: MLIT</i> Wider road secures passage during disaster</p>	<p><i>Source: Cabinet Secretariat</i> Emergency Evacuation Space on Elevated Expressway</p>

Figure 19.2-8 Example of Disaster Prevention Functions

<Green Infrastructure Function>

Items	Function
Provision of Roadside Vegetation/Roadside Greening	Protection for Slope Erosion, Harmonious Landscape, Noise Absorption and Prevention from Global Warming
Environment-Friendly Construction Method	Minimization of excavation impact area on green land using “Ring Beams Earth Retaining Method”
Greening of Existing Infrastructure	Provision of natural green space at existing JCT, SA and PA which prevents heat island phenomenon and enhance of tourism functions
Creation and Improvement of Biotope	Creation and/or improvement of natural green land for habitat of flora and fauna near expressway





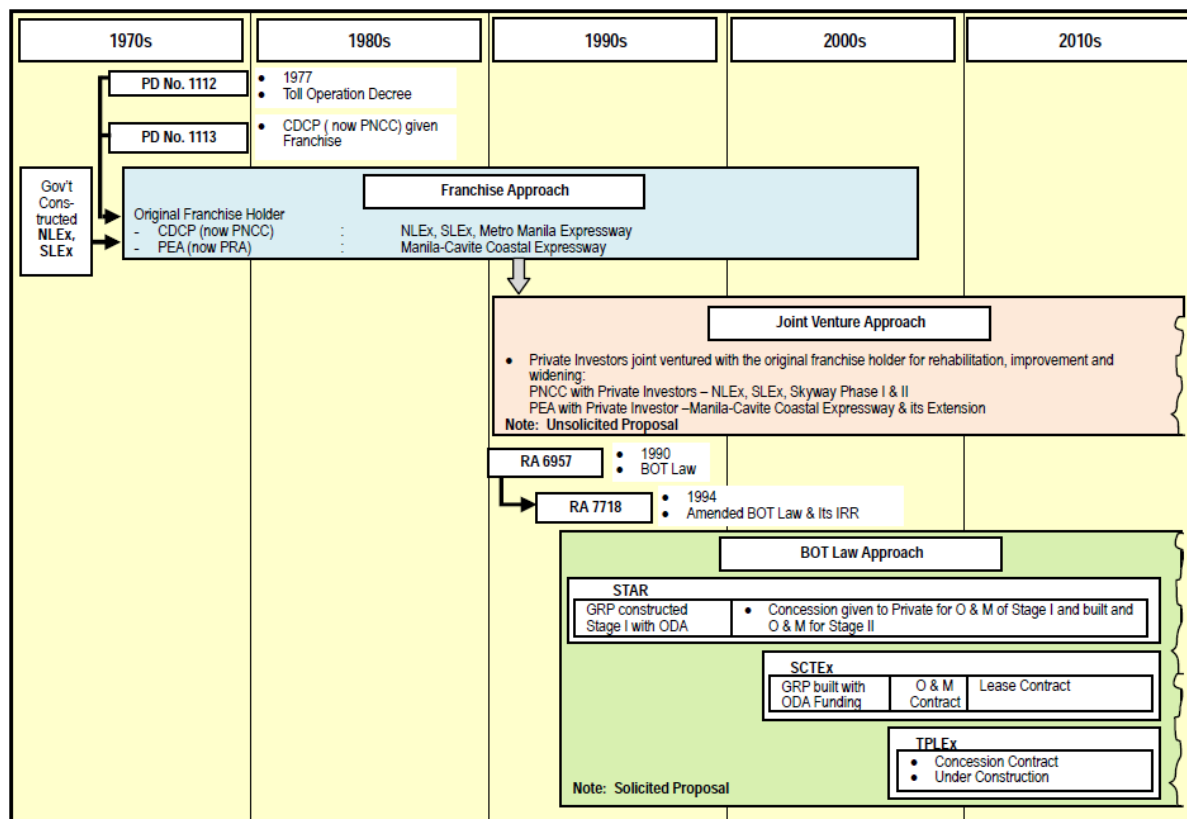
	
<i>Source: NEXCO</i>	<i>Source: MILT</i>
Greening of Expressway Slope/Roadside	Minimization of Excavation Impact Area by Ring Beam Earth Retaining Construction Method
	
<i>Source: MEX</i>	<i>Source: MEX</i>
Natural Green Space at JCT (Ohashi JCT in Japan)	Improvement of Biotope near Expressway

Figure 19.2-9 Example of Green Infrastructure Features

19.2.3 Conventional Development Scheme of Expressway Construction in the Philippines

(1) Development Scheme and Legal framework



Source: JICA "Preparatory Survey for Public-Private Partnership (PPP) Infrastructure Development Projects in the Republic of the Philippines" 2010

Figure 19.2-10 Historical Flow of Private Sector Participation in Expressway Services

Development scheme applied in Philippines is basically summarized in the table below.

Scheme No.1 is the traditional method based on the franchise system and JV system. Expressway in Metro Manila such as North Luzon Expressway (NLEX) and South Luzon Expressway (SLEX) had been realized by this scheme. Scheme No.2 is the scheme under the BOT law and its IRR that was established in the 1990's as successor law of P.D.1112 and P.D.1113.

Scheme No.3 and No.4 are schemes under the BOT law but the No.3 is the BOT scheme with VGF as a subsidy to the build stage. This scheme was applied for the Tarlac-Pangasinan-La Union Expressway (TPLEX) project. While the No.4 is a scheme where the project is conducted by segment, shared by both the public and private sectors. By having the public sector bear part of the construction cost, the demand risk on the private sector, which is the operator, is reduced. The No.4 scheme which is a Hybrid Scheme (BOT Law Scheme applying Segment Dividing), was applied on the Southern Tagalog Arterial Road (STAR) and Central Luzon Link Expressway (CLLEX) projects.

No. 5 is a hybrid scheme in which all construction stages are covered as public works. The form of operation stage is different between No.5-1 and No.5-2. Among them, No. 5-1 is operated by the private sector, but as a Real toll method, the private sector has a demand risk. This is the method applied in the maintenance of Subic-Clark-Tarlac Expressway (SCTEX).

On the other hand, in No. 5-2, the availability payment method is applied as a method of operation and maintenance. The demand risk is borne by the public side. The Availability Payment method is a mechanism shown in the BOT law, but it is a new method that has not yet been applied to highway maintenance projects. The legal framework of hybrid scheme is shown in the resolution No. 2019-07-02 (Suggested Guidelines on Managing Greenfield Solicited Hybrid PPP Projects). No.6 is pure public works scheme.

Table 19.2-3 Expressway Development Schemes in the Philippines (Development Scheme for HSH Class 1)

Characteristic of section	No.	Type of Scheme	Revenue Risk	Implementation agency			Existing Case
				ROW acquisition /Resettlement	Construction of Infrastructure	Operation and Maintenance	
<Toll Road> Expressways connected to the existing expressway implemented through Franchise Scheme	1	Franchise scheme	None	Public /Private	Private sector	Private sector	NLEx SLEx Skyway
		JV scheme	Private sector	Public Sector			
<Toll Road> New expressway	2	BOT law scheme (Solicited Projects)	Private sector	Public sector	Private sector	Private sector	NAIAx CALA MCX
<Toll Road> Expressway projects that are not that much profitable based on their own revenues	3	BOT law scheme (VGF application type)	Private sector	Public sector	Private Sector with fixed support fund from Government	Private sector	TPLEx
	4	Hybrid Scheme (BOT Law Scheme applying Segment Dividing)	Private sector	Public sector	Private and Public Sector	Private sector	STAR CLLEx
	5-1	Hybrid scheme	Private sector.	Public sector	Public sector	Private sector (Real toll method)	SCTEx
	5-2		Public sector			Private sector (Availability payment method)	No example
<Non-Toll Road>	6	Pure Public Work *Same scheme with National highways.	No revenue collection	Public sector	Public sector	Public Sector	National highway

*Hybrid scheme is shown in the resolution No. 2019-07-02 (Suggested Guidelines on Managing Greenfield Solicited Hybrid PPP Projects)

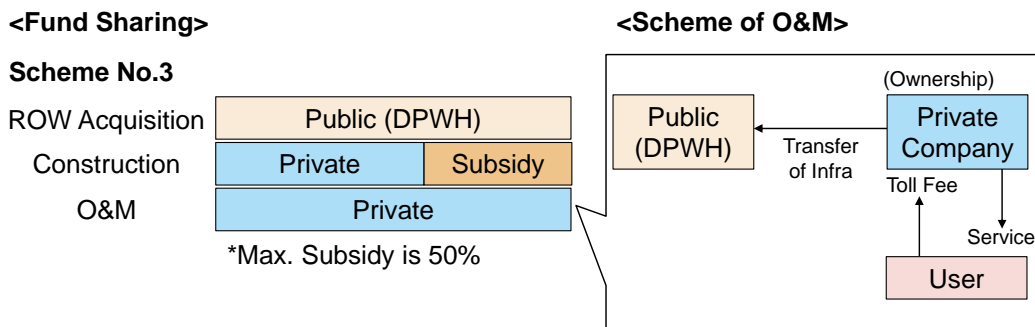


Figure 19.2-11 BOT scheme with VGF application type

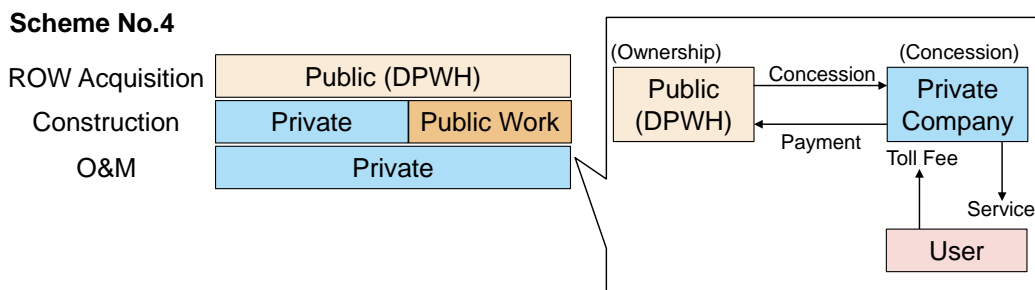


Figure 19.2-12 BOT scheme with Segment Dividing Type

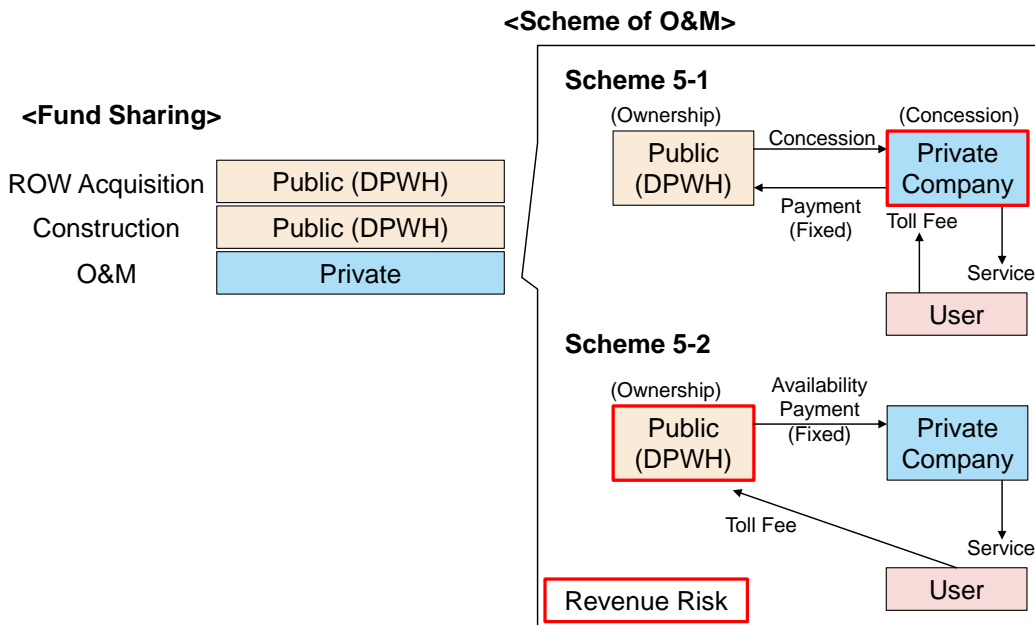


Figure 19.2-13 Hybrid Scheme of HSH development

(2) Organization

DPWH is the implementing agency of PPP road projects under the BOT law (R.A.7718). Expressway implemented by DPWH under the BOT law has been handled and monitored by PPP Service in accordance with the provisions of the respective concession agreements. The PPP Service is composed of three divisions, namely:

Project Development Division:

Prepare project proposal and other pertinent documents for project approval. The division also provides assistance in the preparation of bid documents for procurement of concessionaire and independent consultant.

Project Implementation and Supervision Division:

Monitor progress and implementation of projects to ensure that the parameter during bidding and the terms and conditions in the contract are adhered to.

Project Operation and Maintenance Management Division:

Form technical supervision over facility operation and maintenance (routine, periodic and preventive maintenance, rehabilitation, etc..) by the Concessionaire to check its compliance with contract.

(3) Example of Expressway Development

Under construction (Require to DPWH)

(4) Lessons learned from previous practices

Based on the above analysis of the current situation on expressway development in the Philippines, the following issues were pointed out:

The expressways in the Philippines were developed mainly as a private funding project under the PD1112, PD1113 for the franchise system, JV system and BOT law (RA7718) for BOT projects. Expressways by the scheme No.1 was developed under the PD1112 and PD1113. The expressway by the scheme No. 2, 3 and 4 is implemented under the BOT law, RA7718. The BOT law is also the basis for Scheme 5-1 where the private company carries out the O&M only as a concessionaire.

The main mandate of DPWH is to undertake the planning of infrastructures, such as national road and bridges, and to design, construct, and maintain these infrastructures. However, there is no existing guidelines wherein DPWH could operate a toll road on its own to generate revenue except for a minimal cost for maintenance purposes only.

Basically, there is no legal system that guarantees the public sector directly to collect toll from toll road for redeeming the expressway construction cost.

Traditionally, the expressway development of solicited projects was handled and monitored by PPP Service in DPWH under the BOT law. While the unsolicited projects of expressway have been implemented by Toll Regulatory Board (TRB) under the Department of Transportation (DOTr) through a STOA: Supplemental Toll Operation Agreement. In the Philippines, there are expressways under the jurisdiction of different departments: DPWH or DOTr.

The legal system has not been established that guarantees highway and expressway development plan (For example, the expressway construction act shows the description of expressway plan in Japan). Individual project proceeded individually under the BOT law.

Traditionally, the construction of expressway has relied on private funding due to the lack of state funding. As a result, DPWH's experience in proactively implementing the construction of expressway is limited. Relying on private funds for development does not increase the speed of development of regional expressway.

There is no framework for returning the profits of existing profitable expressways to other expressway development.

As a tool to promote expressway development, installation of new method may be required such as the Availability Payment method, Land value capture mechanism and Toll pool system.

In order to certainly promote expressway development along HSH development master plan that shows medium-long term planning, the lead organization and legal procedures need to be centralized. The legal system will need to be restructured for this purpose.

The private funding expressway projects can be promoted under the development scheme of the BOT law from now on. Some projects presented in the HSH Development Master Plan will be handled by DPWH as a solicited project. But on the other hand, the unsolicited projects would be led by TRB. There will be two types of projects.

We learned that the DOTr had also indicated its intention to promote the development of the solicited project type expressway. Under the charter of the TRB it is authorized to enter into contracts on behalf of the government with qualified entities for the construction, operation and maintenance of toll facilities. Hence, the future delineation of roles and functions of DPWH and TRB in highway development needs to be sorted out.

Future high standard highway development should be led by DPWH, which has highway planning, design, and construction as its mandate. In other words, all road network including expressways (except local roads) should be made part of the planning system of the DPWH.

The organization needs to be strengthened to promote public funded expressway projects, which are expected to increase in number of public funded projects in the future.

Most importantly, the capacity of PPPS will be strengthened to promote the development of highways through the existing scheme. In the medium and long term, the establishment of a new organization will be considered.

19.2.4 Proposal of Development Scheme for HSH in the Philippines

(1) Establishment of Specific Legal System to Promote HSH Development

<Major Issues>

The introduction of a mechanism to secure consistency, reliability, and sustainability is required in the implementation of the High Standard Highway Development Plan.

Due to limited funding resources, the proposed projects of HSH are being implemented through PPP with the assistance of the private sector. In the future, HSH development will be extended on regional areas where abundant demand for transportation is not expected like in Metro Manila. Therefore, it is necessary to promote the development of HSH not only by private sector investment but also by applying a development scheme in which the public sector shares the demand risk.

<Possible Measures>

It is suggested that the establishment of a legal system to guarantee the planned promotion of HSH development master plan should be considered. Specifically, the enactment of a law or executive order that stipulates the following items should be considered for HSH Class-1 development: the planned routes and major transit cities, the timing and scheme of public notification of the specific route, number of lanes, design speed, and organization of implementation for each section to be developed.

In addition, it is necessary to consider a legal system that allows public authorities to plan, construct, operate and maintain toll road projects, especially to legally position the DPWH or its delegate to be able to collect tolls.

The introduction of a mechanism to promote the development of HSH networks in regional areas by using public investment is proposed by applying BOT schemes using VGfFs, hybrid

schemes which was shown in the resolution No. 2019-07-02 (Suggested Guidelines on Managing Greenfield Solicited Hybrid PPP Projects), or public works methods.

(2) Strengthening the implementing organization for HSH development

<Major Issues>

In order to systematically promote the development of HSH, it is necessary to unify the organizations that lead the Master Plan.

Due to limited funding resources, the proposed projects of HSH is being implemented through PPP with the assistance of the private sector. In the future, the budget for HSH should be secured more to promote the HSH development Master Plan. Increasing the available amount of public fund for HSH projects is expected to the development of inter-regional HSH network by applying the public initiative scheme such as BOT scheme with VGF or Hybrid scheme and not totally rely to BOT scheme. Fast development of HSH Class 1 would require more than 100km per year until 2040.

<Possible Measures>

The function of PPP Service in DPWH should be strengthened to meet the increasing number of HSH projects and the highly technical capacity needs in implementing PPP projects. Especially, strengthening the functions corresponding to the increase of HSH project by public funding development schemes should be undertaken immediately. The legal system and efficient administrative procedure and workflow for working on public initiated HSH projects should be worked out.

Strengthening implementation capacity of DPWH (Planning, Budgeting, O&M, Regulation of PPP projects).

Improving the examination capabilities for revenue risks in the PPP scheme project. Appropriate revenue risk sharing between the Public and Private sectors.

Creating a mechanism to support a new PPP scheme (Availability Payment method) or a new system to support a project such as the land value capture system.

In medium and long term, the establishment of a special public corporation is recommended as an implementation organization of HSH development that would be centrally in charge of the planning, construction and O&M.

(3) Securing Budget System for Efficient Promotion of HSH Development

<Major Issues>

As the number of HSH project by public initiative and public subsidy increases, the increase of DPWH's budget for HSH Class 1 project must be directly proportional. It is important to ascertain a secure budget for the promotion of HSH development.

The toll revenue share of the government from the existing toll expressway is not directly used by the implementing agency, but it is remitted to the Bureau of Treasury and will be included in the national budget.

When the public funding toll road project is realized using the development scheme: Hybrid scheme (No.5-2), DPWH have to manage the toll collection and income generation.

<Possible Measures>

There is a need for a mechanism to repatriate profits from the existing toll roads that are almost profitable by franchise contract or JV contract for the expressway extension projects and new construction of regional HSH.

Establishment of special budget for HSH development in DPWH and formulation of 5-year investment plan of HSH development to clarify the amount of investment for this.

Establishment of mechanism to promote investment from private sector for HSH development.

Something more practical proposal is required.

(4) Application of Stage Construction for early network formation

<Major Issues>

The development of high standard highway requires a large amount of initial cost for construction, and it takes a lot of time to put them into service.

Ideas are needed to increase the speed of development and form an early HSH nationwide network as much as possible.

The early formation of a nationwide HSH network will strengthen connectivity of regions and lead to the promotion of development in regional areas in the Philippines and will be effective in suppressing the overconcentration in Metro Manila and encourage the development of regional areas.

<Possible Measures>

Stage construction: approach of temporary two-lane road construction like case in Japan is an idea to initial cost reduction and for formation of early HSH network. Initial cost of construction would be cut in around 60~80% depending on type of road.

In the addition, majority of PPP market players in the Philippines are generally very concerned of interface risks (Risks that existing structures and performance thereof are inadequate to support new improvements / expansions).

In future business case / feasibility studies for toll road projects considering arrangements such as “segment dividing”, and “stage construction” should be looked closely on the impact of interface risks.

Likewise, proper assessment of interface risks is critical in estimating possible contingent liability to be carried by public sector.

Other risks that needs to be assessed in the business case / feasibility studies for toll road projects considering arrangements such as “segment dividing”, and “stage construction”:

- Interconnectivity Risk
- Inter-Operability Risk
- Demand risk
- Operation and Maintenance risk

PART H

RECOMMENDATIONS

CHAPTER 20

RECOMMENDATIONS

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RECOMMENDATIONS

20.1 Authorization of the Master Plan

The Master Plan for nationwide High Standard Highway Network Development was prepared under this Study. To realize the proposed projects in the Master Plan, the first step is for the Philippine Government to adopt the Master Plan as the agency's plan which would allow NEDA to integrate it in the National Development Plan. Huge investment is required to realize the Master Plan. Hence firm commitment must be obtained from the concerned government agencies coupled with strong political will to realize the Master Plan.

20.2 DPWH Budget Increase

The proposed Master Plan generally involves the development of inter-city highway and construction of most of the projects will fall under the DPWH hence there is a need to increase further the agency's budget corresponding to the required investment cost.

It is estimated that the Master Plan requires an investment of PhP 394 Billion by 2025, PhP 323 Billion between 2026 and 2030, PhP 543 Billion between 2031 and 2040 or a total of PhP 1,262 Billion (at 2020 prices). Huge investment is needed to form an efficient transport backbone axes that would contribute to strengthen national integration, universal development of the country, mitigate serious traffic congestion and improve the country's global competitiveness.

20.3 Strong DPWH's Initiative to Be Exercised

Through the strong initiative of the DPWH, most of the projects proposed in the earlier Master Plan (2010 High Standard Highway Masterplan) were realized which gave the agency substantial experience in implementing large-scale expressway projects. Some of the projects in the 2010 Master Plan were implemented through Public-Private Partnership (PPP) scheme which includes the Muntinlupa-Cavite Expressway, NAIA Expressway Phase II, Cavite-Laguna Expressway, NLEx-SLEx Connector Road, Central Luzon Link Expressway Phase I among others.

DPWH should continue to tap participation of the private sector by pursuing PPP implementation mode for the Proposed Priority Projects for PPP identified in the Master Plan. Equally important is for the DPWH to create a firm implementation schedule. As a first step, DPWH should allocate an annual budget for the preparation of business case/detailed feasibility study. The tasks above require further organizational strengthening of the DPWH. Similarly, DPWH should be authorized as "a single-entry point of PPP projects". All road project proposals by the private sector should be firstly submitted to DPWH. This should be clearly specified in the proposed amendment of the Implementing Rules and Regulations (IRR) of the BOT Law.

Although the Toll Regulatory Board (TRB) is currently under the Department of Transportation (DOTr), its function is strongly related with the activities of the DPWH. TRB has a function to supervise, monitor and regulate the construction, operation, and maintenance of toll facilities as well as the rates that may be charged. TRB should be under the DPWH instead of DOTr in order to harmonize development and maintenance of expressways.

20.4 PPP Project Promotion

Most of the proposed projects in Metro Manila and the surrounding areas (Mega Manila) will be implemented under the Public-Private Partnership (PPP) scheme. Similar with the 2010 Master Plan where most of the identified projects in Metro Manila and surrounding areas were implemented by the private sector, DPWH should continue this approach in this 2021 Master Plan. In order to identify the appropriate PPP arrangement for a particular project, detailed feasibility study should be undertaken. The detailed F/S should cover profitability estimate,

appropriate risk sharing, and documents preparation to obtain necessary clearances from related agencies and LGUs, and ROW acquisition plans for an early start of the ROW acquisition. It is recommended to undertake the following studies:

- Business Case Study to define which PPP modality best fits to the project, including risk sharing.
- Detailed Feasibility Study through which all necessary clearances such as ECC, LGU endorsements, necessary documents required for NEDA approval, ROW acquisition plan to start ROW acquisition among others should be prepared.

20.5 Implementation of F/S Projects

Four (4) projects were subjected for Pre-Feasibility Study under this Master Plan study. These four projects were selected considering the applicability of advanced construction technologies and materials. Such required advanced construction technologies may include construction of long span steel bridge, mountain bridge with high pier, mountain tunnel among others. The four projects are found to be economically viable and further discuss below.

20.5.1 Central Mindanao Highway (CDO – Malaybalay Section)

The Central Mindanao Highway (CMH) which connects two (2) Metropolitan Centers (Cagayan de Oro City and Davao City) for a total length of 208km is proposed as an important corridor in Mindanao. The Cagayan de Oro (CDO) - Malaybalay Section of CMH is a high priority section. Aside from addressing the difficult traffic movement at the steep slope section of Sayre Highway, the CDO-Malaybalay Section is envisioned as primary axis to connect the various large plantations to Mindanao Container Terminal (MCT). Improved truck access to MCT will increase port traffic that would boost the local economy and subsequently will lead to increased contribution to the national economy.

In order to attain a safe and smooth traffic flow, a high pier and/or a long span bridge at hilly area of the proposed highway is necessary. Erecting this structure requires the application of advanced bridge construction technology.

In the succeeding Feasibility Study stage, it is necessary to study optimal alignment to reduce cost further and confirm applicability of advanced technology. Similarly, selection of optimal alignment shall identify in detail possible environmental and social issues including coming up with route that would avoid the protected area and CADT nearby.

20.5.2 Cebu Circumferential Road

The result of the Pre-F/S has revealed that the proposed project has a big traffic impact to decongest Cebu City. Similarly, residential development along the proposed alignment is progressing in higher pace. There will be approximately 1,900 affected buildings and structures of which 1,200 structures are affected by the road construction while remaining 700 structures may be affected by junctions and other related facilities.

In the succeeding Feasibility Study stage, minimizing the number of affected buildings and structure through the application of compact interchange type such as diamond-type interchange should be considered.

This project requires construction of many tunnel sections and long pier bridge sections which requires application of advanced construction technology.

Preliminary design was carried out based on secondary data, therefore, it is recommended to carry out the following surveys during the feasibility study.

- Topographic Survey
- Boring Survey

20.5.3 2nd San Juanico Bridge and Access Road

This bridge construction project is a part of High Standard Highway connecting Samar Island and Leyte Island. The progressive deterioration of the existing San Juanico Bridge and concern about the increasing maintenance cost are the reasons for selecting this project as among the priority projects. The proposed location of the 2nd San Juanico Bridge is about 10km north of the existing bridge. Comparative evaluation of the three bridge types (Arch Bridge, Truss Bridge, Cable Stayed Bridge) revealed that Arch Bridge is the most advantageous.

In the succeeding Feasibility Study stage, it is necessary to conduct the following investigations in full-scale: topographic survey, bathymetric survey, geological and soil survey. Mangrove troops on both sides of Leyte and Samar were found hence measures such as transplantation of mangrove should be studied in detail.

20.5.4 Agusan del Norte - Butuan Logistical Highway

This project is important part of the government's effort to push Butuan City toward industrial development. Similarly, chronic traffic congestion experienced at the first Magsaysay Bridge justifies the need for a new bypass route. For the construction of Butuan Bridge crossing over Agusan River, the applicability of advanced construction and material technologies is high due to the needs for the treatment method of soft soil foundation. Soft ground investigation is necessary which could be the basis for selecting suitable construction method.

In the succeeding Feasibility Study stage and in view of the fact that the proposed alignment will traverse many fishponds, it is necessary to have a dialogue with the affected owners and compensation method should be established.

Similarly, as shown by the result of the Pre-F/S, traffic demand along the Logistical Highway will depend on progress of development of the Special Economic Zone (SEZ). Hence the Feasibility Study should seek phased development of the Logistical Highway in accordance with development of the SEZ.

20.6 Updating of the Master Plan

Assumptions made in this Master Plan such as socio-economic conditions, urban development plans, government and private sector's financial conditions may change in the future. Hence, the Master Plan should be periodically reviewed and updated reflecting the followings:

- Future socio-economic framework
- Progress of the urban development plans in certain areas
- Government and private sector's financial conditions
- Technological innovations such as spread of electric vehicle, automated vehicle, and introduction of new transportation service/systems (e.g. Mobility-as-a-Service (MaaS), Intelligent Transport System (ITS), etc.)

Although the traffic demand of this Master Plan has considered the impact of the urban railway projects such as Metro Manila Subway Project, North South Commuter Railway Project, other transport mode demand was assumed to the same as the past trend.

The comprehensive transport master plan, that describes suitable modal share, should be prepared and HSH Master Plan should be updated accordingly.

20.7 HSH Class-2 Roads Development

Some of the proposed HSH Class-2 projects focuses on eliminating traffic bottlenecks along the existing national highway. Implementation timing of HSH Class-1 and HSH Class-2 should be considered to achieve synergy effects. DPWH Central Office should closely coordinate with the respective Regional Offices in selecting HSH Class-2 projects.

20.8 DPWH's Road Classification

DPWH should add HSH Class-1 and HSH Class-2 in its road classification. Also, information such as road length, traffic volume, the number of lanes, etc. should be included in the road statistics. DPWH's design standards should also include HSH Class-1 and HSH Class-2 roads.

20.9 Updating of Traffic Data

Various traffic surveys were undertaken under this Study and a nationwide vehicle OD matrix and node-link data were prepared. These data should be updated regularly. Whenever traffic surveys are undertaken by new feasibility studies and detailed design studies for projects identified in this Master Plan, these data should be compiled by DPWH in addition to DPWH's annual traffic survey.

It is also recommended that DPWH should also include a travel speed survey along major roads which reflects clearly the condition of traffic congestion. This survey results will become a good index to justify construction of a new bypass, grade-separation among others.

It is recommended to utilize new technology in undertaking the survey such as GPS device and smartphone as they can easily measure the vehicle's travel speed with less error compared with the manual type of travel speed survey.

20.10 Expedite ROW Acquisition

One of the major bottlenecks of project implementation is the delay in ROW acquisition and the relocation of Project Affected Persons (PAPs). Three (3) measures are proposed to address the above problems:

- To start ROW acquisition and related works as soon as the Project is approved by NEDA Board. ROW acquisition should start based on the preliminary design. To realize this, accuracy of a preliminary design during a detailed feasibility study needs to be improved.
- To acquire land and compensate properties at a market price value.
- To utilize the ROW Acquisition Manual including its Implementing Rules and Regulations.

20.11 Interchange Location

Strategic placing of the interchange is important to maximize the functions of the High Standard Highway. Interchange connection to a congested urban road may affect the High Standard Highway's performance. Hence it is important to discuss between the DPWH and concerned local government unit on how to improve an urban road which connect to the High Standard Highway.

Similarly, it is desirable for the interchange to directly connect with logistics centers such as ports, airports, Economic Zone and industrial area to achieve smooth traffic. This was one of the findings of the survey with logistics and trucking company interview where they raised the issue of congested road between the expressway and logistics facility. This should be part of any future Feasibility Study.