CHAPTER 12

PROPOSED HSH DEVELOPMENT MASTER PLAN

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12.1 Introduction

This chapter describes the project priority methodology, criteria and project prioritization study result. **Figure 12.1-1** illustrates the flow chart of HSH Network M/P.

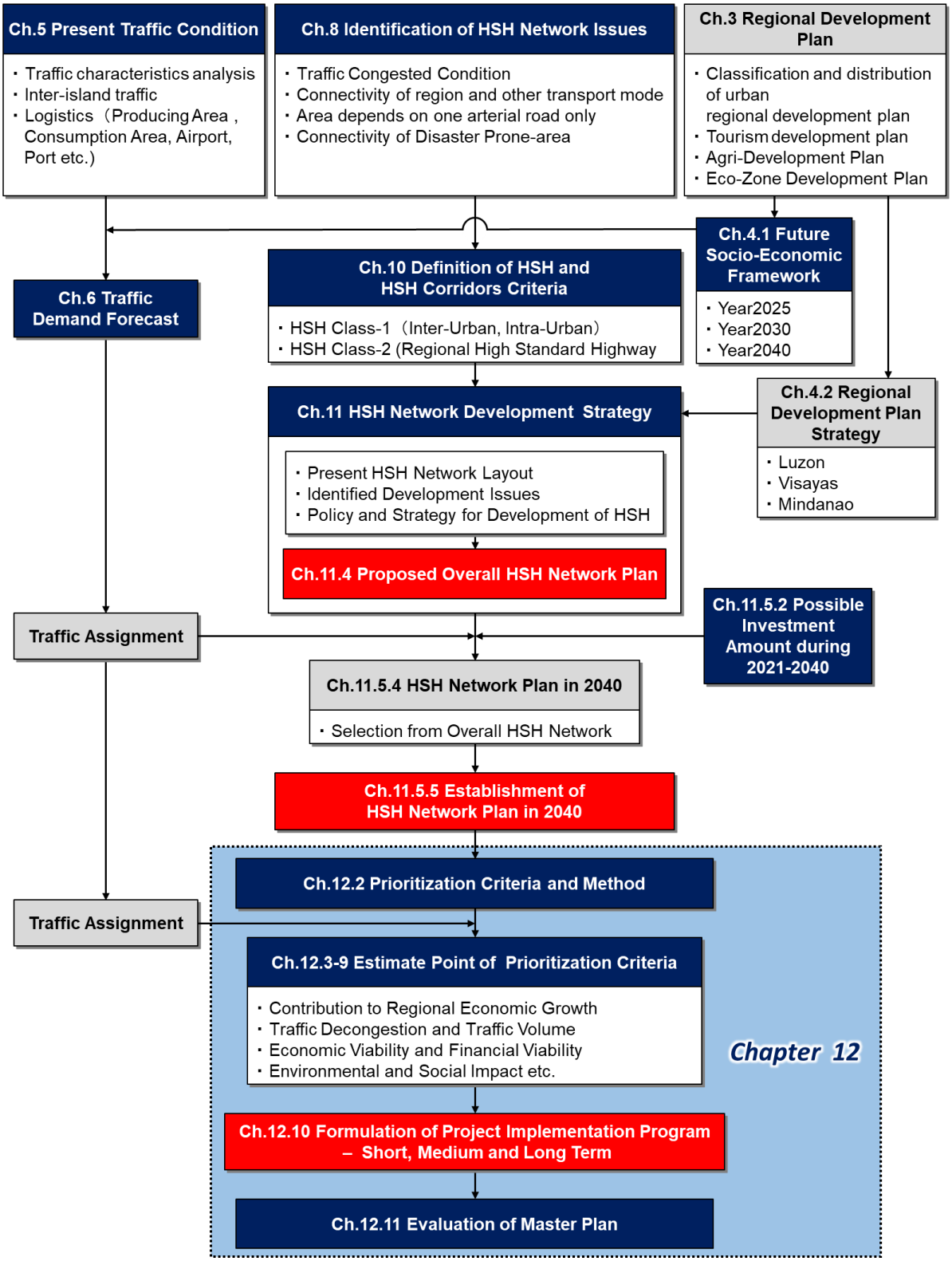


Figure 12.1-1 Procedure of HSH Road Network M/P Development

12.2 Prioritization Criteria of HSH Projects

The prioritization criteria for HSH Projects was studied.

As reference, the set of criteria of DPWH evaluation method is summarized in the following section.

12.2.1 Prioritization Method of DPWH

DPWH is applying a Multi-Criteria analysis for evaluation subject to a Feasibility Study. The M/P stage criteria are indicators for selecting a new project on the F/S stage, and it is introduced as reference information.

I. Diversion Road

Indicators	Total
1. Length of the proposed project versus the existing road	40
2. Project Readiness	20
3. Linkage with other road network	20
4. Social Development and Inclusiveness	20
TOTAL	**100**

Source: DPWH

II. Bypass Road

Indicators	Total
1. Volume Capacity Ratio of Existing Road	30
2. Location End Points Relative to Built-Up Area	10
3. Project Readiness F/S	20
4. Linkage with other road network	20
5. Social Development and Inclusiveness	20
TOTAL	**100**

Source: DPWH

III. Flyover, Underpass or Viaduct

Indicators	Total
1. Volume Capacity Ratio of Existing Route	20
2. Right of Way (ROW) 2.1 Geometric Configuration (10) 2.2 Right of Way Costs (10)	20
3. Project Readiness for F/S	20
4. Linkage with other road network	20
5. Social Development and Inclusiveness	20
TOTAL	**100**

Source: DPWH

IV. New Road Opening

Indicators	Total
1. Contribution to Economic Growth and Development	40
2. Project Readiness F/S	20
3. Linkage with other road network	20
4. Social Development and Inclusiveness	20
TOTAL	**100**

Source: DPWH

For the new road opening, "Contribution to Economic Growth and Development" is given the highest priority at 40. Common indicators are "Project Readiness F/S", "Linkage with other road network" and "Social Development and Inclusiveness".

Table 12.2-1 shows the multi-criteria analysis for proposed project as a new road opening. Item D [**Social Development and Inclusiveness**] is considered the highest point for the poorest cluster of provinces in order to promote the least developed area.

Table 12.2-1 Multi-Criteria Analysis for Proposed Projects Subject to Feasibility Study (New Road Opening)

Indicators	Points	Max. Points
A. Contribution to Economic Growth and Development [a]		**40**
Leading to areas with existing development	40	
Leading to areas with planned national development	32	
Leading to areas with planned LGU development	24	
Leading to areas with planned private development	16	
Leading to areas with no planned but with potential development	8	
B. Project Readiness for F/S		**20**
With existing F/S but needs updating [b]	**20**	
With no existing F/S but		
Identified in Master Plan	**5**	
Identified in City/Municipality CDP	**5**	
Identified as Flagship Project as stated in official documents from DPD	**5**	
With resolution from LGU/RDC	**5**	
With no resolution but with endorsement from LGU	**3**	
C. Linkage with other road network [c]		**20**
Connects to a Primary Road	**20**	
Connects to a Secondary Road	**14**	
Connects to a Tertiary Road	**8**	
Connects to a Local Road	**0**	
D. Social Development and Inclusiveness [d]		**20**
1. -bottom (poor) cluster of provinces	20	
2. -	17	
3. -	14	
4. -	11	
5. -	8	
	TOTAL	**100**

Note:
a Development in this situation is defined as agricultural, commercial, industrial, IT areas, government centers, ports, airports, and tourist destinations.
b Existing Feasibility Studies may have passed the 5-year validity period and are proposed for updating. In such case, these are prioritized since previous studies have already been conducted and these will need to be re-evaluated for any possible changes in the benefits or costs.
c A minimum of one end of the new road opening is considered in this case. If one end connects to a primary and the other connects to a secondary, it will be considered as connected to a primary road. The same applies to the other road classifications – the classification with more significance will be considered.
d This is derived from the 2015 Poverty Incidence Clustering of Provinces as taken from PSA.

Source: DPWH

12.2.2 Prioritization Method

(1) HSH Class-1 Prioritization

1) Identification of Criteria

In order to prioritize each project in 2040, multi-criteria analysis was applied. In the national spatial strategy and "Long Term Vision", these keywords are essential. Especially, "Connectivity" is related to the High Standard Highway Master Plan.

1) Overall Goal and Objectives: Inclusive Growth
2) Concentration: urban centers as "engines of economic growth" and "venues of growth and poverty reduction"
3) Connectivity: infrastructure "to provide efficient connective networks of sustainable urban and rural communities"

- **Investment in high-quality infrastructure** to make the cost of moving people, goods, and services competitive (Long Term Vision: AmBisyon Natin 2040)
- **Integration of leading and lagging areas** and **urban-rural linkages** through transportation networks to address socio-economic inequality
- Improve linkages among **settlements and key production areas**
- Direct growth in areas with **greatest economic potentials** through efficient transportation networks
- Increase **access to jobs and services** by people in smaller settlements

(National Physical Development Framework 2016-2040 (Draft)/ National Spatial Strategy)

To achieve the above vision, one of the key indicators used is "Contribution to Regional Economic Growth and Development", for proposed projects subject to a feasibility study by DPWH (see **Table 12.2-1**). **Table 12.2-2** shows the proposed multi-criteria indicators and points. The multi-criteria indicators were determined based on the discussion in C / P meeting, and policy decisions based on JCC and TWG. The points of criteria are assigned with emphasis on the contribution to regional economic growth and development and the investment efficiency in order to achieve the national vision.

Table 12.2-2 Proposed Multi-criteria Items and Points for HSH Class-1

	Major Items	Indicator	Points
1	Contribution to Regional Economic Growth and Development	1) Connect SEZs (operation and planned), tourism attractions, and production centers with ports, airports, and markets. 2) Connect Weak Regional Centers/ Strong Sub-Regional Centers 3) Strengthen connection to Metropolitan Centers and Regional Centers 4) Development potential identified in the existing development plans	40
2	Contribution to traffic decongestion and usage of HSH-1	1) Reduction of total travel time 2) Traffic volume along HSH Class-1	20
3	Economic Viability	EIRR	16
4	Environmental and Social Impact	Avoid Protected Area, IP Area, etc.	12
5	Project Readiness	F/S, Business Case Study, etc.	8
6	Financial Viability	Project FIRR	4
	Total		100

Source: JICA Study Team

Table 12.2-3 shows the detailed indicators and points. The evaluation idea and method of scoring is mentioned from **Section 12.3** to **Section 12.9**. Each indicators result is shown in the next section.

Table 12.2-3 Proposed Multi-criteria Items, Criteria and Points for HSH Class-1

Major Items	Indicator	Points
1. Contribution to Regional Economic Growth and Development **(40)**	- Connect SEZs with ports, airports, and markets. - Connect tourism attractions with ports, airports, and markets. - Connect Production Centers with ports, airports, and markets.	Max. 10 5 5
	- Connect Weak Regional Centers/ Strong Sub-Regional Centers	5
	- Strengthen connection to Metropolitan Centers and Regional Centers	5
	- Development potential identified in the existing development plans (see **Section 12.3** for details**)**	10
2. Contribution to traffic decongestion and usage of HSH-1 **(20)**	1) Reduction of total travel time [veh.*hour/day] in 2040 Over 100,000 50,001- 100,000 20,000-50,000 Less than 20,000 (3)	 12 9 6 3
	2) Traffic volume along HSH Class-1 [veh./day] in 2040 Over 30,000 20,001-30,000 10,001-20,000 Less 10,000 (see **Section 12.8** for details**)**	 8 6 4 2
3. Economic Viability **(16)**	EIRR Over 25% 15.1-25% 10.1-15% 5-10% Less than 5% (see **Section 12.4** for details)	16 12 8 4 0
4. Environmental and Social Impact **(12)**	1. Nature, Ecosystem — Evaluation A=Point 0 2. Affected Buildings and Resettlement — Evaluation B=Point 1 3. Protected Area — Evaluation C=Point 2 4. IP Area (see **Section 12.9** for details) — Evaluation D=Point 3	0~3 0~3 0~3 0~3
5. Project Readiness **(8)**	- Waiting for NEDA ICC Approval - F/S or Business Case Study - Concept Plan	8 6 2
6. Financial Viability **(4)**	- Project FIRR is Over 6%, BOT Scheme - Project FIRR is 3-6%, Subsidy or PPP Scheme - Project FIRR is less than 3%, Government Project 6% is the capital of debt (see **Section 12.5** for details)	4 2 0
Total		100

Source: JICA Study Team

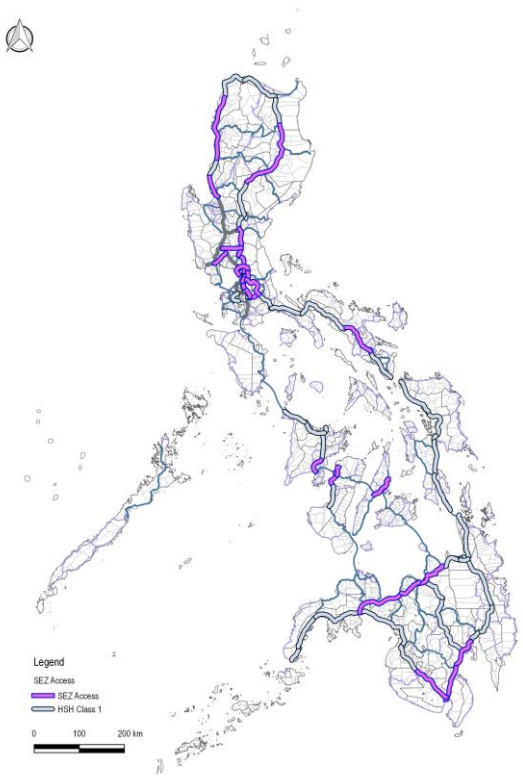
(2) HSH Class-2

As major work of HSH Class-2 is the upgrading of national primary roads or secondary roads, prioritization for HSH Class-2 was decided based on the future traffic volume (year2040). (see **Section 12.8** for details)

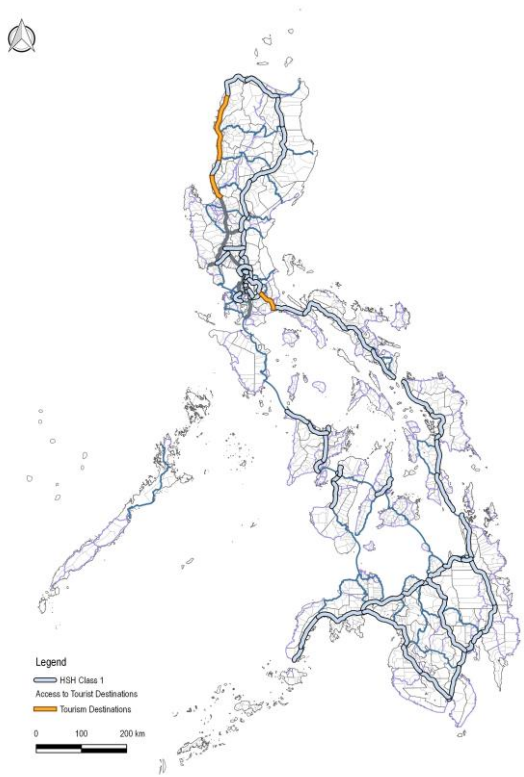
12.3 Contribution to Regional Economic Growth and Development

12.3.1 Connect SEZs, Tourism Attractions, and Production Centers with Ports, Airports, and Markets

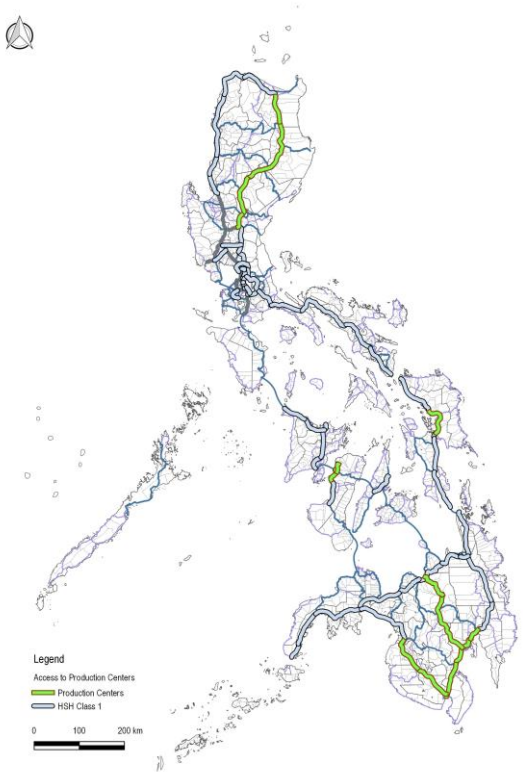
These SEZs (operation and planned), tourism attraction and production centers (agricultural production, etc.) and corridor was indicated in **Figure 12.3-1**.



Connect SEZs with ports, airports, and markets



Connect Tourism attractions, with ports, airports, and markets



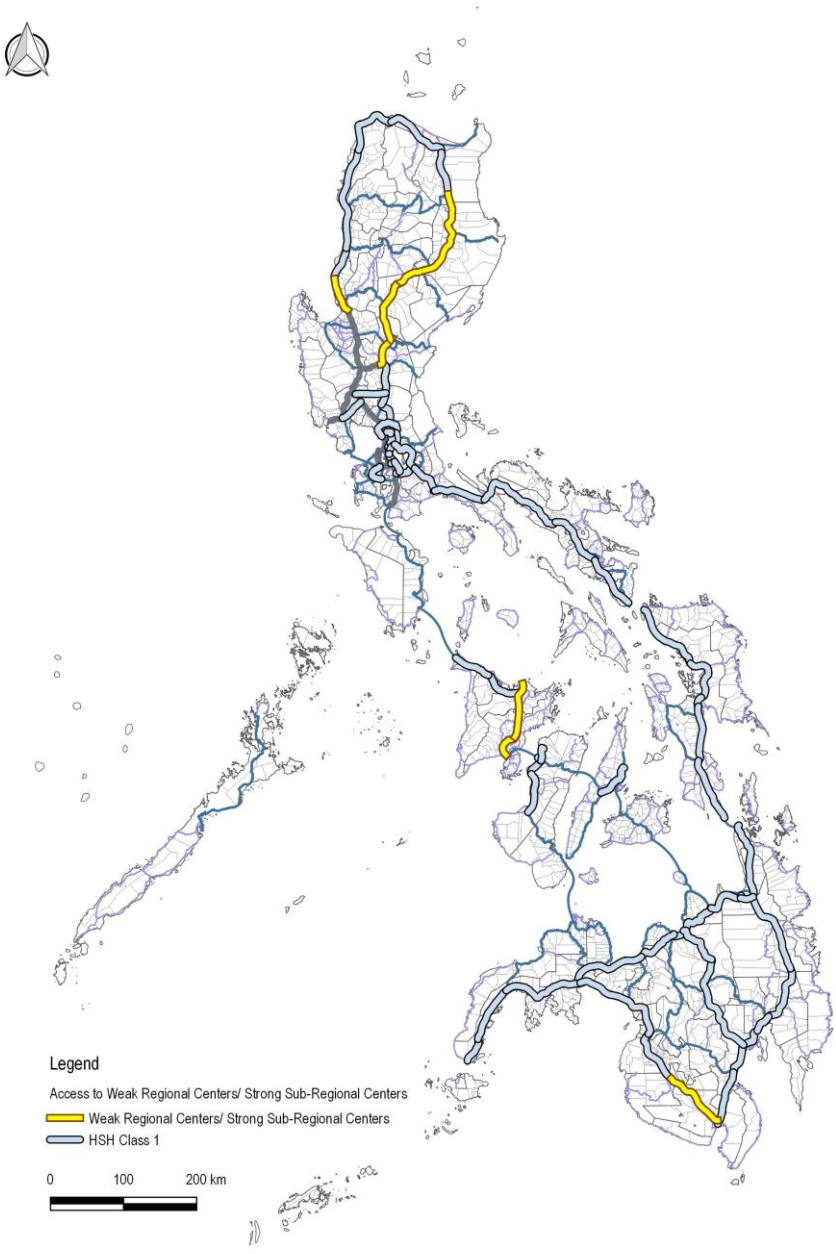
Connect production centers with ports, airports, and markets.

Source: JICA Study Team

Figure 12.3-1 Corridors Which Links the SEZs, Tourism Attractions, and Production Centers to Ports, Airports, and Markets

12.3.2 Connect Weak Regional Centers/Strong Sub-Regional Centers

As a Result of analysis of Regional and Sub-regional Centers by JST, the following cities were identified as weak regional centers and strong sub-regional centers (see **Section 4.2.2**). Weak regional centers shall be supported by HSH corridor to become a strong regional center. Strong sub-regional center also to be supported by HSH corridor to become and play a role of regional centers.



<Weak Growth/ Development Potential Regional Center>
- Baguio - Tabuk
- Santiago - Koronadal in Mindanao

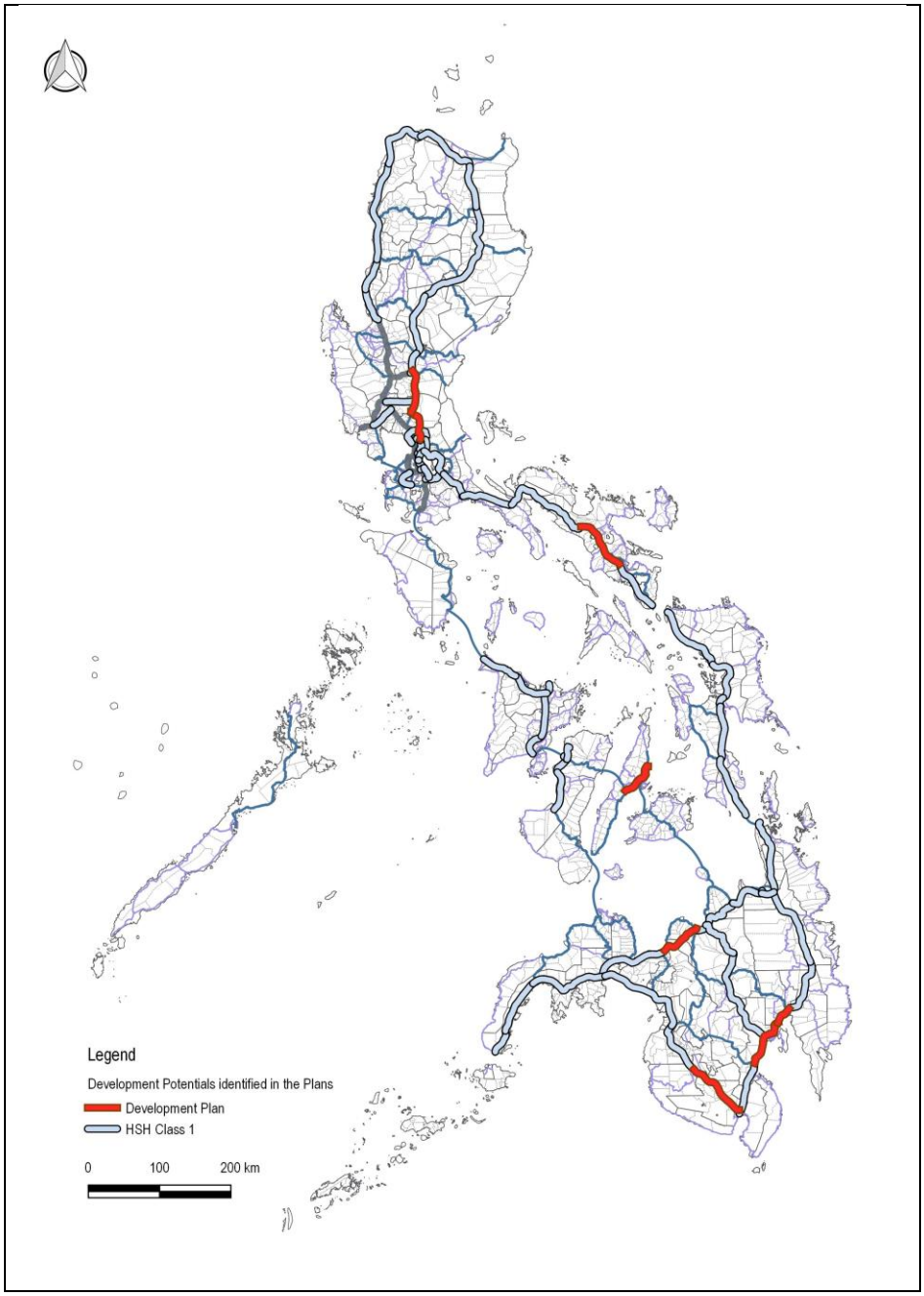
<Strong Growth/ Development Potential Sub Regional Center >
Roxas in Visayas

Source: JICA Study Team

Figure 12.3-2 Corridors Which Support Weak Regional Centers and Strong Sub-Regional Centers

12.3.3 Development Potential Identified in the Existing Development Plans

These corridors, which are illustrated in **Figure 12.3-3** are high potential development as described in Regional Physical Development Framework.



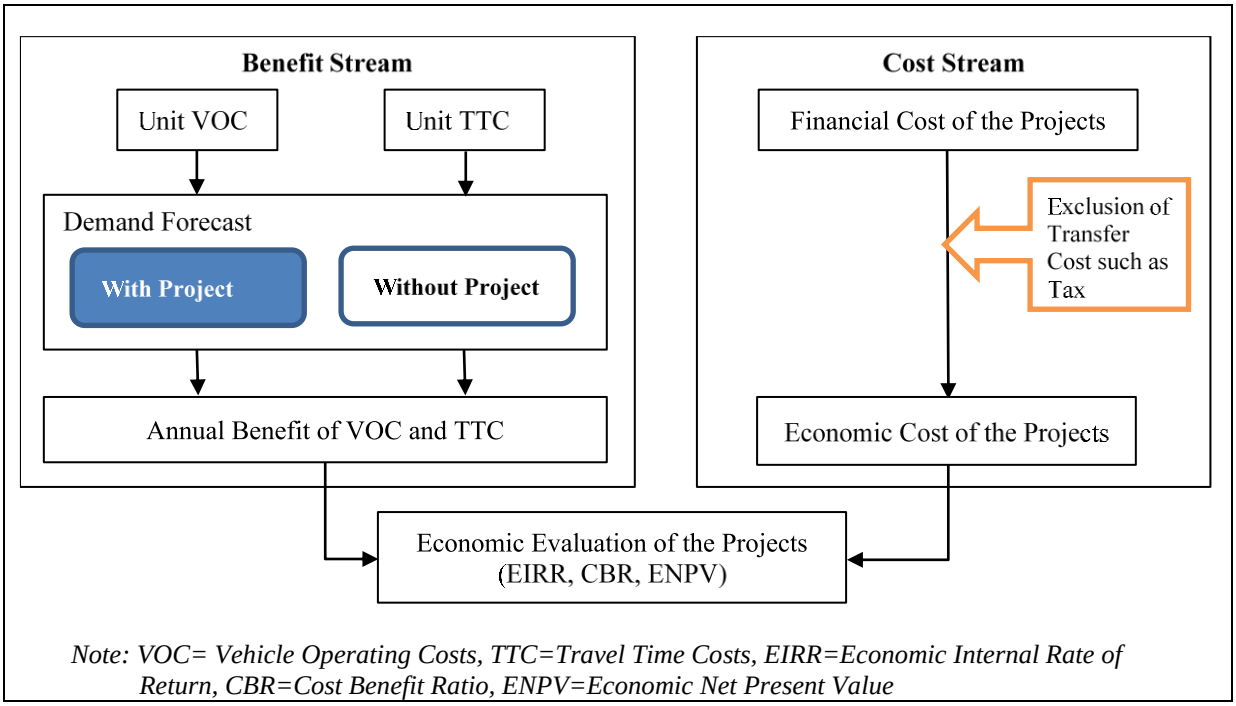
Source: JICA Study Team

Figure 12.3-3 High Potential Development Corridor in Regional Physical Development Framework

12.4 Economic Evaluation

12.4.1 General Methodology of Economic Evaluation

Economic validity of the project was evaluated by calculating economic benefits and costs of "With" and "Without" the projects. The projects are implemented in "With" case. Projects are not implemented in "Without" case. Economic Internal Rate of Return (EIRR) are calculated by using economic benefits and economic costs. Flow of economic analysis is shown in **Figure 12.4-1**. Annual benefit of VOC and TTC was calculated based on the demand forecast in **Chapter 6** and **Section 12.8**.



Note: VOC= Vehicle Operating Costs, TTC=Travel Time Costs, EIRR=Economic Internal Rate of Return, CBR=Cost Benefit Ratio, ENPV=Economic Net Present Value

Source: JICA Study Team

Figure 12.4-1 Workflow of Economic Analysis

Economic analysis regarding the following projects in **Table 12.4-1** was conducted.

Table 12.4-1 Project List for Economic Analysis

No.	Project Name	Phase/Segment	Length (km)
1	Ilocos High Standard Highway 1 (TPLEX Extension)	Rosario-San Fernando City	48.17
2	Ilocos High Standard Highway 2	San Fernando City-Tagudin	46.81
3	Ilocos High Standard Highway 3	Tagudin-Laoag City	142.86
4	Northern East-West High Standard Highway 1	Laoag City-Claveria	89.18
5	Northern East-West High Standard Highway 2	Claveria-Lal-lo	92.12
6	Cagayan Valley High Standard Highway 1	Bayombong-Tuguegarao City	175.35
7	Cagayan Valley High Standard Highway 2	Tuguegarao City-Allacapan	60.07
8	Dalton Pass East Alignment Alternative Road Project	San Jose City-Bayombong	89.82
9	NLEE Phase 1 and Phase 2	Quezon City-San Rafael	46.48
10	NLEE Phase 1 and Phase 2	San Rafael-Cabanatuan City	62.06
11	Central Luzon Link High Standard Highway (CLLEX) Phase II	Cabanatuan City-San Jose City	31.05
12	2nd Central Luzon Link High Standard Highway	Angeles City-San Miguel	41.34
13	NLEX Phase 3	San Fernando City-Dinalupihan	34.12
14	C6 High Standard Highway 1 (South East Metro Manila High Standard Highway)	Metro Manila-Rizal	41.08
15	C5 High Standard Highway 1	Taguig City-Quezon City	15.5

No.	Project Name	Phase/Segment	Length (km)
16	Laguna Lakeshore High Standard Highway	Taguig City-Pila	82.59
17	Laguna De Bay Crossing High Standard Highway 1	Taytay-Pila	59.56
18	Laguna De Bay Crossing High Standard Highway 2	Pila-Lucena City	43.73
19	Cavite-Tagaytay High Standard Highway	Tagaytay City-CALAEx	31.68
20	Quezon-Bicol High Standard Highway 1	Lucena City-Lopez	71.84
21	Quezon-Bicol High Standard Highway 2	Lopez-Naga City	137.38
22	Bicol High Standard Highway I	Naga City-Legaspi City	81.79
23	Bicol High Standard Highway II	Legaspi City-Matnog	76.72
24	Panay High Standard Highway 1	Iloilo City-Pototan	35.28
25	Panay High Standard Highway 2	Pototan-Roxas City	76.87
26	Panay High Standard Highway 3	Panitan-Numancia	56.5
27	Panay High Standard Highway 4	Numancia-Malay	51.85
28	Negros High Standard Highway 1	Silay City-Valladolid	52.22
29	Negros High Standard Highway 2	Valladolid-Kabankalan City	57.32
30	Metro Cebu High Standard Highway	Naga City-Danao City	58.67
31	Samar-Leyte High Standard Highway 1	Allen-Catbalogan City	104.43
32	Samar-Leyte High Standard Highway 2	Catbalogan City-Santa Rita	72.01
33	Samar-Leyte High Standard Highway 3	Santa Rita-Tacloban City	14.82
34	Samar-Leyte High Standard Highway 4	Tacloban City-Mahaplag	77.24
35	Samar-Leyte High Standard Highway 5	Mahaplag-San Ricardo	88.74
36	Surigao-Butuan High Standard Highway	Surigao City-Butuan City	106.38
37	Butuan-Tagum High Standard Highway 1	Tagum City-Trento	83.35
38	Butuan-Tagum High Standard Highway 2	Trento-Butuan City	117.9
39	Tagum-Davao-Digos High Standard Highway 1 (Davao City By-Pass)	Digos City-Panabo City	76.62
40	Tagum-Davao-Digos High Standard Highway 2	Panabo City-Tagum City	26.52
41	Digos-Gen. San High Standard Highway	Digos City-Gen Santos City	77.42
42	North Mindanao High Standard Highway I - 1	Cagayan De Oro City-Gingoog City	82.65
43	North Mindanao High Standard Highway I - 2	Gingoog City-Butuan City	75.3
44	North Mindanao High Standard Highway II - 1	Cagayan De Oro City-Iligan City	61.65
45	North Mindanao High Standard Highway II - 2	Iligan City-Pagadian City	107.23
46	Central Mindanao High Standard Highway 1	Cagayan De Oro City-Malaybalay City	66.19
47	Central Mindanao High Standard Highway 2	Malaybalay City-Davao City	142.01
48	Gen. San-Cotabato High Standard Highway 1	Gen. Santos City-Isulan	90.17
49	Gen. San-Cotabato High Standard Highway 2	Isulan-Cotabato City	78.85
50	Cotabato-Zamboanga High Standard Highway 1	Zamboanga City	34.92
51	Cotabato-Zamboanga High Standard Highway 2	Zamboanga City-Ipil	78.99
52	Cotabato-Zamboanga High Standard Highway 3	Ipil-Pagadian City	116.15
53	Cotabato-Zamboanga High Standard Highway 4	Labangan-Cotabato City	138.17

Source: JICA Study Team

12.4.2 Assumptions of Economic Evaluation

Assumptions of economic evaluation is shown in **Table 12.4-2**.

Table 12.4-2 Assumptions of Economic Evaluation

Items	Assumptions	Remarks
Social Discount Rate	10%	
Project Period	2021-2054	2021-2024: Detailed Design (D/D), Right of Way (ROW) Acquisition, and Civil Work 2025-2054: Operation (30 years)
Price Level Year	2019	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.

12.4.3 Economic Cost for the Project

Economic cost includes construction cost, ROW cost, consulting service cost, administration cost and O&M cost of the projects. VAT (12%) was deducted from financial cost of the project. Capital Gain Tax (CGT), which was 6%, and the Documentary Stamp Tax (DST), which was 1.5%, were deducted from the financial cost regarding ROW cost[1]. Inflation was not considered in the economic evaluation.

(1) Initial Cost

Initial costs, which consist of construction, ROW, consulting service and administration costs, are shown in **Table 12.4-3**.

Table 12.4-3 Initial Costs of Economic Evaluation

Unit: PhP million

No.	Project Name	Construction Cost	ROW Cost	Consulting Service (D/D)	Consulting Service (C/S)	Administ-ration Cost	Total
1	Ilocos High Standard Highway 1 (TPLEX Extension)	14,832	540	593	1,186	565	17,717
2	Ilocos High Standard Highway 2	14,623	525	585	1,170	557	17,460
3	Ilocos High Standard Highway 3	38,883	1,603	1,555	3,111	1,487	46,638
4	Northern East-West High Standard Highway 1	25,987	9,660	1,040	2,079	1,262	40,029
5	Northern East-West High Standard Highway 2	28,317	9,979	1,133	2,266	1,359	43,053
6	Cagayan Valley High Standard Highway 1	49,679	1,124	1,987	3,974	1,871	58,636
7	Cagayan Valley High Standard Highway 2	16,248	385	650	1,300	613	19,196
8	Dalton Pass East Alignment Alternative Road Project	42,572	7,579	1,703	3,406	1,810	57,070
9	NLEE Phase 1 and Phase 2	12,639	3,922	506	1,011	590	18,668
10	NLEE Phase 1 and Phase 2	18,516	5,236	741	1,481	848	26,823
11	Central Luzon Link High Standard Highway (CLLEX) Phase II	8,933	2,620	358	715	412	13,037
12	2nd Central Luzon Link High Standard Highway	12,195	3,488	488	976	560	17,706
13	NLEX Phase 3	11,194	4,387	448	896	551	17,475
14	C6 High Standard Highway 1 (South East Metro Manila High Standard Highway)	32,045	17,138	1,282	2,564	1,720	54,748
15	C5 High Standard Highway 1	42,501	3,899	1,700	3,400	1,693	53,192
16	Laguna Lakeshore High Standard Highway	96,447	6,440	3,858	7,716	3,766	118,227

[1] Source: DPWH (2017) "DPWH RIGHT-OF-WAY Acquisition Manual Main Guidelines"

No.	Project Name	Construction Cost	ROW Cost	Consulting Service (D/D)	Consulting Service (C/S)	Administ-ration Cost	Total
17	Laguna De Bay Crossing High Standard Highway 1	84,837	1,460	3,394	6,787	3,181	99,659
18	Laguna De Bay Crossing High Standard Highway 2	11,639	4,744	466	931	578	18,359
19	Cavite-Tagaytay High Standard Highway	10,726	3,437	429	858	504	15,954
20	Quezon-Bicol High Standard Highway 1	18,460	7,793	739	1,477	926	29,395
21	Quezon-Bicol High Standard Highway 2	31,690	14,903	1,268	2,535	1,637	52,033
22	Bicol High Standard Highway I	20,648	1,527	826	1,652	811	25,465
23	Bicol High Standard Highway II	45,395	1,433	1,816	3,631	1,723	53,997
24	Panay High Standard Highway 1	8,623	1,339	345	690	361	11,358
25	Panay High Standard Highway 2	18,193	2,918	728	1,456	764	24,059
26	Panay High Standard Highway 3	13,899	2,145	556	1,112	581	18,293
27	Panay High Standard Highway 4	12,900	1,968	516	1,032	538	16,954
28	Negros High Standard Highway 1	14,234	1,982	569	1,139	588	18,513
29	Negros High Standard Highway 2	14,814	2,176	593	1,185	616	19,383
30	Metro Cebu High Standard Highway	33,693	7,700	1,348	2,696	1,486	46,923
31	Samar-Leyte High Standard Highway 1	27,377	6,118	1,095	2,190	1,203	37,982
32	Samar-Leyte High Standard Highway 2	19,629	4,218	785	1,570	857	27,059
33	Samar-Leyte High Standard Highway 3	8,826	868	353	706	353	11,107
34	Samar-Leyte High Standard Highway 4	20,572	4,525	823	1,646	902	28,467
35	Samar-Leyte High Standard Highway 5	27,715	5,198	1,109	2,217	1,187	37,426
36	Surigao-Butuan High Standard Highway	28,317	798	1,133	2,266	1,072	33,586
37	Butuan-Tagum High Standard Highway 1	19,054	626	762	1,524	724	22,689
38	Butuan-Tagum High Standard Highway 2	27,832	885	1,113	2,226	1,056	33,113
39	Tagum-Davao-Digos High Standard Highway 1 (Davao City By-Pass)	19,584	10,621	783	1,566	1,056	33,610
40	Tagum-Davao-Digos High Standard Highway 2	6,702	3,676	268	536	363	11,545
41	Digos-Gen. San High Standard Highway	19,561	10,732	783	1,565	1,058	33,699
42	North Mindanao High Standard Highway I - 1	25,595	7,312	1,024	2,048	1,175	37,154
43	North Mindanao High Standard Highway I - 2	20,444	565	818	1,636	773	24,236
44	North Mindanao High Standard Highway II - 1	33,368	5,454	1,335	2,669	1,404	44,231
45	North Mindanao High Standard Highway II - 2	28,539	9,487	1,141	2,283	1,351	42,802
46	Central Mindanao High Standard Highway 1	25,713	5,856	1,029	2,057	1,133	35,788
47	Central Mindanao High Standard Highway 2	37,705	19,685	1,508	3,016	2,009	63,923
48	Gen. San-Cotabato High Standard Highway 1	21,323	2,121	853	1,706	854	26,857
49	Gen. San-Cotabato High Standard Highway 2	19,315	1,855	773	1,545	772	24,259
50	Cotabato-Zamboanga High Standard Highway 1	8,722	262	349	698	331	10,362
51	Cotabato-Zamboanga High Standard Highway 2	18,266	593	731	1,461	694	21,745
52	Cotabato-Zamboanga High Standard Highway 3	29,215	872	1,169	2,337	1,107	34,699
53	Cotabato-Zamboanga High Standard Highway 4	36,487	12,224	1,460	2,919	1,731	54,821

Source: JICA Study Team

(2) O&M Cost

O&M costs of economic evaluation are shown in **Table 12.4-4**.

Table 12.4-4 O&M Costs of Economic Evaluation

Unit: PhP million / year

No.	Routine O&M	Periodic Maintenance/ 5 years	Periodic Maintenance/ 15 years
1	576	148	297
2	560	146	293
3	1,703	389	778
4	1,065	260	520
5	1,101	283	566
6	2,092	497	994
7	716	163	325
8	1,089	426	851
9	554	126	253
10	741	185	370
11	371	89	179
12	494	122	244
13	409	112	224
14	1,151	320	641
15	311	425	850
16	1,058	964	1,929
17	778	848	1,697
18	521	116	233
19	380	107	214
20	855	185	369
21	1,632	317	634
22	973	207	413
23	939	454	908
24	420	86	173
25	913	182	364
26	672	139	278
27	617	129	258
28	622	142	285
29	682	148	296
30	717	337	674
31	1,244	274	548
32	858	196	393
33	181	88	177
34	920	206	411
35	1,061	277	554
36	1,267	283	566
37	990	191	381
38	1,401	278	557
39	912	196	392
40	316	67	134
41	921	196	391
42	988	256	512
43	897	204	409
44	751	334	667
45	1,277	285	571
46	797	257	514
47	1,692	377	754
48	1,071	213	426
49	938	193	386
50	415	87	174
51	938	183	365
52	1,382	292	584
53	1,646	365	730

Source: JICA Study Team

12.4.4 Economic Benefit of the Project

Economic benefits were calculated by measuring "Saving on Travel Time Costs (TTC)", and "Saving on Vehicle Operating Costs (VOC)" since they are measurable in monetary value.

(1) Unit TTC

Unit TTC in 2015, which was shown in **Table 12.4-5**, was estimated by DPWH. Since the costs were updated in 2015, JICA study team estimated that in 2019, which was shown in **Table 12.4-6**, by using inflation rate[2] from 2016 to 2019. TTC includes the following costs; 1) passenger time costs in working time; 2) those in non-working time; and 3) cargo inventory costs[3].

Table 12.4-5 Unit TTC in 2015

Unit: PhP/veh.-minute

Car	Jeepney	Bus	Truck
6.68	7.37	27.54	2.52

Source: DPWH (2015) "HIGHWAY DEVELOPMENT MANAGEMENT (HDM)-4 VERSION 1.3"

Table 12.4-6 Unit TTC in 2019

Unit: PhP/veh.-minute

Car	Jeepney	Bus	Truck
7.40	8.17	30.52	2.80

Source: DPWH (2015) "HDM-4 VERSION 1.3", JICA STUDY TEAM

(2) Unit VOC

Unit VOC in 2015, which was shown in **Table 12.4-7**, was estimated by DPWH. Since the costs were updated in 2015, JICA study team estimated that in 2019, which was shown in **Table 12.4-8**, by using inflation rate[4] from 2016 to 2019. VOC includes the costs of the following items; 1) fuel; 2) lubricants; 3) tires; 4) maintenance labor; 5) spare parts; 6) crew costs; 7) depreciation; 8) interest charges; and 9) overheads[5].

Table 12.4-7 Unit VOC in 2015

Unit: PhP/veh.-km

Speed	Car	Jeepney	Bus	Truck
20 km/h	10.3	10.8	34.9	58.5
30 km/h	9.1	9.1	28.8	49.6
40 km/h	8.3	7.8	24.3	43.1
50 km/h	7.8	7.2	22.0	39.9
60 km/h	7.7	6.9	20.7	38.5
70 km/h	7.7	6.9	20.1	38.0
80 km/h	7.8	7.0	20.1	38.0
90 km/h	7.9	7.2	20.1	38.3
100 km/h	8.1	7.3	20.1	38.5

Source: DPWH (2015) "HDM-4 Version 1.3"

[2] Source: Philippine Statistics Authority (PSA)

[3] Source: DPWH (2014) "Procedures Manual for Updating Vehicle Costs and User Costs, Work Unit Costs, Asset Values, Traffic Growth Rates (TGR) Version 2"

[4] Source: Philippine Statistics Authority (PSA)

[5] Source: DPWH (2014) "Procedures Manual for Updating Vehicle Costs and User Costs, Work Unit Costs, Asset Values, Traffic Growth Rates (TGR) Version 2"

Table 12.4-8 Unit VOC in 2019

Unit: PhP/veh.-km

Speed	Car	Jeepney	Bus	Truck
20 km/h	11.4	12.0	38.7	64.9
30 km/h	10.1	10.1	31.9	54.9
40 km/h	9.1	8.7	27.0	47.7
50 km/h	8.7	8.0	24.3	44.2
60 km/h	8.5	7.7	22.9	42.7
70 km/h	8.5	7.6	22.3	42.1
80 km/h	8.6	7.7	22.2	42.2
90 km/h	8.8	7.9	22.2	42.5
100 km/h	9.0	8.1	22.2	42.7

Source: DPWH (2015) "HDM-4 Version 1.3"

(3) Estimation of Economic Benefit of the Projects

Saving on TTC was calculated by multiplying unit TTC and the traffic volumes, which were estimated in Chapter 6. Saving on VOC was calculated by multiplying unit VOC and the traffic volume. Thus, the economic benefit of the projects is shown in **Table 12.4-9**.

Table 12.4-9 Economic Benefit of the Projects

Unit: million PHP

No.	Project Name	Economic Benefit (TTC+VOC Saving)	
		2025	2040
1	Ilocos High Standard Highway 1 (TPLEX Extension)	5,890	20,963
2	Ilocos High Standard Highway 2	3,164	5,106
3	Ilocos High Standard Highway 3	4,291	10,484
4	Northern East-West High Standard Highway 1	2,739	4,153
5	Northern East-West High Standard Highway 2	1,881	3,179
6	Cagayan Valley High Standard Highway 1	10,438	18,584
7	Cagayan Valley High Standard Highway 2	1,183	1,801
8	Dalton Pass East Alignment Alternative Road Project	4,704	10,683
9	NLEE Phase 1 and Phase 2	18,839	20,216
10	NLEE Phase 1 and Phase 2	17,661	44,990
11	Central Luzon Link High Standard Highway (CLLEX) Phase II	6,968	3,302
12	2nd Central Luzon Link High Standard Highway	7,753	18,265
13	NLEX Phase 3	5,609	10,806
14	C6 High Standard Highway 1 (South East Metro Manila High Standard Highway)	41,757	69,731
15	C5 High Standard Highway 1	6,462	36,652
16	Laguna Lakeshore High Standard Highway	2,119	20,527
17	Laguna De Bay Crossing High Standard Highway 1	2,443	8,148
18	Laguna De Bay Crossing High Standard Highway 2	1,233	139,300
19	Cavite-Tagaytay High Standard Highway	1,135	17,039
20	Quezon-Bicol High Standard Highway 1	4,548	15,453
21	Quezon-Bicol High Standard Highway 2	3,971	8,971
22	Bicol High Standard Highway I	3,681	8,636
23	Bicol High Standard Highway II	1,791	3,907
24	Panay High Standard Highway 1	53	1,789
25	Panay High Standard Highway 2	2,353	10,602
26	Panay High Standard Highway 3	1,870	11,413
27	Panay High Standard Highway 4	1,575	2,987
28	Negros High Standard Highway 1	182	1,022

No.	Project Name	Economic Benefit (TTC+VOC Saving)	
		2025	2040
29	Negros High Standard Highway 2	1,401	2,627
30	Metro Cebu High Standard Highway	7,758	29,377
31	Samar-Leyte High Standard Highway 1	2,557	4,094
32	Samar-Leyte High Standard Highway 2	1,645	3,713
33	Samar-Leyte High Standard Highway 3	887	1,906
34	Samar-Leyte High Standard Highway 4	2,162	5,059
35	Samar-Leyte High Standard Highway 5	598	1,139
36	Surigao-Butuan High Standard Highway	1,199	3,650
37	Butuan-Tagum High Standard Highway 1	5,608	24,504
38	Butuan-Tagum High Standard Highway 2	11,348	20,488
39	Tagum-Davao-Digos High Standard Highway 1 (Davao City By-Pass)	30,829	38,114
40	Tagum-Davao-Digos High Standard Highway 2	5,140	8,991
41	Digos-Gen. San High Standard Highway	2,701	4,800
42	North Mindanao High Standard Highway I - 1	4,292	10,665
43	North Mindanao High Standard Highway I - 2	1,795	7,233
44	North Mindanao High Standard Highway II - 1	10,292	14,394
45	North Mindanao High Standard Highway II - 2	4,311	9,199
46	Central Mindanao High Standard Highway 1	17,363	25,654
47	Central Mindanao High Standard Highway 2	34,277	38,992
48	Gen. San-Cotabato High Standard Highway 1	1,165	1,820
49	Gen. San-Cotabato High Standard Highway 2	3,943	10,701
50	Cotabato-Zamboanga High Standard Highway 1	1,944	4,526
51	Cotabato-Zamboanga High Standard Highway 2	2,404	5,968
52	Cotabato-Zamboanga High Standard Highway 3	6,451	12,000
53	Cotabato-Zamboanga High Standard Highway 4	10,329	22,931

Source: JICA Study Team

12.4.5 Results of Economic Evaluation

(1) Results of Base Case

The following economic indicators: EIRR, Cost Benefit Ratio (CBR) and Economic Net Present Value (ENPV) of each project were calculated. Calculation formula and remarks of them are shown in **Table 12.4-10** Discount rate is 10% based on NEDA (2016). Results of economic evaluation are shown in **Table 12.4-11**.

Table 12.4-10 Indicators of Economic Evaluation

Indicators	Calculation Formula	Remarks
EIRR	EIRR is a rate "r" which satisfies the following formula. B=Benefit, C=Cost, $\sum \frac{B_n - C_n}{(1+r)^n} = 0$	It is higher than social discount rate (10%) = Feasible
CBR	DR= Discount Rate (10%) CBR=$\sum \frac{B_n}{(1+DR)^n} \div \sum \frac{C_n}{(1+DR)^n}$	It is higher than 1.0 = Feasible
ENPV	ENPV=$\sum \frac{B_n - C_n}{(1+DR)^n}$	It is plus. = Feasible

Source: JICA Study Team

Table 12.4-11 Results of Economic Evaluation

No.	Project Name	Indicators of Economic Analysis		
		EIRR (%)	CBR	ENPV (PhP million)
1	Ilocos High Standard Highway 1 (TPLEX Extension)	33.2%	5.05	72,855
2	Ilocos High Standard Highway 2	15.6%	1.54	9,524
3	Ilocos High Standard Highway 3	10.2%	1.02	850
4	Northern East-West High Standard Highway 1	4.4%	0.58	-16,527
5	Northern East-West High Standard Highway 2	1.3%	0.40	-25,128
6	Cagayan Valley High Standard Highway 1	15.9%	1.58	35,122
7	Cagayan Valley High Standard Highway 2	2.2%	0.49	-10,277
8	Dalton Pass East Alignment Alternative Road Project	9.7%	0.97	-1,714
9	NLEE Phase 1 and Phase 2	55.6%	6.78	107,518
10	NLEE Phase 1 and Phase 2	47.1%	7.94	183,240
11	Central Luzon Link High Standard Highway (CLLEX) Phase II	31.2%	2.48	19,105
12	2nd Central Luzon Link High Standard Highway	35.2%	4.98	69,363
13	NLEX Phase 3	26.8%	3.25	37,636
14	C6 High Standard Highway 1 (South East Metro Manila High Standard Highway)	47.7%	7.12	315,476
15	C5 High Standard Highway 1	21.9%	3.29	102,723
16	Laguna Lakeshore High Standard Highway	11.0%	0.77	-23,768
17	Laguna De Bay Crossing High Standard Highway 1	13.0%	0.42	-49,492
18	Laguna De Bay Crossing High Standard Highway 2	11.0%	27.13	474,346
19	Cavite-Tagaytay High Standard Highway	15.0%	4.12	47,821
20	Quezon-Bicol High Standard Highway 1	16.0%	2.31	38,351
21	Quezon-Bicol High Standard Highway 2	8.1%	0.82	-9,349
22	Bicol High Standard Highway I	15.0%	1.53	14,317
23	Bicol High Standard Highway II	1.9%	0.38	-30,563
24	Panay High Standard Highway 1	12.0%	0.70	-3,547
25	Panay High Standard Highway 2	9.0%	1.57	14,292
26	Panay High Standard Highway 3	8.0%	1.88	16,722
27	Panay High Standard Highway 4	11.2%	1.12	2,123
28	Negros High Standard Highway 1	4.0%	0.51	-9,251
29	Negros High Standard Highway 2	5.8%	0.67	-6,685
30	Metro Cebu High Standard Highway	21.9%	2.97	83,400
31	Samar-Leyte High Standard Highway 1	4.0%	0.57	-16,754
32	Samar-Leyte High Standard Highway 2	5.9%	0.65	-9,481
33	Samar-Leyte High Standard Highway 3	9.2%	0.92	-825
34	Samar-Leyte High Standard Highway 4	8.2%	0.83	-4,775
35	Samar-Leyte High Standard Highway 5	-9.8%	0.16	-31,239
36	Surigao-Butuan High Standard Highway	3.0%	0.46	-18,877
37	Butuan-Tagum High Standard Highway 1	17.0%	4.41	84,024
38	Butuan-Tagum High Standard Highway 2	17.0%	6.02	179,292
39	Tagum-Davao-Digos High Standard Highway 1 (Davao City By-Pass)	15.0%	0.72	-9,352
40	Tagum-Davao-Digos High Standard Highway 2	20.0%	14.87	157,284
41	Digos-Gen. San High Standard Highway	18.7%	2.06	34,986
42	North Mindanao High Standard Highway I - 1	16.0%	1.15	5,575
43	North Mindanao High Standard Highway I - 2	10.8%	1.08	1,933
44	North Mindanao High Standard Highway II - 1	18.6%	2.30	52,553
45	North Mindanao High Standard Highway II - 2	11.1%	1.10	4,163
46	Central Mindanao High Standard Highway 1	31.1%	4.44	116,754
47	Central Mindanao High Standard Highway 2	28.0%	5.95	308,801
48	Gen. San-Cotabato High Standard Highway 1	9.0%	0.63	-10,535

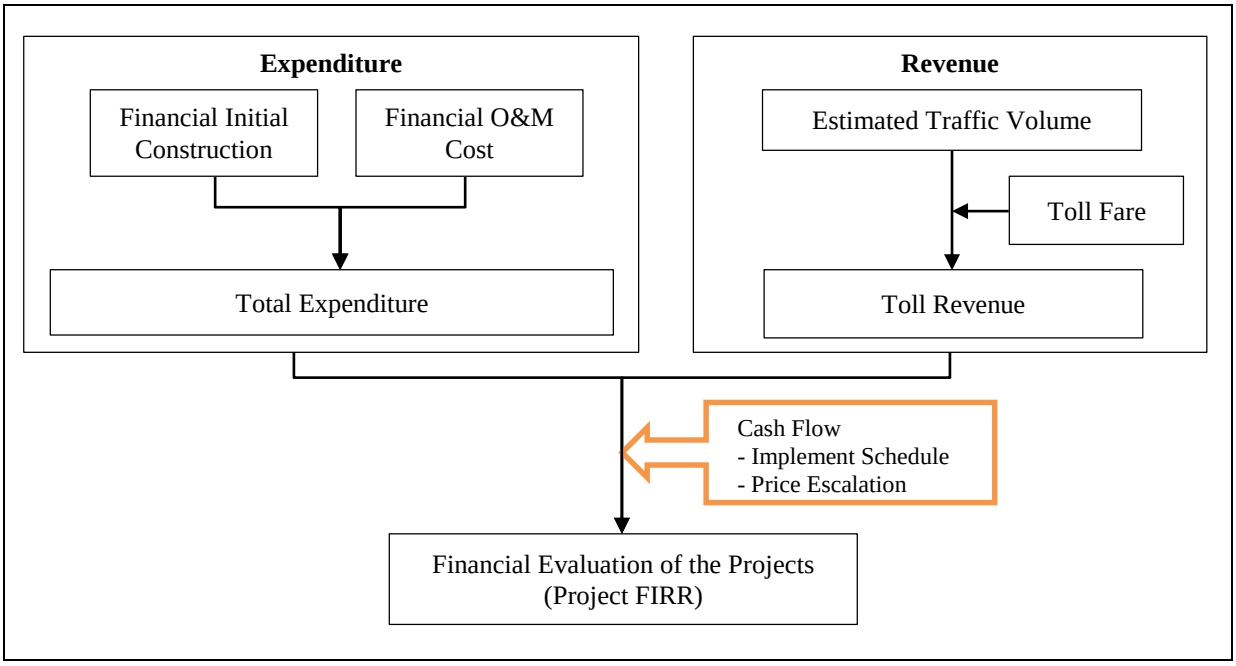
No.	Project Name	Indicators of Economic Analysis		
		EIRR (%)	CBR	ENPV (PhP million)
49	Gen. San-Cotabato High Standard Highway 2	15.6%	1.72	18,334
50	Cotabato-Zamboanga High Standard Highway 1	14.0%	1.29	3,145
51	Cotabato-Zamboanga High Standard Highway 2	11.0%	1.42	9,816
52	Cotabato-Zamboanga High Standard Highway 3	12.4%	1.23	8,445
53	Cotabato-Zamboanga High Standard Highway 4	11.0%	1.29	16,088

Source: JICA Study Team

12.5 Financial Evaluation

The Project Financial Internal Rate of Return (FIRR) is calculated to determine the balance between expenditure and revenue of the proposed projects. JICA Study Team undertook the financial analysis for proposed highway projects as shown in **Table 12.4-1**.

The framework of financial analysis is shown in **Figure 12.5-1**.



Source: JICA Study Team

Figure 12.5-1 Workflow of Financial Analysis

12.5.1 Assumptions for Parameters for Financial Analysis

Assumptions for parameters for financial analysis are shown in **Table 12.5-1**. The analysis of the FIRR depends upon the conditions as shown in the Table below.

Table 12.5-1 Assumptions for Parameters for Financial Analysis

Item	Description	Detail	Term/Amount
I. Implementation Schedule			
1	Preparation Stage	Detailed Design	1 year (2021)
		ROW Acquisition	1 year (2021)
2	Construction Stage	Same period of proposed highway	2.5 years (2022-2024)
3	Operation Stage	Operation and Maintenance	30 years (2025-2054)
II. Revenue			
4	Fare Setting (based on TPLEX toll fee)	Class-1	3.5 Pesos/km
		Class-2	8.7 Pesos/km
		Class-3	10.5 Pesos/km
5	Revenue	-	As given in **Table** 12.5-2
III. Expenditure			
6	Inflation Rate	Estimated by PSA	2.6%/year
7	Construction Cost	-	As given in **Table 12.4-3**
8	Consultancy Service Cost	Detailed Design	
		Construction Supervision	
9	Administrative Cost	-	Project Cost*3.0%
10	Operation & Maintenance (O&M) Cost (as given in **Table 12.4-4**)	Routine Operation	O&M Cost was estimated by NLEX actual Cost
		Routine Maintenance	
		Periodic 5years Maintenance	Construction Cost*1.9%
		Periodic 15years Maintenance	Construction Cost*2.0%

Table 12.5-2 Estimated Revenue

No.	Project Name	Revenue (PhP Million /Year)	
		2025	2040
1	Ilocos High Standard Highway 1 (TPLEX Extension)	1,040	1,687
2	Ilocos High Standard Highway 2	736	1,044
3	Ilocos High Standard Highway 3	1,040	2,072
4	Northern East-West High Standard Highway 1	712	938
5	Northern East-West High Standard Highway 2	669	864
6	Cagayan Valley High Standard Highway 1	2,670	3,578
7	Cagayan Valley High Standard Highway 2	343	575
8	Dalton Pass East Alignment Alternative Road Project	1,184	1,868
9	NLEE Phase 1 and Phase 2	1,168	1,899
10	NLEE Phase 1 and Phase 2	2,108	3,349
11	Central Luzon Link High Standard Highway (CLLEX) Phase II	1,026	1,550
12	2nd Central Luzon Link High Standard Highway	697	1,223
13	NLEX Phase 3	804	1,044
14	C6 High Standard Highway 1 (South East Metro Manila High Standard Highway)	2,584	5,142
15	C5 High Standard Highway 1	1,106	2,462
16	Laguna Lakeshore High Standard Highway	2,009	3,830
17	Laguna De Bay Crossing High Standard Highway 1	976	1,835
18	Laguna De Bay Crossing High Standard Highway 2	407	685
19	Cavite-Tagaytay High Standard Highway	333	476
20	Quezon-Bicol High Standard Highway 1	1,299	1,949
21	Quezon-Bicol High Standard Highway 2	1,528	2,144
22	Bicol High Standard Highway I	1,043	1,550
23	Bicol High Standard Highway II	364	577
24	Panay High Standard Highway 1	613	822

No.	Project Name	Revenue (PhP Million /Year)	
		2025	2040
25	Panay High Standard Highway 2	995	1,457
26	Panay High Standard Highway 3	543	916
27	Panay High Standard Highway 4	474	751
28	Negros High Standard Highway 1	445	739
29	Negros High Standard Highway 2	541	712
30	Metro Cebu High Standard Highway	2,107	2,958
31	Samar-Leyte High Standard Highway 1	765	1,138
32	Samar-Leyte High Standard Highway 2	567	831
33	Samar-Leyte High Standard Highway 3	212	275
34	Samar-Leyte High Standard Highway 4	771	1,208
35	Samar-Leyte High Standard Highway 5	237	380
36	Surigao-Butuan High Standard Highway	453	752
37	Butuan-Tagum High Standard Highway 1	1,343	2,422
38	Butuan-Tagum High Standard Highway 2	1,891	3,358
39	Tagum-Davao-Digos High Standard Highway 1 (Davao City By-Pass)	2,125	3,243
40	Tagum-Davao-Digos High Standard Highway 2	791	958
41	Digos-Gen. San High Standard Highway	1,458	2,636
42	North Mindanao High Standard Highway I - 1	963	1,857
43	North Mindanao High Standard Highway I - 2	379	1,144
44	North Mindanao High Standard Highway II - 1	1,496	2,199
45	North Mindanao High Standard Highway II - 2	1,013	1,527
46	Central Mindanao High Standard Highway 1	1,482	2,294
47	Central Mindanao High Standard Highway 2	3,775	5,180
48	Gen. San-Cotabato High Standard Highway 1	1,348	2,071
49	Gen. San-Cotabato High Standard Highway 2	799	1,588
50	Cotabato-Zamboanga High Standard Highway 1	493	620
51	Cotabato-Zamboanga High Standard Highway 2	836	1,254
52	Cotabato-Zamboanga High Standard Highway 3	906	1,544
53	Cotabato-Zamboanga High Standard Highway 4	1,319	2,278

Source: Estimated by JICA Study Team

12.5.2 Project FIRR

(1) Indicator of Financial Analysis

The following financial indicators: Project FIRR (Financial Internal Rate of Return) of each project was calculated based on calculation formula and the results are shown in **Table 12.5-3**. The following FIRR are set for the examination of financial viability.

Table 12.5-3 Indicator of Financial Analysis

No.	Area	Project Name	Project FIRR
1	Luzon	Ilocos High Standard Highway 1 (TPLEX Extension)	4.3%
2		Ilocos High Standard Highway 2	Negative
3		Ilocos High Standard Highway 3	Negative
4		Northern East-West High Standard Highway 1	Negative
5		Northern East-West High Standard Highway 2	Negative
6		Cagayan Valley High Standard Highway 1	Negative
7		Cagayan Valley High Standard Highway 2	Negative
8		Dalton Pass East Alignment Alternative Road Project	Negative
9		NLEE Phase 1 and Phase 2	5.4%
10		NLEE Phase 1 and Phase 2	7.5%
11		Central Luzon Link High Standard Highway (CLLEX) Phase II	7.0%

No.	Area	Project Name	Project FIRR
12		2nd Central Luzon Link High Standard Highway	2.1%
13		NLEX Phase 3	1.1%
14		C6 High Standard Highway 1 (South East Metro Manila High Standard Highway)	5.7%
15		C5 High Standard Highway 1	2.4%
16		Laguna Lakeshore High Standard Highway	Negative
17		Laguna De Bay Crossing High Standard Highway 1	Negative
18		Laguna De Bay Crossing High Standard Highway 2	Negative
19		Cavite-Tagaytay High Standard Highway	Negative
20		Quezon-Bicol High Standard Highway 1	1.4%
21		Quezon-Bicol High Standard Highway 2	Negative
22		Bicol High Standard Highway I	Negative
23		Bicol High Standard Highway II	Negative
24	Visayas	Panay High Standard Highway 1	0.6%
25		Panay High Standard Highway 2	Negative
26		Panay High Standard Highway 3	Negative
27		Panay High Standard Highway 4	Negative
28		Negros High Standard Highway 1	Negative
29		Negros High Standard Highway 2	Negative
30		Metro Cebu High Standard Highway	2.9%
31		Samar-Leyte High Standard Highway 1	Negative
32		Samar-Leyte High Standard Highway 2	Negative
33		Samar-Leyte High Standard Highway 3	Negative
34		Samar-Leyte High Standard Highway 4	Negative
35		Samar-Leyte High Standard Highway 5	Negative
36	Mindanao	Surigao-Butuan High Standard Highway	Negative
37		Butuan-Tagum High Standard Highway 1	4.2%
38		Butuan-Tagum High Standard Highway 2	3.8%
39		Tagum-Davao-Digos High Standard Highway 1 (Davao City By-Pass)	10.7%
40		Tagum-Davao-Digos High Standard Highway 2	3.8%
41		Digos-Gen. San High Standard Highway	3.4%
42		North Mindanao High Standard Highway I - 1	Negative
43		North Mindanao High Standard Highway I - 2	Negative
44		North Mindanao High Standard Highway II - 1	0.5%
45		North Mindanao High Standard Highway II - 2	Negative
46		Central Mindanao High Standard Highway 1	2.0%
47		Central Mindanao High Standard Highway 2	3.7%
48		Gen. San-Cotabato High Standard Highway 1	1.1%
49		Gen. San-Cotabato High Standard Highway 2	0.1%
50		Cotabato-Zamboanga High Standard Highway 1	Negative
51		Cotabato-Zamboanga High Standard Highway 2	Negative
52		Cotabato-Zamboanga High Standard Highway 3	Negative
53		Cotabato-Zamboanga High Standard Highway 4	Negative

Source: JICA Study Team

12.6 Preliminary Design

12.6.1 Preliminary Design of HSH Class-1

HSH Class-1 is designed preliminarily with reference to Topographical map. As it is difficult to identify the bridge length, it was estimated based on the parallel national road's bridge length. Summary of project lengths based on the preliminary design is shown in **Table 12.6-1**.

Table 12.6-1 Proposed HSH Class-1 Preliminary Design Road/Bridge Length

No.	Project Name	Section	No. of Lane	Length (Km)	Type of Area/Structure (km)					No. of Interchange	No. of Crossing Major Road
					Road(Flat)	Road(Mont')	PC Bridge	SpecialBridge	Tunnel		
1	Ilocos High Standard Highway 1 (TPLEX Extension)	Rosario-San Fernando City	4	48.17	17.89	28.00	2.28	0.00	0.00	3	6
2	Ilocos High Standard Highway 2	San Fernando City-Tagudin	4	46.81	14.59	30.00	2.22	0.00	0.00	3	4
3	Ilocos High Standard Highway 3	Tagudin-Laoag City	4	142.86	65.08	73.00	4.78	0.00	0.00	5	15
4	Northern East-West High Standard Highway 1	Laoag City-Claveria	4	89.18	52.02	32.00	5.16	0.00	0.00	2	8
5	Northern East-West High Standard Highway 2	Claveria-Lal-lo	4	92.12	28.79	58.00	5.33	0.00	0.00	2	12
6	Cagayan Valley High Standard Highway 1	Bayombong-Tuguegarao City	4	175.35	87.19	80.00	8.16	0.00	0.00	6	10
7	Cagayan Valley High Standard Highway 2	Tuguegarao City-Allacapan	4	60.07	57.27	0.00	2.80	0.00	0.00	4	9
8	Dalton Pass East Alignment Alternative Road Project	San Jose City-Bayombong	4	89.82	16.47	63.00	2.35	0.00	8.00	3	5
9	NLEE Phase 1 and Phase 2	Quezon City-San Rafael	4	46.48	44.97	0.00	1.51	0.00	0.00	6	9
10	NLEE Phase 1 and Phase 2	San Rafael-Cabanatuan City	4	62.06	58.85	0.00	2.21	1.00	0.00	5	11
11	Central Luzon Link High Standard Highway (CLLEX) Phase II	Cabanatuan City-San Jose City	4	31.05	29.59	0.00	1.46	0.00	0.00	3	1
12	2nd Central Luzon Link High Standard Highway	Angeles City-San Miguel	4	41.34	40.00	0.00	1.34	0.00	0.00	7	6
13	NLEX Phase 3	San Fernando City-Dinalupihan	4	34.12	31.45	0.00	2.67	0.00	0.00	4	9
14-1	C6 High Standard Highway 1 (South East Metro Manila High Standard Highway)	Metro Manila-Rizal	6	41.08	37.08	0.00	3.00	1.00	0.00	7	0
14-2	C6 High Standard Highway 2 (South East Metro Manila High Standard Highway)	Metro Manila-Rizal-Bulacan	6	54.99	51.87	0.00	2.12	1.00	0.00	7	0
15-1	C5 High Standard Highway 1	Taguig City-Quezon City	6	15.50	1.00	0.00	12.50	2.00	0.00	5	0
15-2	C5 High Standard Highway 2	NLEX Segment 8.2	6	7.53	0.00	0.00	6.00	1.53	0.00	2	0
16-1	Laguna Lakeshore High Standard Highway 1	Taguig City-Pila	6	70.32	30.32	0.00	40.00	0.00	0.00	10	0
16-2	Laguna Lakeshore High Standard Highway 2	Access Road	6	1.09	0.59	0.00	0.50	0.00	0.00	1	1
16-3	Laguna Lakeshore High Standard Highway 3	Access Road	6	0.87	0.47	0.00	0.40	0.00	0.00	1	1
16-4	Laguna Lakeshore High Standard Highway 4	Access Road	6	5.23	2.73	0.00	2.50	0.00	0.00	1	4
16-5	Laguna Lakeshore High Standard Highway 5	Access Road	6	5.08	2.58	0.00	2.50	0.00	0.00	1	1
17	Laguna De Bay Crossing High Standard Highway 1	Taytay-Pila	4	59.56	27.66	0.00	3.50	28.40	0.00	9	4
18	Laguna De Bay Crossing High Standard Highway 2	Pila-Lucena City	4	43.73	32.32	10.00	1.41	0.00	0.00	2	11
19	Cavite-Tagaytay High Standard Highway	Tagaytay City-CALAEx	4	31.68	6.65	24.00	1.03	0.00	0.00	6	10
20	Quezon-Bicol High Standard Highway 1	Lucena City-Lopez	4	71.84	43.63	27.00	1.21	0.00	0.00	5	7
21	Quezon-Bicol High Standard Highway 2	Lopez-Naga City	4	137.38	120.04	15.00	2.34	0.00	0.00	6	6
22	Bicol High Standard Highway I	Naga City-Legaspi City	4	81.79	55.02	25.00	1.77	0.00	0.00	4	17
23	Bicol High Standard Highway II	Legaspi City-Matnog	4	76.72	49.81	20.00	1.91	5.00	0.00	4	16
24	Panay High Standard Highway 1	Iloilo City-Pototan	4	35.28	34.56	0.00	0.72	0.00	0.00	2	11
25	Panay High Standard Highway 2	Pototan-Roxas City	4	76.87	75.31	0.00	1.56	0.00	0.00	5	7
26	Panay High Standard Highway 3	Panitan-Numancia	4	56.50	55.11	0.00	1.39	0.00	0.00	4	2
27	Panay High Standard Highway 4	Numancia-Malay	4	51.85	50.57	0.00	1.28	0.00	0.00	4	12
28-1	Negros High Standard Highway 1	Silay City-Valladolid	4	45.33	43.72	0.00	1.61	0.00	0.00	3	7
28-2	Negros High Standard Highway 1	Bacolod City (Access Road)	4	6.89	6.67	0.00	0.22	0.00	0.00	1	4
29	Negros High Standard Highway 2	Valladolid-Kabankalan City	4	57.32	55.29	0.00	2.03	0.00	0.00	4	5
30-1	Metro Cebu High Standard Highway	Naga City-Danao City	4	24.16	13.46	10.00	0.70	0.00	0.00	3	4
30-2	Metro Cebu High Standard Highway	Naga City-Danao City	4	23.17	3.60	10.00	0.67	5.30	3.60	3	4
30-3	Metro Cebu High Standard Highway	Naga City-Danao City	4	11.34	6.01	5.00	0.33	0.00	0.00	1	2
31	Samar-Leyte High Standard Highway 1	Allen-Catbalogan City	4	104.43	91.17	9.00	4.26	0.00	0.00	6	4
32	Samar-Leyte High Standard Highway 2	Catbalogan City-Santa Rita	4	72.01	49.07	20.00	2.94	0.00	0.00	3	2
33	Samar-Leyte High Standard Highway 3	Santa Rita-Tacloban City	4	14.82	13.82	0.00	0.00	1.00	0.00	1	3
34	Samar-Leyte High Standard Highway 4	Tacloban City-Mahaplag	4	77.24	59.09	15.00	3.15	0.00	0.00	3	12
35	Samar-Leyte High Standard Highway 5	Mahaplag-San Ricardo	4	88.74	34.19	50.00	4.55	0.00	0.00	8	2
36	Surigao-Butuan High Standard Highway	Surigao City-Butuan City	4	106.38	72.71	30.00	3.67	0.00	0.00	6	7
37	Butuan-Tagum High Standard Highway 1	Tagum City-Trento	4	83.35	82.10	0.00	1.25	0.00	0.00	5	11
38	Butuan-Tagum High Standard Highway 2	Trento-Butuan City	4	117.90	115.15	0.00	2.75	0.00	0.00	7	5
40	Tagum-Davao-Digos High Standard Highway 2	Panabo City-Tagum City	4	26.52	26.02	0.00	0.50	0.00	0.00	2	4
41	Digos-Gen. San High Standard Highway	Digos City-Gen Santos City	4	77.42	41.79	35.00	0.63	0.00	0.00	6	17
42	North Mindanao High Standard Highway I - 1	Cagayan De Oro City-Gingoog City	4	82.65	28.98	50.00	2.67	0.00	1.00	4	17
43-1	North Mindanao High Standard Highway I - 2	Gingoog City-Butuan City	4	71.58	54.27	15.00	2.31	0.00	0.00	4	3
43-2	North Mindanao High Standard Highway I - 3	Butuan City (Access Road)	4	3.72	3.60	0.00	0.12	0.00	0.00	1	0
44	North Mindanao High Standard Highway II - 1	Cagayan De Oro City-Iligan City	4	61.65	22.67	30.00	1.98	2.00	5.00	5	4
45	North Mindanao High Standard Highway II - 2	Iligan City-Pagadian City	4	107.23	68.77	35.00	3.46	0.00	0.00	6	16
46	Central Mindanao High Standard Highway 1	Cagayan De Oro City-Malaybalay City	4	66.19	31.05	30.00	2.14	3.00	0.00	5	4
47	Central Mindanao High Standard Highway 2	Malaybalay City-Davao City	4	142.01	89.43	48.00	4.58	0.00	0.00	8	19
48	Gen. San-Cotabato High Standard Highway 1	Gen. Santos City-Isulan	4	90.17	87.89	0.00	2.28	0.00	0.00	4	16
49	Gen. San-Cotabato High Standard Highway 2	Isulan-Cotabato City	4	78.85	76.86	0.00	1.99	0.00	0.00	6	4
50	Cotabato-Zamboanga High Standard Highway 1	Zamboanga City	4	34.92	34.26	0.00	0.66	0.00	0.00	3	7
51	Cotabato-Zamboanga High Standard Highway 2	Zamboanga City-Ipil	4	78.99	77.50	0.00	1.49	0.00	0.00	4	4
52	Cotabato-Zamboanga High Standard Highway 3	Ipil-Pagadian City	4	116.15	68.84	45.00	2.31	0.00	0.00	5	5
53	Cotabato-Zamboanga High Standard Highway 4	Labangan-Cotabato City	4	138.17	98.54	35.00	4.63	0.00	0.00	9	10
39	Tagum-Davao-Digos High Standard Highway 1 (Davao City By-Pass)	Digos City-Panabo City	4	76.62	45.18	30.00	1.44	0.00	0.00	4	18
			Total=	**3,970.24**	**2,723.18**	**987.00**	**191.23**	**51.23**	**17.60**	**269**	**435**

12.6.2 Preliminary Design of HSH Class-2

Based on the DPWH's road inventory data (Atlas 2017) and satellite map, the following sections were identified:

- Widening Section
- New Road and New Bypass
- Improvement of 2-lane or 4-lane road
- No improvement (Completed widening section or no need improvement due to low traffic)

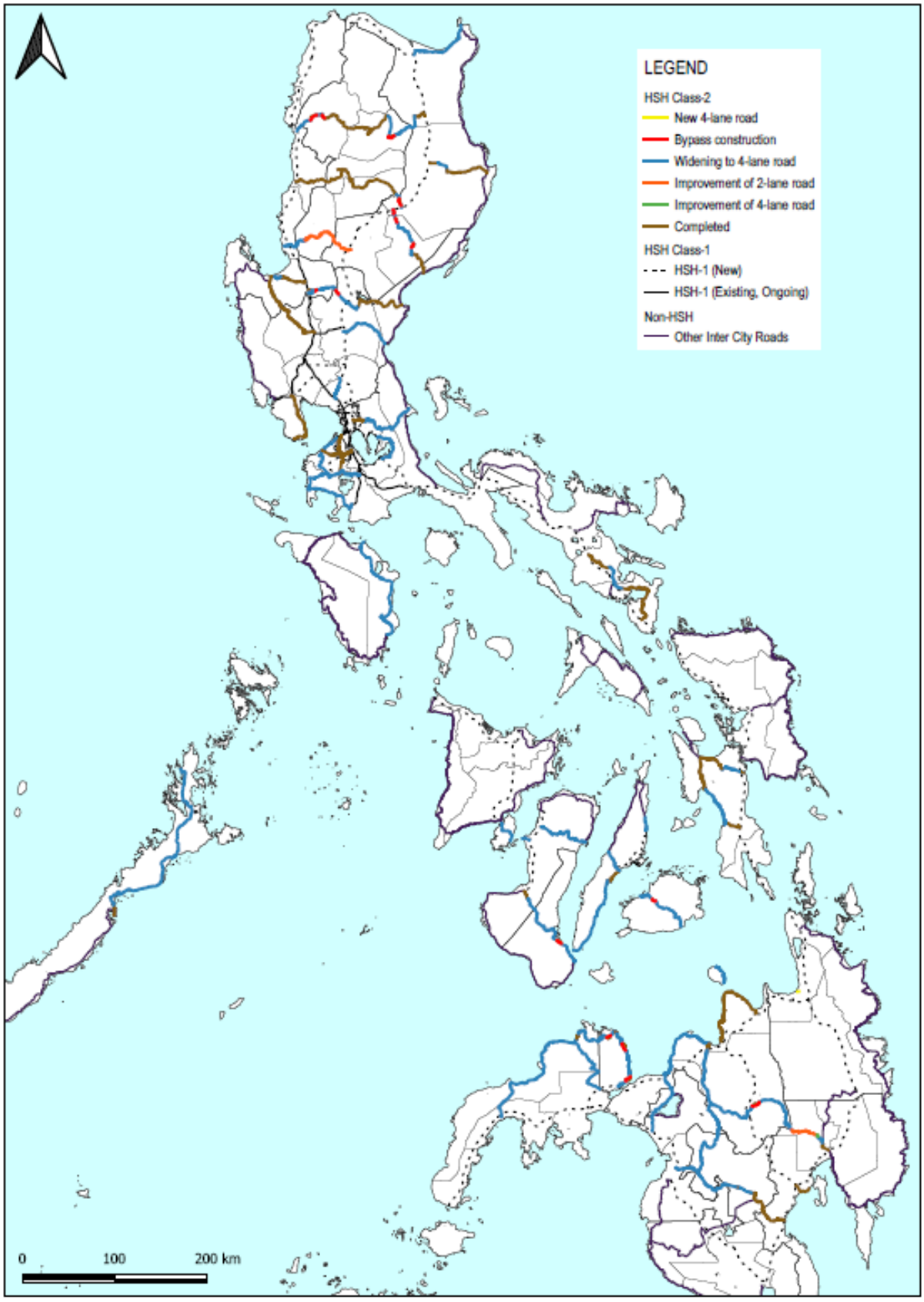
Figure 12.6-1 shows the proposed HSH Class-2 map.

As shown in **Table 12.6-2**, widening length is 2,958 km, new road length is 195 km and road improvement length is 155 km.

Table 12.6-2 HSH Class-2 Proposed Road Design Length (km)

Area	Widening	New road	Road Improvement	No Improvement	Total
Luzon	1,358.0	55.0	102.3	958.7	2,474.0
Visayas	530.1	59.0	0.0	86.2	675.3
Mindanao	1,069.4	80.8	52.8	182.1	1,385.1
Total	**2,957.5 (65.2%)**	**194.8 (4.3%)**	**155.2 (3.4%)**	**1,227.0 (27.1%)**	**4,622.1 (100.0%)**

Source: JICA Study Team



Source: JICA Study Team

Figure 12.6-1 Proposed HSH Class-2 Road Project

Table 12.6-3 Proposed HSH Class-2 Preliminary Design Road/Bridge Length

No.	Road Name	Section	Road Class	Total Length(km)	Total Bridge Length(km)	Road Improvement (km)						No. of FO
						Widening Road Secion		Estimate New Road Secion(Bypass or New Road)		improvement of 2lane	improvement of 4lane	
						Road	Bridge	Road	Bridge	Road	Road	
1	Dugo-San Vicente Road	Lal-lo - Santa Ana	Secondary	76.70	1.83	76.67	1.83		0.00			
2	Kalinga-Cagayan Rd/ Balbagan-Pinukpuk Rd/ Kalinga-Abra-Ilocos Sur Rd	Peñablanca-Tabuk City-Narvacan	1st 2nd 3rd	289.30	3.49	104.87	1.27	23.05	0.28			6
3	Tagudin-Cervantes Rd/ Mt Prov-Ilocos Sur Rd	Tagudin-Bontoc	Secondary	104.20	0.83		0.00		0.00			
4	Banaue-Mayoyao-A Lista-Isabela Bdry Rd/ Nueva Vizcaya-Ifugao-Mt Province Rd	Santiago City-Sagada	Secondary	168.30	0.95	8.68	0.05	7.89	0.04			3
5	Ilagan-Bigao-Palanan Rd	Ilagan City-Palanan	Tertiary	88.20	0.41	16.23	0.08		0.00			
6	Nueva Vizcaya-Benguet Rd/ Agoo-Baguio City Rd/ Marcos Hi-way	Aritao-Baguio City-Tubao	Secondary	143.10	1.75	44.21	0.54		0.00	102.31		
7	Cordon-Aurora Bdry Rd/ Dinadiawan-Madella Rd	Cordon-Dinadiawan	Secondary	112.50	1.32	53.52	0.63	13.36	0.16			4
8	Urdaneta Jct-Dagupan-Lingayen Rd	Urdaneta City-Lingayen	Primary	40.20	0.67	10.04	0.17		0.00			
9	Tarlac-Sta Rosa Rd/ Romulo H-way/ Pangasinan-Tarlac Rd	Tarlac City-Camiling-Lingayen	Primary	93.30	2.00		0.00		0.00			
10	Bakit-Bakit Jct-Umingan Rd/ Rizal-Pantabangan Rd/ Pantabangan-Canili-Basal-Baler Rd	Rosales-San Jose City-Baler	1st 2nd 3rd	153.20	2.46	127.74	2.05	10.04	0.16			4
11	Nueva Ecija-Aurora Rd/ Jct Tablang-Gabaldon Rd	Cabanatuan City-Dingalan	Secondary	62.50	1.27	64.53	1.31		0.00			
12	Plaridel Bypass Rd	Balagtas-San Rafael	Tertiary	24.60	0.00	24.46	0.00		0.00			
13	Roman Highway	Dinalupihan-Mariveles	Secondary	65.80	1.40		0.00		0.00			
14	Marcos Highway/ Marikina Div Rd/	Marikina City-Infanta	Tertiary	111.40	0.76	99.57	0.68		0.00			
15	Rizal Bdry-Famy-Quezon Rd/ Calamba-Sta Cruz-Famy Jct Rd	Pila-Pagsanjan-Pililla	1st 2nd	53.50	0.42	53.42	0.42		0.00			
16	Cavite-Batangas Rd	Bacoor City-Tagaytay City	Secondary	41.70	0.27		0.00		0.00			
17	Noveleta-Naic-Tagaytay Rd/ Maragondon-Magallanes-Amuyong Rd	Kawit-Alfonso	Secondary	67.30	0.60	67.13	0.60		0.00			
18	Dasmariñas-Trece Martires City-Naic Rd	Carmona-Naic	1st 2nd	37.60	1.24		0.00		0.00			
19	Tanauan-Talisay-Tagaytay Rd/ Tagaytay-Nasugbu Rd	Tanauan City-Tagaytay City-Nasugbu	Secondary	70.40	0.45	70.4	0.45		0.00			
20	Palico-Balayan-Batangas Rd/ Balayan-Balibago Rd/ Nasugbu-Lian-Calatagan Rd	Batangas City-Nasugbu	Secondary	80.00	1.01	79.01	1.00		0.00			
21	Daang Maharlika (LZ)	Polangui-Irosin	Primary	140.80	1.62	33.69	0.39		0.00			
22	Calapan South Rd	Calapan City-Mansalay	Secondary	153.80	2.05	153.34	2.04		0.00			
23	Puerto Princesa North Rd	Puerto Princesa City-El Nido	Secondary	267.60	2.25	254.88	2.14		0.00			
24	**Panay-Guimaras-Negros Link Bridge(New)**	Jordan-Sibunag		51.40	18.19	33.32	11.79		0.00			
25	Bacolod-Murcia-DS Benedicto-Sn Carlos City Rd	Bacolod City-San Carlos City	Primary	75.60	0.48	75.53	0.48		0.00			
26	Bago-Mambucal Rd	Bago City-Pulupandan	Tertiary	9.30	0.00	9.31	0.00		0.00			
27	Dumaguete North Rd/ Kabankalan-Bais Rd	Dumaguete City-Kabankalan City	Primary	125.80	1.00	110.53	0.88	5.72	0.05			3
28	N Bacalso Ave (Cebu South Rd)/ Cebu North Hagnaya Wharf Rd	Naga City-Danao City	Primary	13.80	0.30	13.5	0.29		0.00			2
29	Naga-Uling Rd/ Cebu-Toledo Wharf Rd	Naga City-Toledo City	Primary	27.50	0.17	20.9	0.13		0.00			
30	N Bacalso Ave (Cebu South Rd)	Naga City-Santander	Primary	115.90	0.70	97.59	0.59		0.00			
31	Jct (LIR) Carmen-Sagbayan-Bacani Rd/ Jct Dat-an-Carmen-Sierra Bullones-Jagna Rd	Tubigon-Carmen-Jagna	Secondary	86.10	0.68	82.14	0.65	4.48	0.04			2
32	Palo-Carigara-Ormoc Rd	Palo-Carigara-Ormoc City	Primary	97.10	1.23	24.66	0.31		0.00			
33	Ormoc-Baybay-Southern Leyte Bdry Rd/ Tacloban-Baybay South Rd	Ormoc City-Mahaplag	Primary	72.80	2.09	46.19	1.33		0.00			
34	**Butuan City-Coastal Road (New)**	Butuan City-Nasipit		32.00	0.00	0	0.00		0.00			
35	Camiguin Circumferential Rd	Mambajao-Mahinog-Guinsiliban	Secondary	24.40	0.21	24.28	0.21	29.33	0.25			7
36	Butuan City-Cagayan de Oro City-Iligan City Rd	Gingoog City-Tagoloan	Primary	110.70	2.82		0.00		0.00			
37	Butuan City-Cagayan de Oro City-Iligan City Rd/ Misamis Oriental-Ma Cristina Bdry Rd	Cagayan De Oro City-Iligan City	Primary	92.60	1.16	92.45	1.16		0.00			
38	Ozamis-Pagadian Rd/ Ozamis-Oroquieta Rd/ Dipolog-Oroquieta National Rd	Dipolog City-Oroquieta City-Tangub City	Primary	160.80	1.91	145.46	1.73	19.67	0.23			5
39	Dipolog-Sindangan-Liloy Rd/ Liloy-Ipil Rd	Dipolog City-Sindangan-Ipil	Primary	168.30	3.37	168.02	3.36		0.00			
40	Dipolog-Punta-Dansullan-S Osmeña-Zamboanga del Norte/Sur Bdry Rd	Dipolog City-Sergio Osmeñ Sr.-Tambulig	Primary	92.40	0.66	92.2	0.66		0.00			
41	Iligan City-Marawi City Rd/ Marawi-Malabang Rd	Iligan City-Marawi City-Malabang	Primary	96.00	0.15	95.7	0.15		0.00			
42	CDO City-Dominorog-Camp Kibaritan Rd/ Molundo-Wao Rd/ Banisilan-Alamada-Libungan Rd	Cagayan De Oro City-Wao-Libungan	Secondary	196.40	0.53	187.9	0.51		0.00			
43	Tagum-Panabo Circum Rd/ Kapalong-Talaingod-Valencia Rd/ Maramag-Maradugao Rd/ Barandias-Dominorog Rd	Tagum City-Valencia City-Pangantucan-Kalilangan	1st 2nd	232.80	2.06	155.2	1.37	9.41	0.08	49.89	2.95	3
44	Davao-Cotabato Rd (Jct Digos-Cotabato Sect)	Digos City-Kidapawan City-Pikit-Sultan Kudarat	Primary	159.30	1.50	98.11	0.92		0.00			
45	**Davao Coastal Road (New) on-going**	Davao City	Secondary	19.40	51.62				0.00			
46	**Bataan Cavite Bridge(New)**			28.00	28.00							
TOTAL				***4,534.40***	***147.88***	***2,915.38***	***42.17***	***122.95***	***1.29***	***152.20***	***2.95***	***39***

Source: JICA Study Team

12.7 Cost Estimate

Preliminary cost for the project was estimated based on the preliminary design.

The Civil Works Cost, ROW Cost, Consultancy Cost, Administration Cost, Operation and Maintenance Cost were estimated based on several factors. Unit prices used were based from similar GOP and BOT projects implemented or tendered by DPWH from 2017-2019 and unit prices for major items were estimated based on 2019 prices.

Procedures and composition for the derivation of base construction cost were patterned from similar projects. Each Project Implementation Cost for nominated High Standard Highway Project was estimated based on following condition:

12.7.1 Method of Cost Estimation

Implementation Cost was estimated through the following method:

Cost estimate uses unit price for the "base cost" approach, a method which is generally adopted for similar projects and some major item is estimated.

Implementation Cost estimate was based on the following:

(1) Estimation of Unit Cost

The Civil Work unit cost estimate is composed of the direct cost and indirect cost. The computations are in accordance with the DPWH Standard Specifications implementing guidelines and memorandum order relative to unit price analysis.

1) Cost of Material

Materials are classified into two groups: commercial materials, available in the international and/or local markets and materials produced by the contractor. The price of purchased materials are based on the quotations of various suppliers or agencies such as the Price Stabilization Council, the local markets, international and/or local prices of selected materials, the National Steel Corporation, and other private sector sources. The cost of transportation to the site is added to these costs. The costs of processed materials are estimated based on the analysis of outputs of necessary equipment, labor, royalties, and other items in accordance with recommended construction procedures.

2) Cost of Equipment

The cost of equipment is based on "The Association of Construction Equipment Lessors, Inc." (ACEL) rental rates including operator's wages, fringe benefits, fuel, oil, lubricants and equipment maintenance.

3) Cost of Labor

Labor costs used in the analysis are the wages authorized by the Department of Labor and Employment. All fringe benefits such as vacation and sick leaves, Workmen's Compensation Act, GSIS and SSS contributions, allowances, bonus, etc. are taken into account.

4) Indirect Costs

According to the Department Order No. 197/2016 of DPWH, the indirect costs consider the following conditions:

- Mobilization and demobilization (less than 1.0 % of direct cost)
- Value Added Tax (VAT): 5.0% of total Direct and Indirect Cost.
- Mark-Up (16% of Estimated Direct Cost)
  - Overhead Expenses: 7.0% of Estimated Direct Cost
  - Contingencies: 0.5% of Estimated Direct Cost
  - Miscellaneous Expenses: 0.5% of Estimated Direct Cost
  - Profit: 8.0% of Estimated Direct Cost

5) List of Unit Cost Estimation

List of Unit Cost Estimation is shown in **Table 12.7-1**.

Table 12.7-1 List of Unit Cost for Project

Description	Unit	Unit Cost
PART C - EARTHWORKS		
Clearing and Grubbing	ha	291,964.48
Structure Excavation, Common Material	cu.m.	753.97
Back fill	cu.m.	1,328.46
Roadway Excavation (Common Soil)	cu.m.	642.11
Roadway Excavation (Soft Rock)	cu.m.	963.16
Embankment from Roadway Excavation	cu.m.	242.33
Subgrade Preparation	sq.m	30.06
Embankment From Borrow Excavation	cu.m.	1,208.34
PART D - SUBBASE AND BASE COURSE		
Aggregate Subbase Course	cu.m.	1,530.27
Crushed Aggregate Base Course	cu.m.	1,765.50
Cement Treated Base Course	cu.m.	2,800.44
PART E - SURFACE COURSES		
Bituminous Prime Cost, MC-701 (1.0 L/m2)	sq.m	36.38
Bituminous Tack Coat, Emulsified Asphalt, SS-1 (0.45 L/m2)	sq.m	33.07
Anti-Rutting Bituminous Concrete Binder Course, Hot Laid (t=5 cm)	sq.m	1,010.31
Anti-Rutting Bituminous Wearing Concrete Course, Hot Laid (t=5 cm)	sq.m	1,087.45
Polymer Asphalt Concrete III-WF Type (t=4 cm)	sq.m	11,718.11
Portland Cement Concrete Reinforced with Wire Mesh Pavement, 320mm thk.	sq.m	2,505.52
Concrete Piles case in Drilled Holes (1000mm) excluding Re-Bar	l.m.	19,980.16
Concrete Piles case in Drilled Holes (1500mm) excluding Re-Bar	l.m.	32,825.62
Concrete Piles case in Drilled Holes (1800mm) excluding Re-Bar	l.m.	41,675.04
Concrete Piles case in Drilled Holes (2000mm) excluding Re-Bar	l.m.	50,301.23
Railing, (Concrete Bridge Railing)	l.m.	6,008.30
Reinforcing Steel, Grade 60 (Bridge)	kg	76.68
Lean Concrete, 17MPa	cu.m.	4,888.50
Structural Concrete Class AA 28MPa for Pile Cap	cu.m.	6,747.60
Structural Concrete Class AA 28MPa for Column	cu.m.	13,995.89
Structural Concrete Class AA P 38MPa for Coping	cu.m.	20,024.50
Structural Concrete Class AA 28MPa for Diaphragm	cu.m.	22,025.16
Structural Concrete Class AA 28MPa for Deck Slab	cu.m.	9,171.97
Structural Concrete Class AA 28MPa for Abutment, Wing wall	cu.m.	11,553.26
Structural Concrete Class AA 21MPa for Parapet, Curb, Median	cu.m.	10,111.06
Structural Concrete Class AA 28MPa for Box Culvert	cu.m.	10,176.97
Non Shrink Grout 41MPa	cu.m.	96,554.59
PSC Member (AASHTO Girder Type V) L = 35 m	each	1,395,023.20
Prestressing Steel	kg	183.48
Structural Steel (Super Structure)	kg	218.23
Structural Steel (Sub Structure)	kg	207.32
SBHS Steel (include Special Election)	ton	500,000.00
Special Paint	sqm.	15,000.00
Elastomeric Bearing Pad (606x 306 x 60mm)	pcs	5,596.26
Elastomeric Bearing Pad (800 x 800 x 60mm)	pcs	19,507.65
Rubber Filler (400 x 150 x 50mm)	each	1,039.00
Hard Rubber Filler & Restrainer Bolts Dia 30mm	sets	1,888.57
Concrete Barrier (New Jersey Type)	l.m	5,592.66
Cast Iron Deck Drain	each	23,615.48

Description	Unit	Unit Cost
Collector Pipe (150mm dia PVC)	l.m.	950.04
Collector Pipe (200mm dia PVC)	l.m.	1,383.84
Expansion Joint, Type A (M80 Multiplex)	lm.	35,302.36
Metal Decking (8 mm thk)	sqm.	2,913.90
Side Walk	sqm.	720.00
RCPC, 1220 mm dia	lm.	8,406.67
Drainage (Grouted Riprap Class A Slide Ditch)	lm	4,553.05
Slope Net with Seeding for Common Soil on Fill	sqm	310.00
Slope Net with Seeding for Common Soil on Cut	sqm	510.00
Slope Net with Seeding for Soft Rock	sqm	630.00
PART H - MISCELLENEOUS STRUCTURES		
ROW Fence	lm	1,681.00
Traffic Sign and Safety Facilities	lm.	10,129.75
Road Lighting	each	190,406.32
PART I- TUNNEL AND TUNNEL FACILITIES		
Main Tunnel Construction for One Cell (2 Lanes)	im	1,045,000.00
Evacuation Tunnel Construction	im	187,000.00
Tunnel Facilities for One Cell	im	172,000.00
PART J- TOLL PLAZA AND SERVICE AREA		
Portable Weighing Station	set	4,277,373.88
Toll Island	each	165,870.88
Crash Attenuators	set	54,935.15
Toll Booth (Type 1)	each	464,645.32
Toll Booth (Maxi Type 2)	each	1,010,267.24
Toll Plaza	sq.m.	26,106.00
Toll Collection System	l.s.	48,000,000.00
Traffic Control System	l.s.	300,000,000.00
Toll Plaza Lighting System	each	369,430.48
Toll Operation Building	l.s.	120,000,000.00
Toll House	Unit	5,400,000.00

Source: JICA Study Team

(2) Preliminary Quantity Estimation for Civil Work Item

Preliminary Quantities for Civil Work Cost for each type of High Standard Highway Category were estimated based on preliminary design. Based on these estimated quantities, Base Civil Work Cost per km or per 100m for each category of High Standard Highway was estimated.

(3) Base Civil Work Cost Estimation

Base Civil Work Cost for per km or per 100m for each category of High Standard Highway was estimated and the result of civil work cost for each category is shown in **Table 12.7-2** to **Table 12.7-5**. Break down of cost estimate is shown in **Appendix 12**.

Table 12.7-2 Base Unit Cost of Major Construction Items HSH Class-1 (R) and (U) Highway

Unit: PhP Million/Km

Item	HSH Class-1 (R) 6 Lanes Inter Regional Highway	HSH Class-1 (R) 4 Lanes Inter Regional Highway	HSH Class-1 (U) 6 Lanes Urban Highway	HSH Class-1 (U) 4 Lanes Urban Highway
Embankment Section	258.80	211.50	175.11	134.11
Cut Section	335.44	279.15	180.64	147.79
Steel Box Viaduct: Second Level	3,679.27	2,835.34	3,408.43	2,542.99
Concrete Viaduct: Second Level	1,987.31	1,537.20	1,843.32	1,377.77
Tunnel (2 Cell for 2 lanes each include Evacuation Tunnel)	2,686.53	2,686.53	2,686.53	2,686.53
Traffic Control System & Toll Correction System *	701.51	688.53	701.51	688.53
Long Span for over sea or water **	1,468.33	1,132.00	-	-

Note: * *This Unit Cost is Million Peso/Set, * * This Unit Cost is Million Peso/100m

Source: JICA Study Team

Table 12.7-3 Base Unit Cost of Major Construction Items HSH Class-2 Regional Standard Highway

Unit: PhP Million/Km

Item	HSH Class-2 4 Lanes Inter-Urban Section	HSH Class-2 4 Lanes Urban Section
Embankment Section	177.89	125.71
Cut Section	228.48	-
Steel Box Viaduct: Second Level	2,528.82	3,010.84
Concrete Viaduct: Second Level	1,390.62	1,609.86
Tunnel (2 Cell for 2 lanes each include Evacuation Tunnel)	2,686.53	2,686.53

Source: JICA Study Team

Table 12.7-4 Base Unit Cost of Major Construction Items HSH Class-2 Widening Section and Detour Section

Unit: PhP Million/Km

Item	HSH Class-2 Widening Inter-Urban Section	HSH Class-2 Widening Urban Section
Widening 4 Lane Both side	62.14	86.02
4 Lanes Detour Road	136.33	167.79
2 Lanes Detour Road	101.79	127.14
2 Lanes Bridge	641.80	939.76

Source: JICA Study Team

Table 12.7-5 Base Unit Cost of Interchange and Junction

Unit: PhP Million/Km

Item	Highway
Interchange (Trumpet Type)	270.93
Junction (Clover Type)	371.27

Source: JICA Study Team

12.7.2 Construction Cost

Construction Cost was estimated based on Base Civil Work Cost of per km or per 100m for each type of Highway for each category of High Standard Highway.

12.7.3 ROW Cost

Estimation for land acquisition cost was done using the market price based on Republic Act No.10752 published in May 2016. Market price is primarily estimated based on the formula of multiplying the zonal valuation provided by the Bureau of Internal Revenue (BIR) with a range of 200% to 250% by the affected area to arrive at a fair market value. Unit Cost for ROW acquisition for each Region was estimated to be used in the new construction of High Standard Highway Network.

The formula is as follows:

MV = Z*P
Where:
MV - Market Value
P - Ranges from 200 - 250% (The range depending on the actual location of a lot)
Z - Zonal Valuation per locality
LAC = MV*A
LAC - Land Acquisition Cost
A - Area of the lot to be acquired

Result of estimation of Market Value for each region is shown in **Table 12.7-6**.

Table 12.7-6 Unit Cost for ROW acquisition

Item		BIR Value A (PHP/m^2)	Market Value B=200% x A (PHP/m^2)
CAR	CR	4,000.00	8,000.00
	RR	3,500.00	7,000.00
	A	360.00	720.00
NCR	CR	25,000.00	50,000.00
	RR	13,500.00	27,000.00
	A	350.00	700.00
Region I	CR	900.00	1,800.00
	RR	500.00	1,000.00
	A	22.00	44.00
Region II	CR	300.00	600.00
	RR	300.00	600.00
	A	11.00	22.00
Region III	CR	4,500.00	9,000.00
	RR	3,000.00	6,000.00
	A	250.00	500.00
Region IV-A	CR	8,350.00	16,700.00
	RR	4,500.00	9,000.00
	A	250.00	500.00
Region IV-B	CR	3,100.00	6,200.00
	RR	1,550.00	3,100.00
	A	65.00	130.00

Item		BIR Value A (PHP/m^2)	Market Value B=200% x A (PHP/m^2)
Region V	CR	2,900.00	5,800.00
	RR	1,000.00	2,000.00
	A	18.00	36.00
Region VI	CR	5,500.00	11,000.00
	RR	2,200.00	4,400.00
	A	18.00	36.00
Region VII	CR	12,000.00	24,000.00
	RR	10,000.00	20,000.00
	A	250.00	500.00
Region VIII	CR	4,800.00	9,600.00
	RR	3,600.00	7,200.00
	A	5.00	10.00
Region IX	CR	5,250.00	10,500.00
	RR	1,580.00	3,160.00
	A	20.00	40.00
Region X	CR	4,750.00	9,500.00
	RR	3,750.00	7,500.00
	A	195.00	390.00
Region XI	CR	12,500.00	25,000.00
	RR	7,500.00	15,000.00
	A	125.00	250.00
Region XII	CR	7,425.00	14,850.00
	RR	1,360.00	2,720.00
	A	11.50	23.00
Region XIII	CR	435.00	870.00
	RR	350.00	700.00
	A	13.00	26.00

* ROW Cost will be used Market Price Based on BIR Value.
CR: Commercial Regular
RR: Residential Regular
A: Agricultural Lands

Source: JICA Study Team

Unit costs in the table are preliminary figures and actual compensation rates shall be determined through replacement cost survey (RCS) which will be implemented as a part of resettlement action plan (RAP) to fulfill JICA's policies on involuntary resettlement.

12.7.4 Project Implementation Cost

Project Implementation Cost is composed of Construction Cost, Consultancy Cost, ROW acquisition Cost, Project Administration Cost, Insurance Cost, Operation and Maintenance Cost.

The project Implementation cost for the priority project will be estimated through the following conditions:

(1) Construction Cost

Construction Cost will be estimated based on **Section 12.7.2** for each project.

(2) Consultancy Cost

a. Construction Cost is less than 10 billion pesos: D/D cost is 5% of Construction Cost and C/S cost is 7% of Construction Cost.

b. Construction Cost is from 10 billion pesos to 50 billion pesos: D/D cost is 4% of Construction Cost and C/S cost is 6% of Construction Cost.

c. Construction Cost is more than 50 billion pesos: D/D cost is 3% of Construction Cost and C/S cost is 5% of Construction Cost.

(3) ROW Acquisition Cost

ROW acquisition cost will be estimated based on **Section 12.7.3** for each project.

(4) Project Administration Cost

Project Administration Cost will be estimated at 3.5% of Construction Cost for each Project.

(5) Insurance Cost

All Risk Insurance Cost will be estimated at 1% of Construction Cost for each Project.

(6) Operation & Maintenance Cost

Operation and Maintenance Cost will be estimated based on the following conditions.

a. Maintenance Cost:

- Every Year 0.1% of Construction Cost
- Every 5 Years 1% of Construction Cost
- Every 15 Years 2% of Construction Cost
- Operation Cost
- National Road 1% of Construction Cost
- Toll Road 7% of Construction Cost

(7) Project Implementation Cost for each Project

Project Implementation cost was estimated based on the above conditions. See **Table 12.7-7** and **Table 12.7-8**.

Table 12.7-7 Construction Cost and ROW Acquisition Cost for only HSH Class-1

Unit: PhP million

NO.	PROJECT NAME	SECTION	LENGTH (Km)	ROW (m)	ROW Acquisition (sqm)	No. of Lane	Design Speed	No. of IC & JCT	No. of Crossing Road	Construction Cost										ROW Cost
										Road(Flat Area)	Road(Hill/Mountain)	PC Bridge	Special Bridge	Tunnel	Traffic Constrol &Toll	Interchange	Over or Underpass	Total	Mil. Php/km	
1	Ilocos High Standard Highway 1 (TPLEX Extension)	Rosario-San Fernando City	48.17	90	4,335,300	4	100km/h	7	6	3,784	7,816	3,505	0	0	689	1,897	553	**18,243**	378.7	4,552
2	Ilocos High Standard Highway 2	San Fernando City-Tagudin	46.81	90	4,212,900	4	100km/h	4	17	3,086	8,374	3,413	0	0	689	1,084	1,568	**16,662**	356.0	979
3	Ilocos High Standard Highway 3	Tagudin-Laoag City	142.86	90	12,857,400	4	100km/h	4	16	13,765	20,378	7,348	0	0	689	1,084	1,476	**43,279**	302.9	2,988
4	Northern East-West High Standard Highway 1	Laoag City-Claveria	89.18	60	535,080	4	80km/h	5	0	9,109	5,780	9,512	0	0	702	1,355	0	**26,457**	296.7	16,909
5	Northern East-West High Standard Highway 2	Claveria-Lal-lo	92.12	60	552,720	4	80km/h	2	0	5,041	10,477	9,825	0	0	702	542	0	**26,587**	288.6	17,466
6	Cagayan Valley High Standard Highway 1	Bayombong-Tuguegarao City	175.35	60	10,521,000	4	80km/h	7	0	15,268	14,451	15,041	0	0	702	1,897	0	**47,359**	270.1	35,035
7	Cagayan Valley High Standard Highway 2	Tuguegarao City-Allacapan	60.07	60	3,604,200	4	80km/h	7	0	10,029	0	5,161	0	0	702	1,897	0	**17,788**	296.1	12,002
8	Dalton Pass East Alignment Alternative Road Project	San Jose City-Bayombong	89.82	90	8,083,800	4	100km/h	6	10	3,483	17,586	3,612	0	21,492	689	1,626	922	**48,498**	540.0	645
9	NLEE Phase 1 and Phase 2	Quezon City-San Rafael	46.48	90	4,183,200	4	100km/h	4	9	9,511	0	2,321	0	0	689	1,084	830	**13,614**	292.9	334
10	NLEE Phase 1 and Phase 2	San Rafael-Cabanatuan City	62.06	90	5,585,400	4	100km/h	5	7	12,447	0	3,397	2,840	0	689	1,355	646	**20,734**	334.1	7,540
11	Central Luzon Link High Standard Highway (CLLEX) Phase II	Cabanatuan City-San Jose City	31.05	90	2,794,500	4	100km/h	6	6	6,258	0	2,244	0	0	689	1,626	553	**10,823**	348.6	3,773
12	2nd Central Luzon Link High Standard Highway	Angeles City-San Miguel	41.34	90	3,720,600	4	80km/h	3	5	8,460	0	2,060	0	0	689	813	461	**12,026**	290.9	3,907
13	NLEX Phase 3	San Fernando City-Dinalupihan	34.12	90	3,070,800	4	100km/h	3	6	6,652	0	4,104	0	0	689	813	553	**12,263**	359.4	429
14	C6 High Standard Highway 1 (South East Metro Manila High Standard Highway)	Metro Manila-Rizal	41.08	90	3,697,200	6	100km/h	3	4	7,843	0	4,612	2,840	0	689	813	369	**16,800**	408.9	516
15	C6 High Standard Highway 2 (South East Metro Manila High Standard Highway)	Metro Manila-Rizal-Bulacan	54.99	90	4,949,100	6	100km/h	5	15	10,971	0	3,259	2,840	0	689	1,355	1,383	**19,128**	347.8	691
16	C5 High Standard Highway 1	Taguig City-Quezon City	15.50	90	139,500	6	100km/h	9	4	212	0	19,215	5,680	0	689	2,438	369	**28,237**	1,821.8	425
17	C5 High Standard Highway 2	NLEX Segment 8.2	7.53	90	677,700	6	100km/h	2	11	0	0	9,223	4,345	0	689	542	1,015	**14,810**	1,966.8	915
18	Laguna Lakeshore High Standard Highway 1	Taguig City-Pila	70.32	60	1,687,680	6	100km/h	10	0	7,847	0	79,492	0	0	702	2,709	0	**90,750**	1,290.5	5,147
19	Laguna Lakeshore High Standard Highway 2	Access Road	1.09	60	6,540	6	100km/h	1	1	153	0	994	0	0	702	271	92	**2,120**	1,944.8	20
20	Laguna Lakeshore High Standard Highway 3	Access Road	0.87	60	52,200	6	100km/h	1	1	122	0	795	0	0	702	271	92	**1,890**	2,172.4	159
21	Laguna Lakeshore High Standard Highway 4	Access Road	5.23	60	313,800	6	100km/h	1	4	707	0	4,968	0	0	702	271	369	**6,651**	1,271.7	957
22	Laguna Lakeshore High Standard Highway 5	Access Road	5.08	60	304,800	6	100km/h	1	1	668	0	4,968	0	0	702	271	92	**6,609**	1,301.1	930
23	Laguna De Bay Crossing High Standard Highway 1	Taytay-Pila	59.56	90	5,360,400	4	100km/h	4	9	5,850	0	5,380	80,656	0	689	1,084	830	**93,668**	1,572.7	8,577
24	Laguna De Bay Crossing High Standard Highway 2	Pila-Lucena City	43.73	90	3,935,700	4	100km/h	6	9	6,836	2,791	2,167	0	0	689	1,626	830	**14,118**	322.8	4,132
25	Cavite-Tagaytay High Standard Highway	Tagaytay City-CALAEx	31.68	90	2,851,200	4	100km/h	5	11	1,407	6,700	1,583	0	0	689	1,355	1,015	**11,744**	370.7	2,994
26	Quezon-Bicol High Standard Highway 1	Lucena City-Lopez	71.84	90	6,465,600	4	100km/h	3	1	9,228	7,537	1,860	0	0	689	813	92	**20,127**	280.2	6,789
27	Quezon-Bicol High Standard Highway 2	Lopez-Naga City	137.38	90	12,364,200	4	100km/h	2	8	25,389	4,187	3,597	0	0	689	542	738	**34,412**	250.5	16,667
28	Bicol High Standard Highway I	Naga City-Legaspi City	81.79	90	7,361,100	4	101km/h	2	12	11,637	6,979	2,721	0	0	689	542	1,107	**22,579**	276.1	9,923
29	Bicol High Standard Highway II	Legaspi City-Matnog	76.72	90	6,904,800	4	80km/h	6	10	10,535	5,583	2,936	14,200	0	689	1,626	922	**35,578**	463.7	9,321
30	Panay High Standard Highway 1	Iloilo City-Pototan	35.28	60	2,116,800	4	80km/h	3	4	4,635	0	992	0	0	689	813	331	**7,132**	202.2	5,186
31	Panay High Standard Highway 2	Pototan-Roxas City	76.87	60	4,612,200	4	80km/h	3	4	10,100	0	2,149	0	0	689	813	331	**13,755**	178.9	11,300
32	Panay High Standard Highway 3	Panitan-Numancia	56.50	60	3,390,000	4	80km/h	1	2	7,391	0	1,915	0	0	689	271	165	**10,268**	181.7	8,306
33	Panay High Standard Highway 4	Numancia-Malay	51.85	90	4,666,500	4	100km/h	3	7	10,696	0	1,968	0	0	689	813	646	**14,172**	273.3	2,204
34	Negros High Standard Highway 1	Silay City-Valladolid	45.33	90	4,079,700	4	100km/h	1	4	9,247	0	2,475	0	0	689	271	369	**12,685**	279.8	1,927
35	Negros High Standard Highway 1	Bacolod City (Access Road)	6.89	90	620,100	4	100km/h	4	5	1,411	0	338	0	0	689	1,084	461	**3,526**	511.8	293
36	Negros High Standard Highway 2	Valladolid-Kabankalan City	57.32	90	5,158,800	4	100km/h	2	11	11,694	0	3,121	0	0	689	542	1,015	**16,056**	280.1	2,437
37	Metro Cebu High Standard Highway	Naga City-Danao City	24.16	90	2,174,400	4	100km/h	5	7	2,847	2,791	1,076	0	0	689	1,355	646	**8,765**	362.8	1,027
38	Metro Cebu High Standard Highway	Naga City-Danao City	23.17	90	2,085,300	4	100km/h	4	2	761	2,791	1,030	15,052	9,671	689	1,084	184	**31,081**	1,341.4	985
39	Metro Cebu High Standard Highway	Naga City-Danao City	11.34	90	1,020,600	4	100km/h	4	12	1,271	1,396	507	0	0	689	1,084	1,107	**4,958**	437.2	482
40	Samar-Leyte High Standard Highway 1	Allen-Catbalogan City	104.43	90	9,398,700	4	100km/h	6	4	19,283	2,512	6,548	0	0	689	1,626	369	**30,662**	293.6	6,852
41	Samar-Leyte High Standard Highway 2	Catbalogan City-Santa Rita	72.01	90	6,480,900	4	100km/h	3	2	10,379	5,583	4,519	0	0	689	813	184	**21,984**	305.3	4,725
42	Samar-Leyte High Standard Highway 3	Santa Rita-Tacloban City	14.82	90	1,333,800	4	100km/h	1	3	2,923	0	0	6,000	0	689	271	277	**9,885**	667.0	972
43	Samar-Leyte High Standard Highway 4	Tacloban City-Mahaplag	77.24	90	6,951,600	4	100km/h	3	12	12,498	4,187	4,842	0	0	689	813	1,107	**23,040**	298.3	5,068
44	Samar-Leyte High Standard Highway 5	Mahaplag-San Ricardo	88.74	90	7,986,600	4	100km/h	8	2	7,231	13,957	6,994	0	0	689	2,167	184	**31,041**	349.8	5,822
45	Surigao-Butuan High Standard Highway	Surigao City-Butuan City	106.38	90	9,574,200	4	100km/h	5	11	15,378	8,374	5,642	0	0	689	1,355	1,015	**31,449**	295.6	894
46	Butuan-Tagum High Standard Highway 1	Tagum City-Trento	83.35	90	7,501,500	4	100km/h	7	5	17,364	0	1,922	0	0	689	1,897	461	**21,876**	262.5	701
47	Butuan-Tagum High Standard Highway 2	Trento-Butuan City	117.90	90	10,611,000	4	100km/h	5	4	24,355	0	4,227	0	0	689	1,355	369	**30,629**	259.8	11,683
48	Tagum-Davao-Digos High Standard Highway 2	Panabo City-Tagum City	26.52	90	2,386,800	4	100km/h	8	19	5,503	0	769	0	0	689	2,167	1,752	**9,147**	344.9	4,117
49	Digos-Gen. San High Standard Highway	Digos City-Gen Santos City	77.42	90	6,967,800	4	100km/h	3	7	8,839	9,770	968	0	0	689	813	646	**21,086**	272.4	651
50	North Mindanao High Standard Highway I - 1	Cagayan De Oro City-Gingoog City	82.65	90	7,438,500	4	100km/h	4	4	6,129	13,957	4,104	0	2,687	689	1,084	369	**28,654**	346.7	695
51	North Mindanao High Standard Highway I - 2	Gingoog City-Butuan City	71.58	90	6,442,200	4	100km/h	5	5	11,478	4,187	3,551	0	0	689	1,355	461	**21,265**	297.1	602
52	North Mindanao High Standard Highway I - 3	Butuan City (Access Road)	3.72	90	334,800	4	100km/h	9	10	761	0	184	0	0	689	2,438	922	**4,083**	1,097.5	369
53	North Mindanao High Standard Highway II - 1	Cagayan De Oro City-Iligan City	61.65	90	5,548,500	4	100km/h	6	17	4,795	8,374	3,044	5,680	13,433	689	1,626	1,568	**37,657**	610.8	9,571
54	North Mindanao High Standard Highway II - 2	Iligan City-Pagadian City	107.23	90	9,650,700	4	100km/h	4	16	14,545	9,770	5,319	0	0	689	1,084	1,476	**31,422**	293.0	2,825
55	Central Mindanao High Standard Highway 1	agayan De Oro City-Malaybalay Cit	66.19	90	5,957,100	4	100km/h	6	4	6,567	8,374	3,290	8,520	0	689	1,626	369	**29,069**	439.2	1,744
56	Central Mindanao High Standard Highway 2	Malaybalay City-Davao City	142.01	90	12,780,900	4	100km/h	4	17	18,915	13,399	7,040	0	0	689	1,084	1,568	**41,144**	289.7	14,072
57	Gen. San-Cotabato High Standard Highway 1	Gen. Santos City-Isulan	90.17	90	8,115,300	4	100km/h	4	3	18,589	0	3,505	0	0	689	1,084	277	**23,869**	264.7	758
58	Gen. San-Cotabato High Standard Highway 2	Isulan-Cotabato City	78.85	90	7,096,500	4	100km/h	1	0	16,256	0	3,059	0	0	689	271	0	**20,275**	257.1	663
59	Cotabato-Zamboanga High Standard Highway 1	Zamboanga City	34.92	90	3,142,800	4	100km/h	5	4	7,246	0	1,015	0	0	689	1,355	369	**10,308**	295.2	3,460
60	Cotabato-Zamboanga High Standard Highway 2	Zamboanga City-Ipil	78.99	90	7,109,100	4	100km/h	6	16	16,392	0	2,290	0	0	689	1,626	1,476	**21,012**	266.0	7,827
61	Cotabato-Zamboanga High Standard Highway 3	Ipil-Pagadian City	116.15	90	10,453,500	4	100km/h	6	7	14,560	12,562	3,551	0	0	689	1,626	646	**32,994**	284.1	976
62	Cotabato-Zamboanga High Standard Highway 4	Labangan-Cotabato City	138.17	90	12,435,300	4	80-100km/h	4	18	20,842	9,770	7,117	0	0	689	1,084	1,660	**39,519**	286.0	21,451
63	Tagum-Davao-Digos High Standard Highway 1 (Davao City By-Pass)	Digos City-Panabo City	76.62	90	6,895,800	4	80-100km/h	2	4	9,556	8,374	2,214	0	0	689	542	369	**21,378**	279.0	11,895
		Total	3970.24		323,646,720			269	435	**556,732**	**258,772**	**320,600**	**148,653**	**47,283**	**43,494**	**72,880**	**40,025**	**1,449,398**		**327,260**

Table 12.7-8 Construction Cost for HSH Class-2

Unit: PhP million

No.	Road Name	Section	Road Class	Total Length (km)	Total Bridge Length (km)	Road Improvement (km)						No. of FO	Construction Cost (Mil. Php)				Cost per km (PhPMil.)	Remarks
						Widening Road Section		Estimate New Road Section (Bypass or New Road)		improve-ment of 2lane	improve-ment of 4lane		Widening Cost	Bypass Cost	Other Cost (Flyover, Tunnel, Special Bridge etc.)	Total Cost		
						Road	Bridge	Road	Bridge	Road	Road							
1	Dugo-San Vicente Road	Lal-lo - Santa Ana	Secondary	76.70	1.83	76.67	1.83		0.00				5,938.80	0.00	0.00	5,938.80	77.43	Not urgent for four lane
2	Kalinga-Cagayan Rd/ Balbagan-Pinukpuk Rd/ Kalinga-Abra-Ilocos Sur Rd	Peñablanca-Tabuk City-Narvacan	1st 2nd 3rd	289.30	3.49	104.87	1.27	23.05	0.28			6	7,331.70	3,348.40	1,800.00	12,480.10	43.14	Not need four lane full section
3	Tagudin-Cervantes Rd/ Mt Prov-Ilocos Sur Rd	Tagudin-Bontoc	Secondary	104.20	0.83		0.00		0.00				0.00	0.00	0.00	0.00	0.00	Not need four lane full section
4	Banaue-Mayoyao-A Lista-Isabela Bdry Rd/ Nueva Vizcaya-Ifugao-Mt Province Rd	Santiago City-Sagada	Secondary	168.30	0.95	8.68	0.05	7.89	0.04			3	571.50	1,056.20	900.00	2,527.70	15.02	Not need four lane full section
5	Ilagan-Bigao-Palanan Rd	Ilagan City-Palanan	Tertiary	88.20	0.41	16.23	0.08		0.00				1,059.90	0.00	0.00	1,059.90	12.02	Not urgent for four lane
6	Nueva Vizcaya-Benguet Rd/ Agoo-Baguio City Rd/ Marcos Hi-way	Aritao-Baguio City-Tubao	Secondary	143.10	1.75	44.21	0.54		0.00	102.31			3,093.80	0.00	6,357.54	9,451.34	66.05	Not need four lane full section
7	Cordon-Aurora Bdry Rd/ Dinadiawan-Madella Rd	Cordon-Dinadiawan	Secondary	112.50	1.32	53.52	0.63	13.36	0.16			4	3,730.10	1,937.10	1,200.00	6,867.20	61.04	Not urgent for four lane
8	Urdaneta Jct-Dagupan-Lingayen Rd	Urdaneta City-Lingayen	Primary	40.20	0.67	10.04	0.17		0.00				733.00	0.00	0.00	733.00	18.23	widening ok, bypass will be needed
9	Tarlac-Sta Rosa Rd/ Romulo H-way/ Pangasinan-Tarlac Rd	Tarlac City-Camiling-Lingayen	Primary	93.30	2.00		0.00		0.00				0.00	0.00	0.00	0.00	0.00	widening ok, bypass will be needed
10	Bakit-Bakit Jct-Umingan Rd/ Rizal-Pantabangan Rd/ Pantabangan-Canili-Basal-Baler Rd	Rosales-San Jose City-Baler	1st 2nd 3rd	153.20	2.46	127.74	2.05	10.04	0.16			4	9,253.50	1,519.70	1,200.00	11,973.20	78.15	
11	Nueva Ecija-Aurora Rd/ Jct Tablang-Gabaldon Rd	Cabanatuan City-Dingalan	Secondary	62.50	1.27	64.53	1.31		0.00				4,850.70	0.00	0.00	4,850.70	77.61	Not urgent for four lane
12	Plaridel Bypass Rd	Balagtas-San Rafael	Tertiary	24.60	0.00	24.46	0.00		0.00							**5,260.00**	213.82	Yen Loan Project
13	Roman Highway	Dinalupihan-Mariveles	Secondary	65.80	1.40		0.00		0.00				0.00	0.00	0.00	0.00	0.00	Almost completed
14	Marcos Highway/ Marikina Div Rd/	Marikina City-Infanta	Tertiary	111.40	0.76	99.57	0.68		0.00				6,623.70	0.00	0.00	6,623.70	59.46	Mountain Area
15	Rizal Bdry-Famy-Quezon Rd/ Calamba-Sta Cruz-Famy Jct Rd	Pila-Pagsanjan-Pililla	1st 2nd	53.50	0.42	53.42	0.42		0.00				3,589.10	0.00	0.00	3,589.10	67.09	
16	Cavite-Batangas Rd	Bacoor City-Tagaytay City	Secondary	41.70	0.27		0.00		0.00				0.00	0.00	0.00	0.00	0.00	
17	Noveleta-Naic-Tagaytay Rd/ Maragondon-Magallanes-Amuyong Rd	Kawit-Alfonso	Secondary	67.30	0.60	67.13	0.60		0.00				4,556.50	0.00	0.00	4,556.50	67.70	
18	Dasmariñas-Trece Martires City-Naic Rd	Carmona-Naic	1st 2nd	37.60	1.24		0.00		0.00				0.00	0.00	0.00	0.00	0.00	
19	Tanauan-Talisay-Tagaytay Rd/ Tagaytay-Nasugbu Rd	Tanauan City-Tagaytay City-Nasugbu	Secondary	70.40	0.45	70.4	0.45		0.00				4,663.50	0.00	0.00	4,663.50	66.24	
20	Palico-Balayan-Batangas Rd/ Balayan-Balibago Rd/ Nasugbu-Lian-Calatagan Rd	Batangas City-Nasugbu	Secondary	80.00	1.01	79.01	1.00		0.00				5,551.50	0.00	0.00	5,551.50	69.39	
21	Daang Maharlika (LZ)	Polangui-Irosin	Primary	140.80	1.62	33.69	0.39		0.00				2,343.80	0.00	0.00	2,343.80	16.65	
22	Calapan South Rd	Calapan City-Mansalay	Secondary	153.80	2.05	153.34	2.04		0.00				10,837.80	0.00	0.00	10,837.80	70.47	
23	Puerto Princesa North Rd	Puerto Princesa City-El Nido	Secondary	267.60	2.25	254.88	2.14		0.00				17,211.70	0.00	0.00	17,211.70	64.32	
24	**Panay-Guimaras-Negros Link Bridge(New)**	Jordan-Sibunag		51.40	18.19	33.32	11.79		0.00				9,637.30		**97,300.00**	**106,937.30**	2,080.49	Inter-Island Bridge
25	Bacolod-Murcia-DS Benedicto-Sn Carlos City Rd	Bacolod City-San Carlos City	Primary	75.60	0.48	75.53	0.48		0.00				5,001.50	0.00	0.00	5,001.50	66.16	
26	Bago-Mambucal Rd	Bago City-Pulupandan	Tertiary	9.30	0.00	9.31	0.00		0.00				578.50	0.00	0.00	578.50	62.20	
27	Dumaguete North Rd/ Kabankalan-Bais Rd	Dumaguete City-Kabankalan City	Primary	125.80	1.00	110.53	0.88	5.72	0.05			3	7,433.10	799.60	900.00	9,132.70	72.60	
28	N Bacalso Ave (Cebu South Rd)/ Cebu North Hagnaya Wharf Rd	Naga City-Danao City	Primary	13.80	0.30	13.5	0.29		0.00			2	1,025.00	0.00	600.00	1,625.00	117.75	
29	Naga-Uling Rd/ Cebu-Toledo Wharf Rd	Naga City-Toledo City	Primary	27.50	0.17	20.9	0.13		0.00				1,382.20	0.00	13,967.20	15,349.40	558.16	Tunnel
30	N Bacalso Ave (Cebu South Rd)	Naga City-Santander	Primary	115.90	0.70	97.59	0.59		0.00				6,442.90	0.00	0.00	6,442.90	55.59	
31	Jct (LIR) Carmen-Sagbayan-Bacani Rd/ Jct Dat-an-Carmen-Sierra Bullones-Jagna Rd	Tubigon-Carmen-Jagna	Secondary	86.10	0.68	82.14	0.65	4.48	0.04			2	5,521.30	627.60	600.00	6,748.90	78.38	
32	Palo-Carigara-Ormoc Rd	Palo-Carigara-Ormoc City	Primary	97.10	1.23	24.66	0.31		0.00				1,731.30	0.00	0.00	1,731.30	17.83	
33	Ormoc-Baybay-Southern Leyte Bdry Rd/ Tacloban-Baybay South Rd	Ormoc City-Mahaplag	Primary	72.80	2.09	46.19	1.33		0.00				3,723.80	0.00	0.00	3,723.80	51.15	
34	**Butuan City-Coastal Road (New)**	Butuan City-Nasipit		32.00	0.00	0	0.00		0.00							**25,000.00**	781.25	Long Span Bridge
35	Camiguin Circumferential Rd	Mambajao-Mahinog-Guinsiliban	Secondary	24.40	0.21	24.28	0.21	29.33	0.25			7	1,643.50	4,089.50	2,100.00	7,833.00	321.02	Not urgent for four lane
36	Butuan City-Cagayan de Oro City-Iligan City Rd	Gingoog City-Tagoloan	Primary	110.70	2.82		0.00		0.00				0.00	0.00	0.00	0.00	0.00	
37	Butuan City-Cagayan de Oro City-Iligan City Rd/ Misamis Oriental-Ma Cristina Bdry Rd	Cagayan De Oro City-Iligan City	Primary	92.60	1.16	92.45	1.16		0.00				6,489.30	0.00	0.00	6,489.30	70.08	
38	Ozamis-Pagadian Rd/ Ozamis-Oroquieta Rd/ Dipolog-Oroquieta National Rd	Dipolog City-Oroquieta City-Tangub City	Primary	160.80	1.91	145.46	1.73	19.67	0.23			5	10,149.20	2,843.00	1,500.00	14,492.20	90.13	
39	Dipolog-Sindangan-Liloy Rd/ Liloy-Ipil Rd	Dipolog City-Sindangan-Ipil	Primary	168.30	3.37	168.02	3.36		0.00				12,597.20	0.00	0.00	12,597.20	74.85	
40	Dipolog-Punta-Dansullan-S Osmeña-Zamboanga del Norte/Sur Bdry Rd	Dipolog City-Sergio Osmeñ Sr.-Tambulig	Primary	92.40	0.66	92.2	0.66		0.00				6,152.90	0.00	0.00	6,152.90	66.59	
41	Iligan City-Marawi City Rd/ Marawi-Malabang Rd	Iligan City-Marawi City-Malabang	Primary	96.00	0.15	95.7	0.15		0.00				6,043.10	0.00	0.00	6,043.10	62.95	
42	CDO City-Dominorog-Camp Kibaritan Rd/ Molundo-Wao Rd/ Banisilan-Alamada-Libungan Rd	Cagayan De Oro City-Wao-Libungan	Secondary	196.40	0.53	187.9	0.51		0.00				12,003.40	0.00	0.00	12,003.40	61.12	
43	Tagum-Panabo Circum Rd/ Kapalong-Talaingod-Valencia Rd/ Maramag-Maradugao Rd/ Barandias-Dominorog Rd	Tagum City-Valencia City-Pangantucan-Kalilangan	1st 2nd	232.80	2.06	155.2	1.37	9.41	0.08	49.89	2.95	3	10,523.40	1,311.70	4,371.01	16,206.11	69.61	
44	Davao-Cotabato Rd (Jct Digos-Cotabato Sect)	Digos City-Kidapawan City-Pikit-Sultan Kudarat	Primary	159.30	1.50	98.11	0.92		0.00				6,687.00	0.00	0.00	6,687.00	41.98	already many widening section
45	**Davao Coastal Road (New) on-going**	Davao City	Secondary	19.40	51.62				0.00				26,003.70	0.00	0.00	26,003.70	1,340.40	On-going(26,350 Mil.php)
46	**Bataan Cavite Bridge(New)**			28.00	28.00											187,000.00	6,678.57	
TOTAL				***4,534.40***	***147.88***	***2,915.38***	***42.17***	***122.95***	***1.29***	***152.20***	***2.95***	***39***	***232,710.20***	***17,532.80***	***132,795.75***	***600,298.75***	**132.39**	

12.8 Traffic Impact

In this section, the traffic impacts by development of the high standard highway network are analyzed. The HSH Class-1 which makes large impact to traffic has been considered. The impact analysis was conducted according to the following factors:

(1) Future Traffic Volume in 2040,

(2) Share of Traffic Volume between Proposed HSH and Primary National Road,

(3) HSH User Volume,

(4) Comparison of Traffic Volume and Vehicle Congestion Ratio With HSH Project and Without HSH Project scenarios.

12.8.1 Future Traffic Volume on HSH Class-1

In studying HSH Class-1 network formation, the road traffic demand forecast is conducted based on the super long network. Also, the future traffic volume in 2040 for 53 planned sections was calculated. The simulation result is utilized for analysis of traffic impact and for the evaluation of prioritization of HSH Class-1 network.

The input data for calculation are as follows:

<Input data for road traffic assignment>

- ✓ Road network data: The network data of the super long- term including HSH Class-1,
- ✓ OD: Vehicle OD table in 2040,
- ✓ Calculation method: Road traffic assignment shown in **Chapter 6**.

The result of traffic assignment was estimated as shown in the **Figure 12.8-1.** While, the average traffic volume in 2040 is summarized in **Table 12.8-1**. The traffic volume in 2040 on the Figure shows the average of traffic volume by 53 sections. The average traffic volume was calculated as the weighted average efficiency considering road length and traffic volume by section.

As shown in the figure, the highest traffic volume is along C5 High Standard Highway with traffic volume estimated to be more than 63,000 veh/day. The other High Standard Highways of higher traffic volume are C6 High Standard Highway, NLEX Phase3 and North Luzon East High Standard Highway, Laguna Lakeshore High Standard Highway, Metro Cebu High Standard Highway and Tagum-Davao-Digos High Standard Highway. These highways are located in Metro Manila, Metro Cebu and Davao City. Thus, traffic volumes in urban areas of Metro Manila, Metro Cebu and Davao City were estimated with high volume compared with rural areas.

Note: HSH (High Standard Highway)
Source: JICA Study Team

Figure 12.8-1 Future Traffic Volume in Year 2040 (HSH Class-1 Full Network)

12.8.2 Share of Traffic Volume between Proposed HSH Class-1 and Primary National Road

Table 12.8-1 shows the share of the future traffic volume on HSH Class-1 and on existing national road which is in parallel to HSH 1. According to these results, it was observed that a new HSH Class-1 will accommodate substantial amount of traffic volume with traffic shifting from existing roads to new HSHs after developing a HSH Class-1. It was expected that HSH Class-1 network will function well as arterial road that share middle or long trip length traffic.

Major characteristics of share of traffic volume are shown in the following:

- Share rate of traffic volume of proposed HSHs in rural area is relatively high. It is partly resulted from peculiarity of traffic demand forecast model, where traffic analysis zones in rural areas are larger than those in urban areas.
- On the other hand, although the share rate in urban area is lower percentage compared with rural area, traffic volume is higher than rural area. Especially, the share rate of C5 High Standard Highway, C6 High Standard Highway, Laguna Lakeshore High Standard Highway and Metro Cebu High Standard Highway traffic volume showed less than 30%.

Table 12.8-1 Share of Traffic Volume between Primary National Road and Proposed HSH Class-1

HSH Class-1		Traffic Volume (Veh/day)			Share (%)		
No	Name	Existing Road	HSH	Total	Existing Road	HSH	Total
1	Ilocos High Standard Highway 1 (TPLEX Extension)	9,001	19,734	28,735	*31%*	*69%*	*100%*
2	Ilocos High Standard Highway 2	1,114	13,489	14,603	*8%*	*92%*	*100%*
3	Ilocos High Standard Highway 3	2,864	11,582	14,446	*20%*	*80%*	*100%*
4	Northern East-West High Standard Highway 1	230	8,733	8,963	*3%*	*97%*	*100%*
5	Northern East-West High Standard Highway 2	2,128	9,188	11,316	*19%*	*81%*	*100%*
6	Cagayan Valley High Standard Highway 1	1,686	10,274	11,960	*14%*	*86%*	*100%*
7	Cagayan Valley High Standard Highway 2	1,481	8,246	9,727	*15%*	*85%*	*100%*
8	Dalton Pass East Alignment Alternative Road Project	3,050	10,569	13,619	*22%*	*78%*	*100%*
9	NLEE Phase 1 and Phase 2	35,955	38,305	74,260	*48%*	*52%*	*100%*
10	NLEE Phase 1 and Phase 2	22,080	38,872	60,952	*36%*	*64%*	*100%*
11	Central Luzon Link High Standard Highway (CLLEX) Phase II	11,538	29,140	40,678	*28%*	*72%*	*100%*
12	2nd Central Luzon Link High Standard Highway	24,469	18,840	43,309	*56%*	*44%*	*100%*
13	NLEX Phase 3	22,799	28,304	51,103	*45%*	*55%*	*100%*
14	C6 High Standard Highway 1 (South East Metro Manila High Standard Highway)	22,359	37,915	60,274	*37%*	*63%*	*100%*
15	C5 High Standard Highway 1	118,697	63,870	182,567	*65%*	*35%*	*100%*
16	Laguna Lakeshore High Standard Highway	134,486	33,162	167,648	*80%*	*20%*	*100%*
17	Laguna De Bay Crossing High Standard Highway 1	18,766	16,571	35,337	*53%*	*47%*	*100%*
18	Laguna De Bay Crossing High Standard Highway 2	3,470	17,508	20,978	*17%*	*83%*	*100%*
19	Cavite-Tagaytay High Standard Highway	50,468	8,659	59,127	*85%*	*15%*	*100%*
20	Quezon-Bicol High Standard Highway 1	3,577	19,674	23,251	*15%*	*85%*	*100%*
21	Quezon-Bicol High Standard Highway 2	3,114	11,743	14,857	*21%*	*79%*	*100%*
22	Bicol High Standard Highway I	4,528	12,153	16,681	*27%*	*73%*	*100%*
23	Bicol High Standard Highway II	9,648	4,480	14,128	*68%*	*32%*	*100%*
24	Panay High Standard Highway 1	17,733	14,292	32,025	*55%*	*45%*	*100%*
25	Panay High Standard Highway 2	6,018	13,424	19,442	*31%*	*69%*	*100%*
26	Panay High Standard Highway 3	807	10,694	11,501	*7%*	*93%*	*100%*

HSH Class-1		Traffic Volume (Veh/day)			Share (%)		
No	**Name**	**Existing Road**	**HSH**	**Total**	**Existing Road**	**HSH**	**Total**
27	Panay High Standard Highway 4	1,875	7,166	9,041	*21%*	*79%*	*100%*
28	Negros High Standard Highway 1	5,187	10,910	16,097	*32%*	*68%*	*100%*
29	Negros High Standard Highway 2	3,204	8,198	11,402	*28%*	*72%*	*100%*
30	Metro Cebu High Standard Highway	180,883	23,014	203,897	*89%*	*11%*	*100%*
31	Samar-Leyte High Standard Highway 1	359	5,706	6,065	*6%*	*94%*	*100%*
32	Samar-Leyte High Standard Highway 2	4,046	9,571	13,617	*30%*	*70%*	*100%*
33	Samar-Leyte High Standard Highway 3	4,793	11,592	16,385	*29%*	*71%*	*100%*
34	Samar-Leyte High Standard Highway 4	5,152	8,045	13,197	*39%*	*61%*	*100%*
35	Samar-Leyte High Standard Highway 5	4,804	2,268	7,072	*68%*	*32%*	*100%*
36	Surigao-Butuan High Standard Highway	441	4,952	5,393	*8%*	*92%*	*100%*
37	Butuan-Tagum High Standard Highway 1	5,866	13,087	18,953	*31%*	*69%*	*100%*
38	Butuan-Tagum High Standard Highway 2	4,649	9,634	14,283	*33%*	*67%*	*100%*
39	Tagum-Davao-Digos High Standard Highway 1 (Davao City By-Pass)	16,078	21,630	37,708	*43%*	*57%*	*100%*
40	Tagum-Davao-Digos High Standard Highway 2	6,928	17,066	23,994	*29%*	*71%*	*100%*
41	Digos-Gen. San High Standard Highway	2,955	16,690	19,645	*15%*	*85%*	*100%*
42	North Mindanao High Standard Highway I - 1	1,374	11,557	12,931	*11%*	*89%*	*100%*
43	North Mindanao High Standard Highway I - 2	7,651	4,878	12,529	*61%*	*39%*	*100%*
44	North Mindanao High Standard Highway II - 1	5,797	19,700	25,497	*23%*	*77%*	*100%*
45	North Mindanao High Standard Highway II - 2	3,383	9,225	12,608	*27%*	*73%*	*100%*
46	Central Mindanao High Standard Highway 1	1,974	18,533	20,507	*10%*	*90%*	*100%*
47	Central Mindanao High Standard Highway 2	3,524	16,587	20,111	*18%*	*82%*	*100%*
48	Gen. San-Cotabato High Standard Highway 1	7,898	11,611	19,509	*40%*	*60%*	*100%*
49	Gen. San-Cotabato High Standard Highway 2	6,723	9,289	16,012	*42%*	*58%*	*100%*
50	Cotabato-Zamboanga High Standard Highway 1	5,429	7,253	12,682	*43%*	*57%*	*100%*
51	Cotabato-Zamboanga High Standard Highway 2	4,228	8,217	12,445	*34%*	*66%*	*100%*
52	Cotabato-Zamboanga High Standard Highway 3	8,043	7,973	16,016	*50%*	*50%*	*100%*
53	Cotabato-Zamboanga High Standard Highway 4	1,264	7,859	9,123	*14%*	*86%*	*100%*

Traffic volume of existing road is typical road section

Source: JICA Study Team

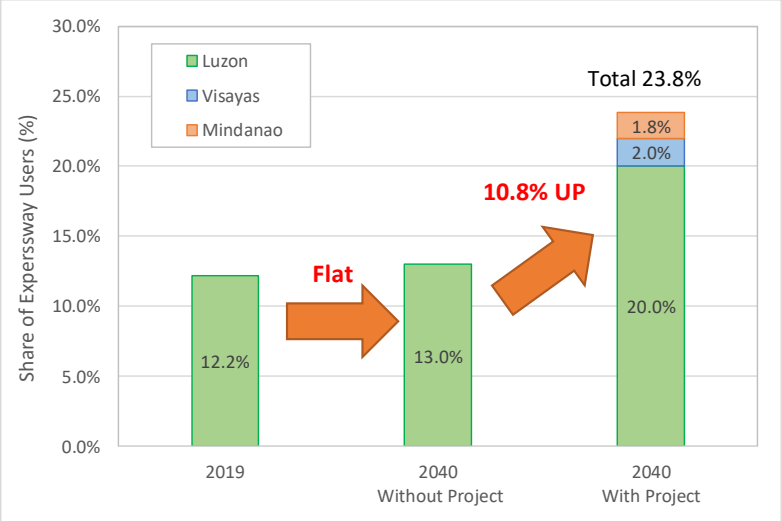
12.8.3 High Standard Highway Class-1 User Volume

Table 12.8-2 shows the HSH Class-1 user volume in 2019 and 2040 estimated by traffic demand forecast. HSH Class-1 user volume in each case was estimated at 12.2% (694,939 Trip/day) for existing case, 13.0% (895,041 Trip/day) for without proposed HSH Class-1 and 23.8% (1,638,223 Trip/day), respectively. HSH Class-1 user will increase by 10.8% due to construction of the HSH Class-1.

Table 12.8-2 HSH Class-1 User Volume

Case	Area	HSH Class-1 User Volume (Trip/day)				Ratio of HSH Class-1 Users (%)
		Car	Bus	Truck	Total	
2019	Luzon	424,483	47,049	223,407	694,939	10.1%
	Visayas	-	-	-	-	0.0%
	Mindanao	-	-	-	-	0.0%
	Total	424,483	47,049	223,407	694,939	**12.2%**
2040 Do Nothing case	Luzon	679,953	65,470	149,618	895,041	13.0%
	Visayas	-	-	-	-	0.0%
	Mindanao	-	-	-	-	0.0%
	Total	679,953	65,470	149,618	895,041	**13.0%**
2040 With case	Luzon	1,056,579	102,418	217,193	1,376,190	20.0%
	Visayas	90,855	16,565	27,611	135,031	2.0%
	Mindanao	81,192	9,914	35,897	127,003	1.8%
	Total	1,228,626	128,897	280,701	1,638,223	**23.8%**

Note: Ratio of HSH-1 users was estimated by total OD (5,697,881 Trip/day in 2019, 6,878,440 Trip/day in 2040)
Source: JICA Study Team



Source: JICA Study Team

Figure 12.8-2 Shere of HSH Class-1 Utilization

12.8.4 Comparison of Traffic Volume and Vehicle Congestion Ratio for With Project and Without Project

Figure 12.8-3 to **Figure 12.8-10** show the comparison of traffic volume and vehicle congestion for the "Do Nothing case" and "With case" in North Luzon, South Luzon, Visayas and Mindanao related in **Section 12.8.2**. The result in each area showed that traffic volume at national road is shifted to the HSH and caused the decrease of vehicle congestion ratio at national road. The situation revealed that traffic impact of improvement of HSH is highly significant. Characteristics of traffic impact in each area are shown below.

North Luzon

- Traffic volume and vehicle congestion ratio along north of San Jose City had increased after the improvement of HSH as shown in the figures below.
- Traffic volume is still high in Tuguegarao City and Baguio City urban areas because of concentration of traffic volume into these areas.
- Although traffic volume around Metro Manila is shifted to HSHs, vehicle congestion ratio is still over 1.0 and traffic congestion still occurs.

South Luzon

- Traffic volume and vehicle congestion ratio along south of Lucena City had increased after the installation of HSH as shown in the figure below.
- Traffic congestion will be resolved after improvement of the HSH; and the traffic congestion ratio is expected to become 1.0 or less between Legaspi City and Lucena City.

Visayas

- Traffic volume and vehicle congestion ratio in Visayas had increased after the improvement of HSH as shown in the figures below.
- Although the traffic volumes in Cebu City, Iloilo City, Tacloban City, etc. are shifted to the new HSHs, vehicle congestion ratio is still over 1.0 and traffic congestion still occurs.

Mindanao

- Traffic volume and vehicle congestion ratio in Mindanao had increased significantly after improvement of the HSHs as shown in the figure below. Especially, the increase of vehicle congestion ratio is remarkable.
- Although the traffic volumes in Davao City and Digos City were shifted to HSHs, vehicle congestion ratio is still over 1.0 and traffic congestion still occurs.

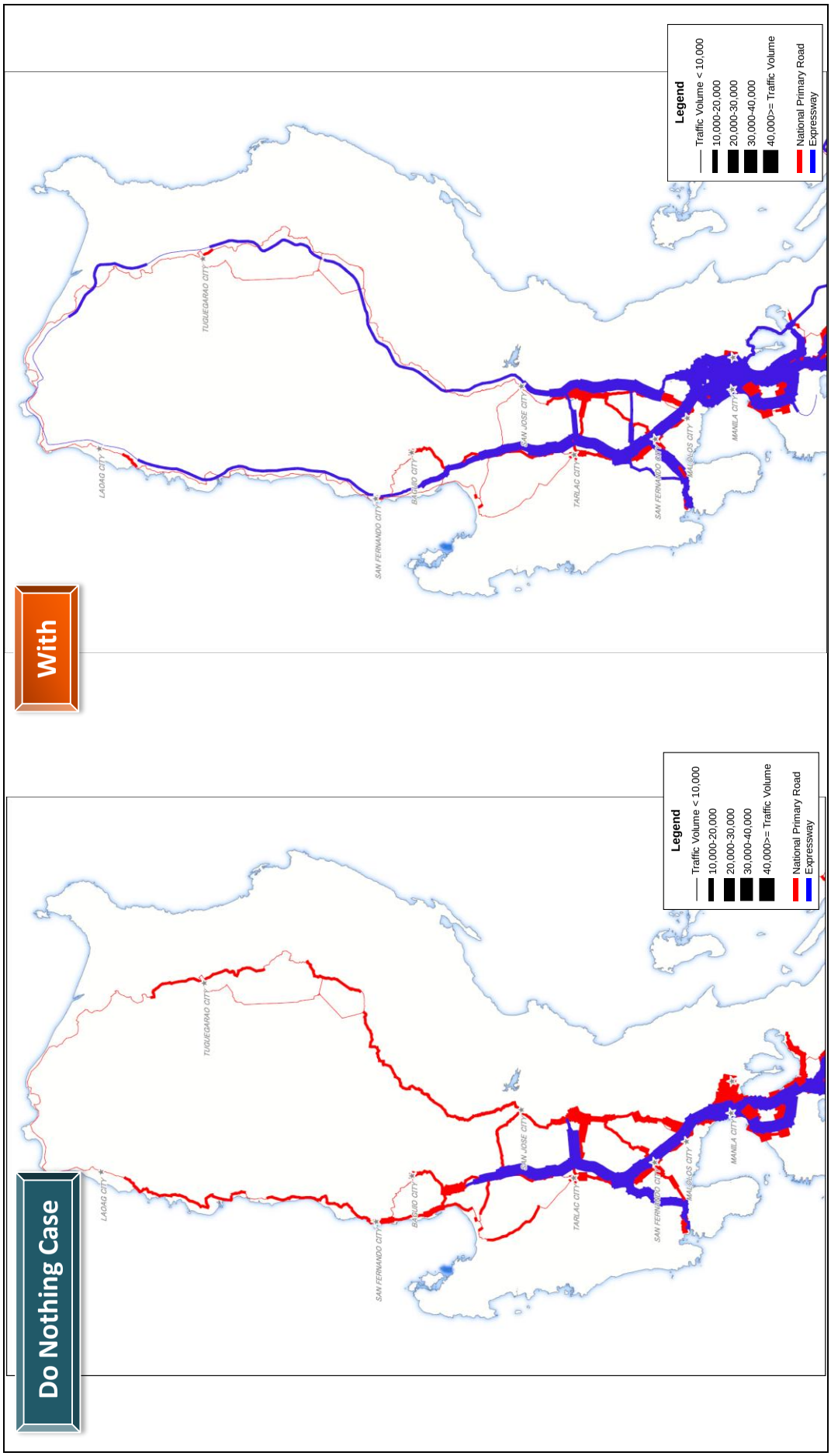


Figure 12.8-3 Traffic Volume Comparison in North Luzon

Source: JICA Study Team

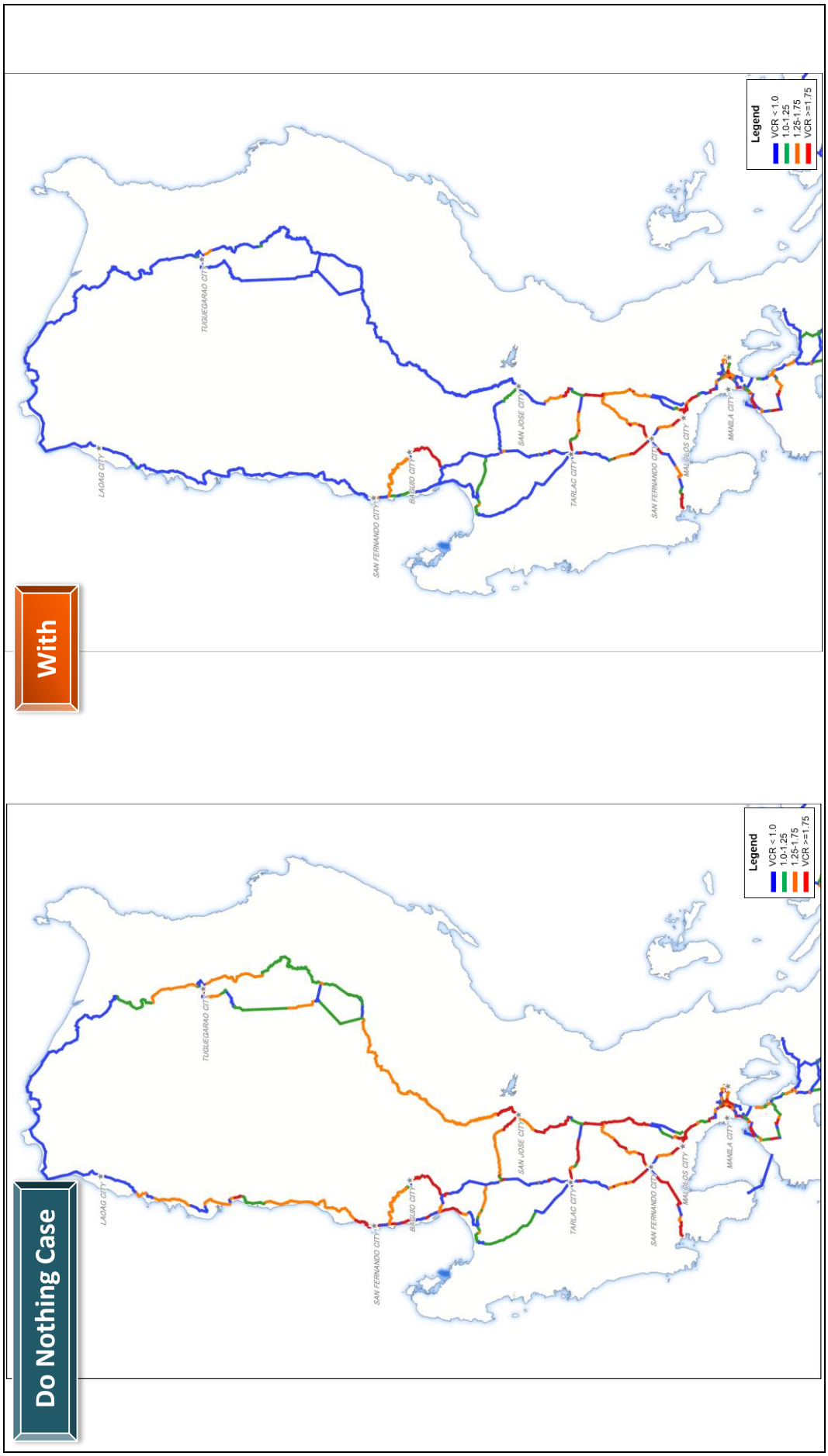
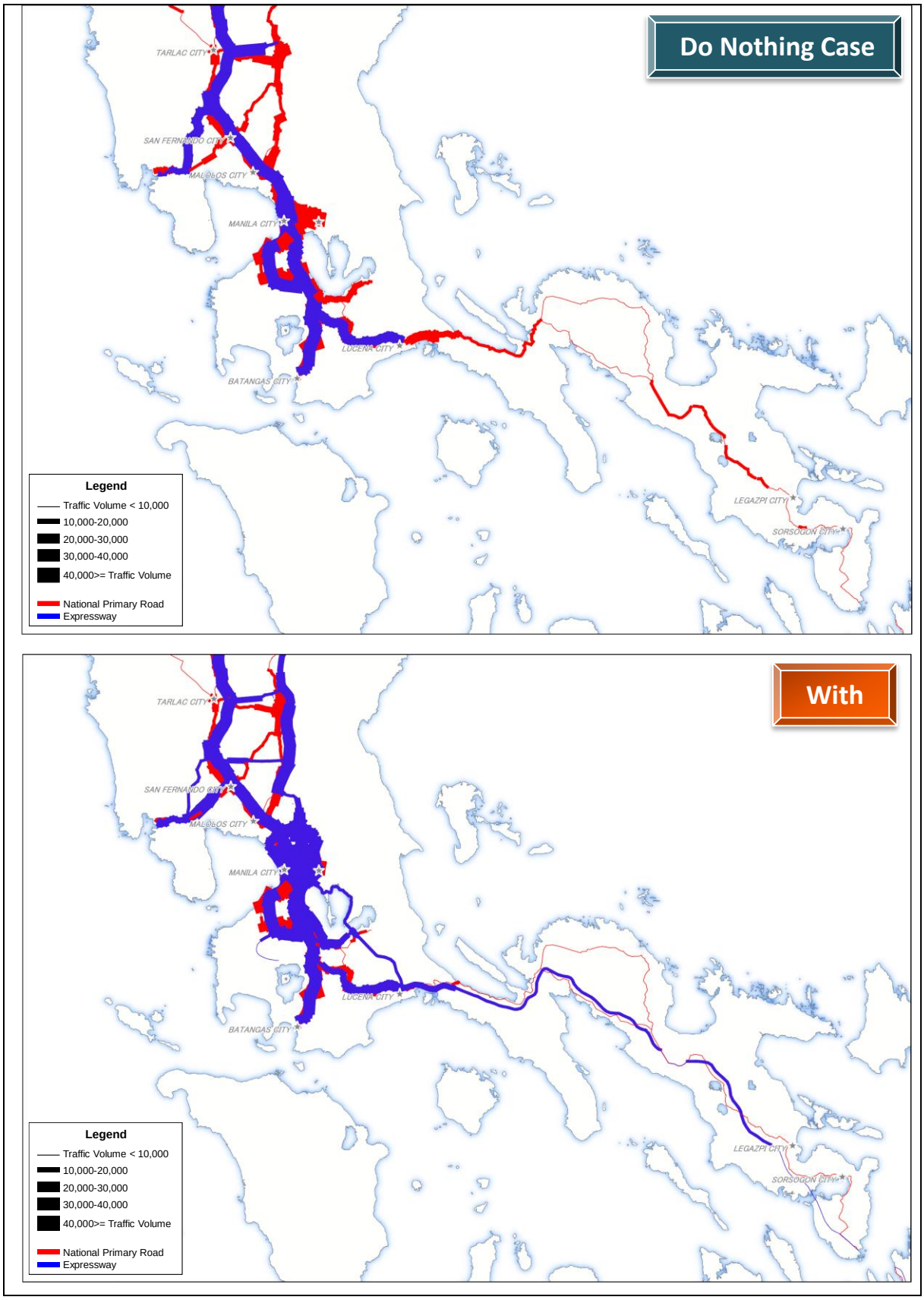


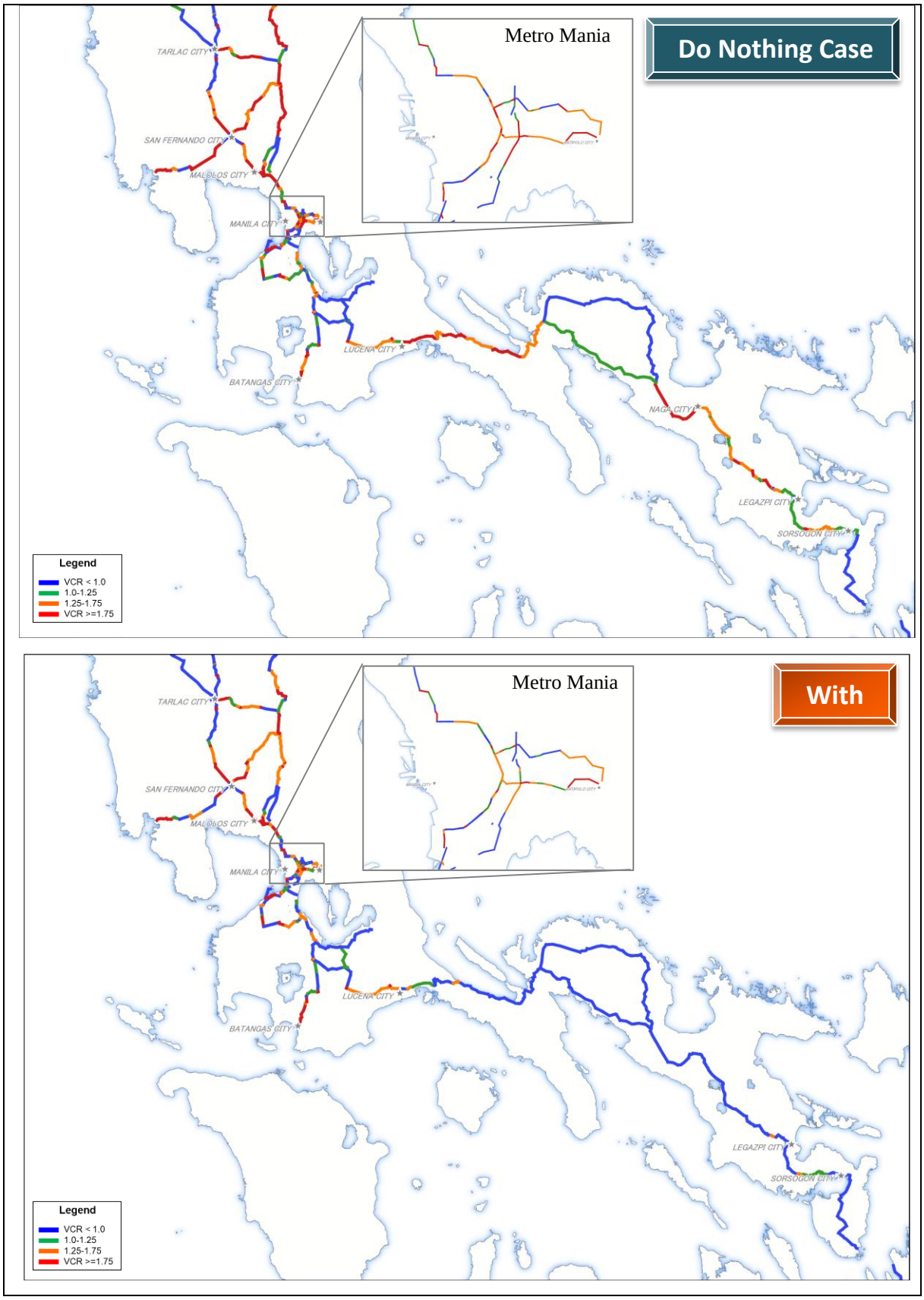
Figure 12.8-4 Vehicle Congestion Ratio Comparison in North Luzon

Source: JICA Study Team



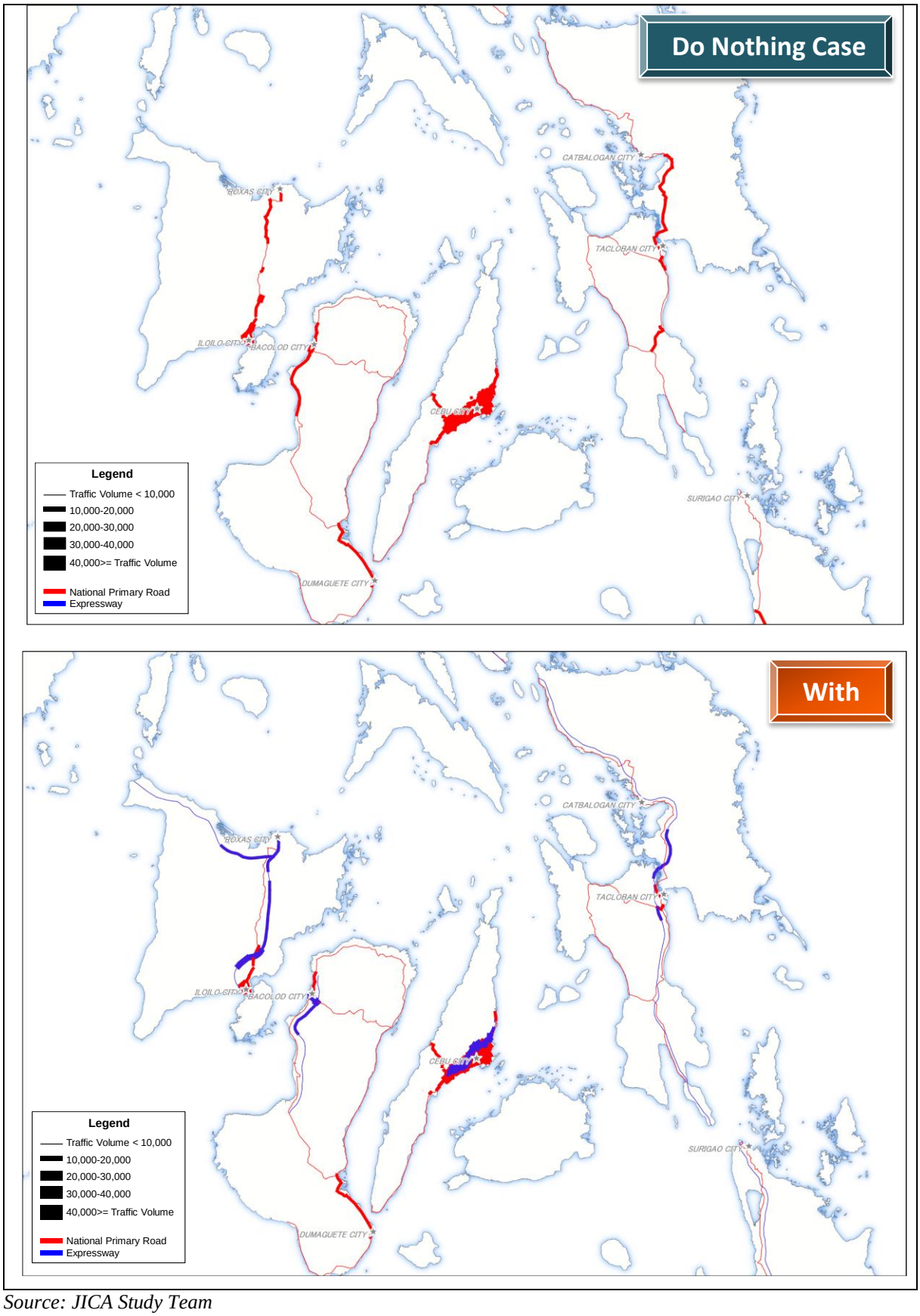
Source: JICA Study Team

Figure 12.8-5 Traffic Volume Comparison in South Luzon



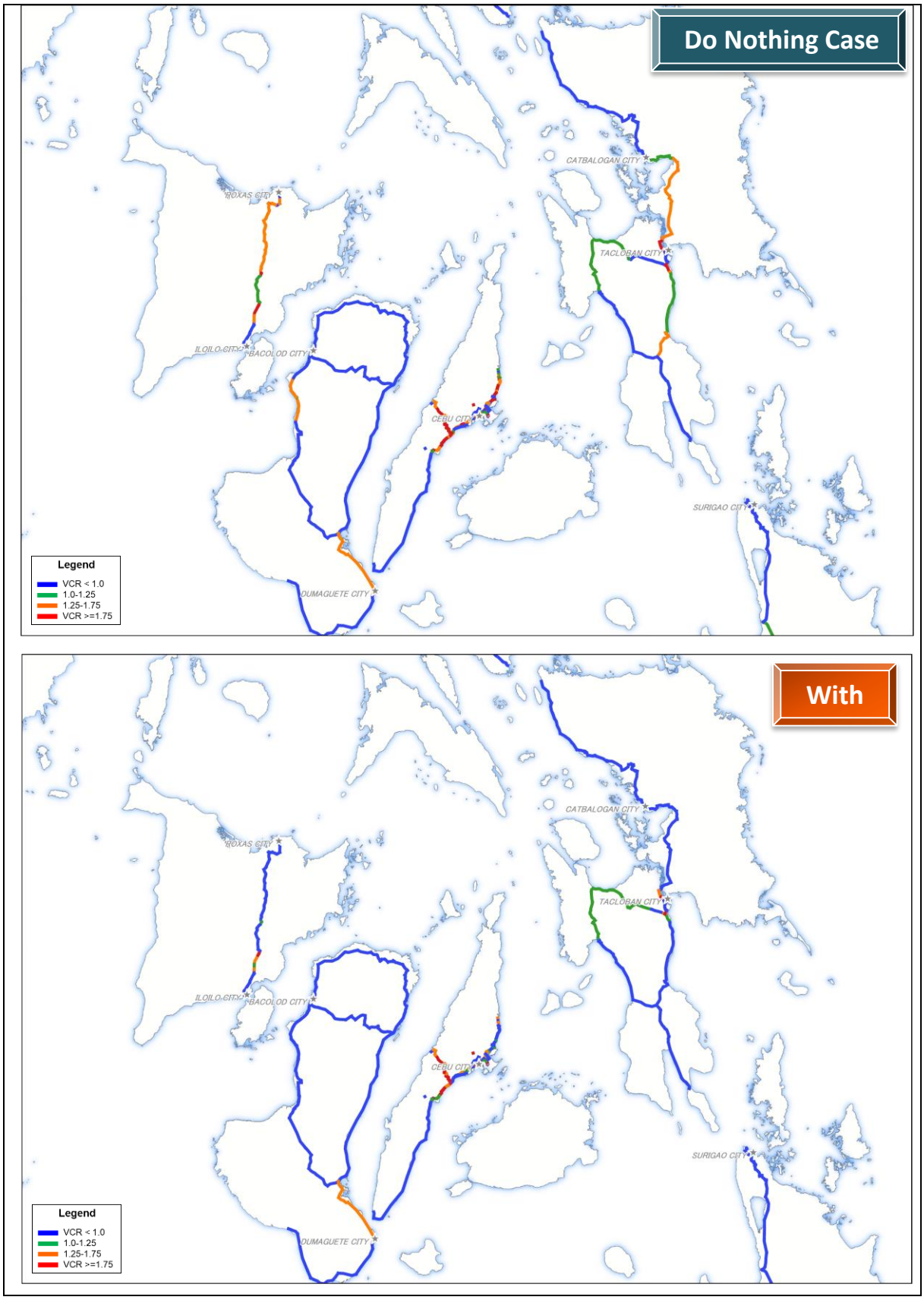
Source: JICA Study Team

Figure 12.8-6 Vehicle Congestion Ratio Comparison in South Luzon



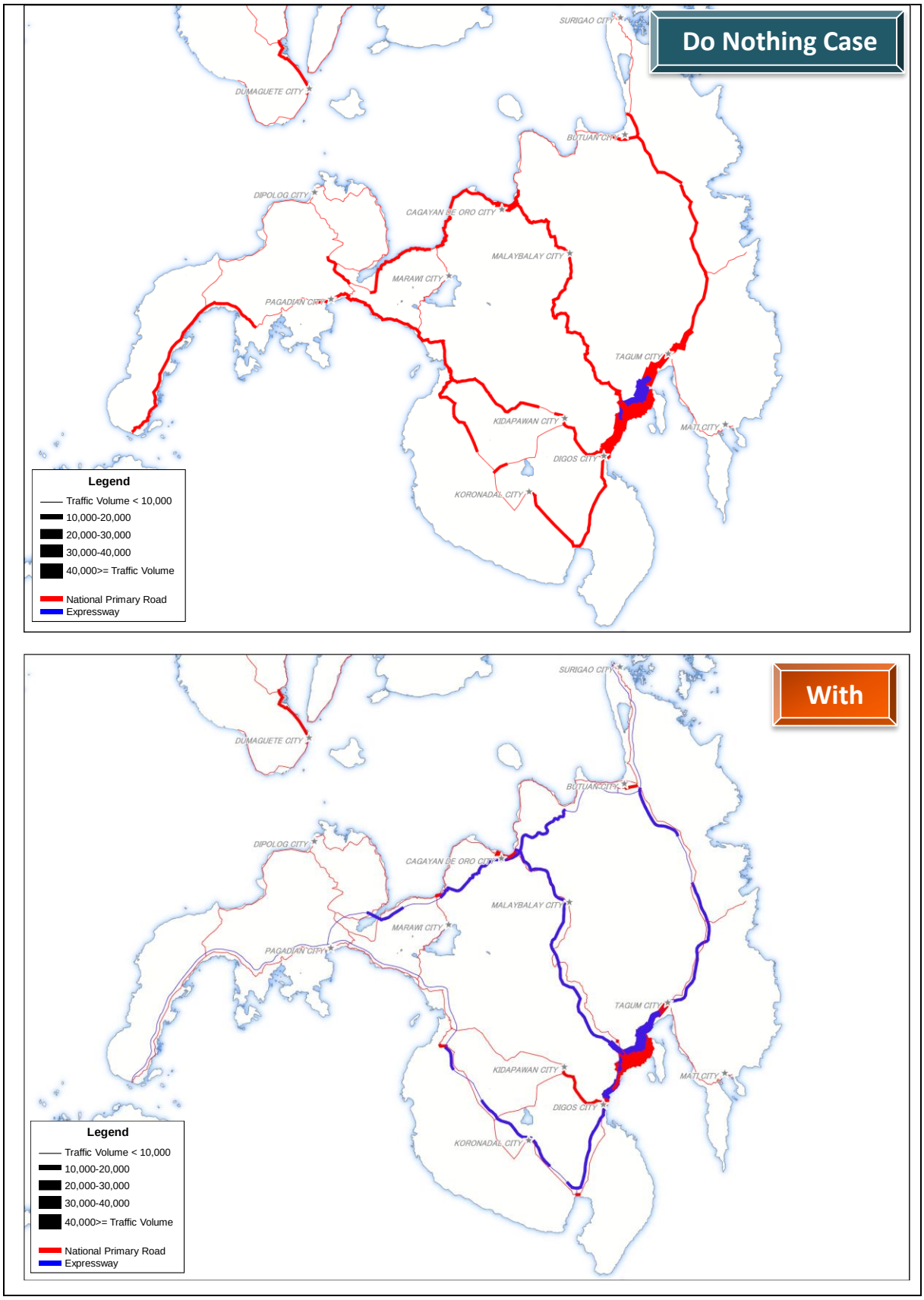
Source: JICA Study Team

Figure 12.8-7 Traffic Volume Comparison in Visayas



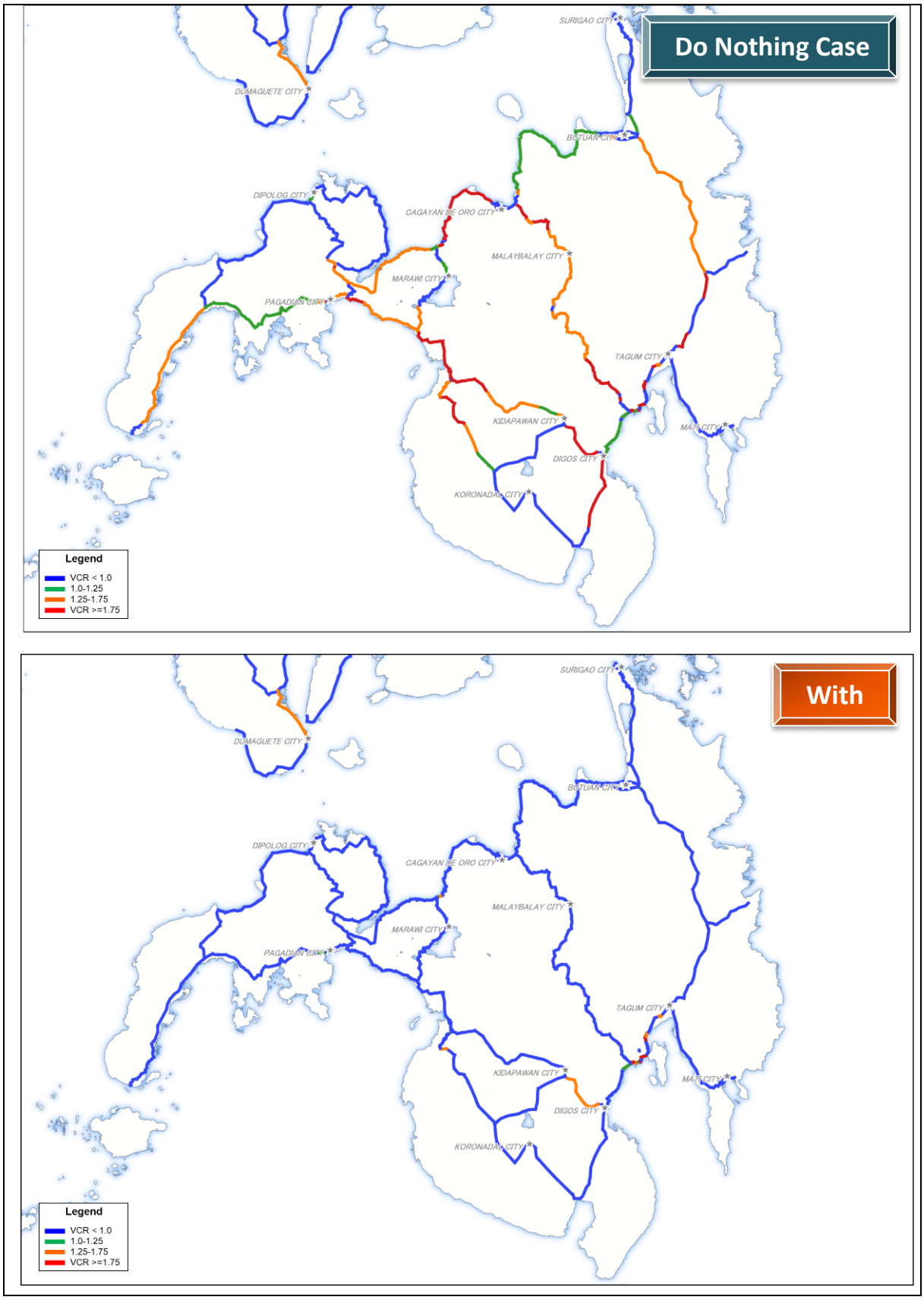
Source: JICA Study Team

Figure 12.8-8 Vehicle Congestion Ratio Comparison in Visayas



Source: JICA Study Team

Figure 12.8-9 Traffic Volume Comparison in Mindanao



Source: JICA Study Team

Figure 12.8-10 Vehicle Congestion Ratio Comparison in Mindanao

12.9 Environmental and Social Impact

12.9.1 Environmental and Social Impact Evaluation Process

Since proposed HSH network design and alignment at Master Plan stage has not been examined in any detail, information of location and development area are not fixed and include uncertainties. In consideration of environmental and social conditions in the Philippines as mentioned in **Chapter 14**, characteristic environmental and social items are selected, and conceivable negative impacts on these items are evaluated simply through two steps process as shown in **Table 12.9-1**, and these were based on available nationwide secondary data.

Table 12.9-1 Environmental and Social Impact Evaluation Process at M/P Stage

Process	Outline of the method
Step1: To grasp the current status of environmental and social condition along proposed HSH network	- Proposed HSH network and Protected Areas (PAs: see Figure 14.3.3), and Certificates of Ancestral Domain Titles (CADTs: see Figure 14.3.5) were overlapped on the google earth satellite map by using google earth software. - Land use[*1], location[*2], and key component[*3] along the proposed HSH were measured to profile environmental and social condition by road section. - Distances between proposed HSH corridors and PAs/CADTs were measured.
Step2: To evaluate the possibility of negative impact due to the HSH development activities	- Four characteristic environmental and social items, Natural Environment and Biodiversity, Social Environment (Affected Buildings and Resettlement), Protected Area, and Indigenous Peoples, were selected to conduct alternative analysis of HSH corridors. - Using the data analysis of "Step 1", negative impact due to the HSH development was evaluated in consideration of the possibility/scale of negative potential impact.
Note: *1 Land use: Forest / Trees / Palm, River / Lake, Seashore / River mouth, Residence / Building / Infrastructure, and Farm / Vacant space *2 Location: Seashore, Flat Land, Flat-Mountain, Mountain, and Distance from nearest Seashore (km) *3 key component: *(Major)* City/Municipality, (Major) River /Lake	

Source: JICA Study Team

The conceivable negative impact and the evaluation concept mentioned in Step 2 are explained in **Table 12.9-2**. Negative impact due to the HSH development is evaluated on a four-level scale, A (Significant large impact/direct impact), B (above average/ relatively large), C (below average), and D (relatively small/ negligible) for conducting alternative analysis.

Since this master plan study includes long-term projects by 2040, to protect ecosystem and to address the Climate Change based on the direction of international goal such as Paris Agreement on Climate Change and Sustainable Development Goals (SDGs), reducing the greenhouse gas (CO2), the length of traversing forest area and distance from the environmental sensitive area were considered into the evaluation of the priority plan.

Through the evaluation process mentioned above, it is expected that the priority alignments include the positive effect (or reducing the negative impact) on the surrounding environment including Climate Change.

Lengths of traversing forest / trees / river /lake / seashore / river mouth area and/or residential area along the proposed HSH and distance from PAs and/or CADTs mentioned in **Table 12.9-2** are tentative volume for preliminary evaluation during master plan stage based on the satellite image map and dynamic alignments. These lengths will be changed in accordance with the progress of the examination of the project alignment at feasibility study.

Table 12.9-2 Conceivable Negative Impact and Evaluation Concept

No.	Items	Conceivable Negative Impact	Impact Level	Evaluation Concept
1	Natural Environment and Biodiversity	There is a possibility of the impact on natural environmental and biodiversity in accordance with the development scale of forest area and/or waterside area	A	Total length of crossing forest / trees / river /lake / seashore / river mouth area along the proposed HSH is above the volume "A": Volume A= [Average of affected length] + [Standard Deviation] for Forest / trees: 56.2 km or, for River /lake: 12.8 km or, for Seashore/River mouth: 2.8 km
			B	Total length of crossing forest / trees / river /lake / seashore / river mouth area along the proposed HSH is above the volume "B" and below the volume "A" at least one parameter. Volume B= [Average of affected length] for Forest / trees: 29.5 km or, for River /lake: 2.9 km or, for Seashore/River mouth: 0.4 km
			C	Impact level is below "B" and above "D"
			D	Total length of crossing forest / trees area along the proposed HSH is below 10km, and total length of crossing river /lake / seashore / river mouth area along the proposed HSH is below 1km.
2	Social Environment (Affected Buildings and Resettlement)	There is a possibility of the largescale resettlement and land acquisition in accordance with the development scale of the residential area	A	Total length of crossing residential area along the proposed HSH is above the volume "A": Volume A= [Average of affected length] + [Standard Deviation]=12.4km
			B	Total length of crossing residential area along the proposed HSH is above the volume "B" and below the volume "A" or passing near densely settled area. Volume B= [Average of affected length] = 6.0km
			C	Impact level is below "B" and above "D"
			D	Total length of crossing residential area along the proposed HSH is below 1km and crossing settled area is little.
3	Protected Area	There is a possibility of the negative impact in accordance with the distance between development area and PAs	A	Proposed HSH alignment is crossing PAs.
			B	The distance between proposed HSHs and PAs is below 1.0km.
			C	The distance between proposed HSHs and PAs is over 1.0km and below 5.0km.
			D	The distance between proposed HSHs and PAs is over 5.0km
4	Indigenous Peoples	There is a possibility of the negative impact in accordance with the distance between development area and CADTs	A	Proposed HSH alignment is crossing CADTs.
			B	The distance between proposed HSHs and CADTs is below 1.0km.
			C	The distance between proposed HSHs and CADTs is over 1.0km and below 5.0km.
			D	The distance between proposed HSHs and CADTs is over 5.0km

Note: A: significant large impact/direct impact, B: above average/ relatively large, C: below average, D: relatively small/ negligible

Source: JICA Study Team

12.9.2 Result of Analysis

(1) Environmental and Social Condition along Proposed HSH Network

Table 12.9-3 presents the current status of environmental and social condition along proposed HSH network.

Table 12.9-3 Environmental and Social Condition along Proposed HSH Network

No.	Island	Highway Name	Road Section	Length (km)	Environmental and Social Profile											Protected Area					CADT (Certificate of Ancestral Domain Title)			
					Land Use					Location					key component										
					Forest/ Trees/ Palm	River/ Lake	Seashore / River mouth	Residence/ Building/ Infrastructure	Farm / Vacant space	Seashore	Flat Land	Flat-Mountain	Mountain	Distance from nearest Seashore (km)	City/Municipality	River /Lake	Cross	Near (0.1～0.9km)	Far (1.0km～)	Distance from nearest PA (km)	Type	Cross	Near (0.1～0.9km)	Far (1.0km～)	Distance from nearest CADT (km)
1	Luzon	Ilocos High Standard Highway 1	Rosario-San Fernando City	48.17	17.1	0.5		2.1	28.4			✔		3～8	Rosario	Aringay River , Balili River			✔	5.0	Landscape			✔	3.0
2	Luzon	Ilocos High Standard Highway 2	San Fernando City-Tagudin	46.81	21.7	1.4		5.9	17.8			✔		3～10	San Fernando City	Amburayan River, Baroro River			✔	10 ≤			✔		1.0
3	Luzon	Ilocos High Standard Highway 3	Tagudin-Laoag City	142.86	44.1	4.4		13.4	80.9			✔		2～11	Santa, Vigan City	Lagben River, Padsan River	✔	✔			National Park, Landscape(2km), Watershed(3km)			✔	1.1
4	Luzon	Northern East-West High Standard Highway 1	Laoag City-Claveria	89.18	48.1	1	16.9	6.1	17	✔		✔		0-8.5		Bislak River	✔				Watershed, National Park			✔	2.3
5	Luzon	Northern East-West High Standard Highway 2	Claveria-Lal-lo	92.12	36.3	2.1		9.6	44.1			✔		6～19		Abulung River, Cagayan River	✔				Landscape			✔	5 ≤
6	Luzon	Cagayan Valley High Standard Highway 1	Bayombong-Tuguegarao City	175.35	14.3	1.9		5.9	153.3		✔			10 ≤	Peñablanca, Santiago City	Cagayan River, Pinacanauan River		✔		3.6	Landscape		✔		2.1
7	Luzon	Cagayan Valley High Standard Highway 2	Tuguegarao City-Allacapan	60.07	13.6	0.3		1.9	44.2		✔			10 ≤		Pared River	✔				Landscape		✔		2.5
8	Luzon	Dalton Pass High Standard Highway	San Jose City-Bayombong	89.82	45	3.5		0.8	40.5				✔	10 ≤		Santa Cruz River	✔	✔			Watershed, Natural Monument(0.1km)	✔			
9	Luzon	North Luzon East High Standard Highway 1	Quezon City-San Rafael	46.48	11.4	1		22.1	11.9		✔			10 ≤	Brgy178, 179	Angat River, La Mesa Reservoir			✔	10 ≤				✔	10 ≤
10	Luzon	North Luzon East High Standard Highway 2	San Rafael-Cabanatuan City	62.06	1.5	0.5		2.2	57.8		✔			10 ≤		Pampanga River			✔	6.0	National Park			✔	10 ≤
11	Luzon	North Luzon East High Standard Highway 3	Cabanatuan City-San Jose City	31.05		0.3		1.1	29.7		✔			10 ≤		Talavera River			✔	10 ≤				✔	10 ≤
12	Luzon	2nd Central Luzon Link High Standard Highway	Angeles City-San Miguel	41.34		0.3		3.6	37.4		✔			10 ≤	Angeles City, Aryat	Pampanga River		✔		1	National Park			✔	10 ≤
13	Luzon	NLEX Phase 3	San Fernando City-Dinalupihan	34.12		0.8		8.5	24.8		✔			10 ≤	San Fernando	Gumain River			✔	6.5	National Park			✔	10 ≤
14	Luzon	C6 High Standard Highway 1	Metro Manila-Rizal	41.08	11.2	6.4		17.8	5.7		✔			10 ≤	Quezon City	(Mangghan Floodway)	✔				National Park			✔	10 ≤
15	Luzon	C5 High Standard Highway 1	Taguig City-Quezon City	15.5		7.3		7.7	0.5		✔			10.0	Within exting road/River	(Marilina River)			✔	6.0	National Park			✔	10 ≤
16	Luzon	Laguna Lakeshore High Standard Highway	Taguig City-Pila	82.59		66.8		7.8	8		✔			10 ≤	Baybayin, In the lake	Laguna Lake		✔		0.4	National Park			✔	10 ≤
17	Luzon	Laguna De Bay Crossing High Standard Highway 1	Taytay-Pila	59.56	4	32.7		2.2	20.7		✔			10 ≤		Laguna Lake			✔	10 ≤				✔	10 ≤
18	Luzon	Laguna De Bay Crossing High Standard Highway 2	Pila-Lucena City	43.73	17.7			2.9	23.1		✔			7.5				✔		2.4	Landscape			✔	10 ≤
19	Luzon	Tagaytay High Standard Highway	Tagaytay City-CALAEx	31.68	3			0.5	28.2		✔			10 ≤				✔		0.2	Landscape			✔	10 ≤
20	Luzon	Camarines High Standard Highway 1	Lucena City-Lopez	71.84	49.6			0.5	21.8		✔	✔		0.4～6.6				✔		0.9	Landscape, Watershed(4.3km)			✔	10 ≤
21	Luzon	Camarines High Standard Highway 2	Lopez-Naga City	137.38	87.2	0.2		21.2	28.7		✔	✔		3.2～16.4				✔		0.7	Watershed, Natural Park(9.5km)			✔	10 ≤
22	Luzon	Bicol High Standard Highway I	Naga City-Legaspi City	81.79	28.8	0.3		2.9	49.8		✔	✔		10 ≤				✔		6.2	Natural Park			✔	6.8
23	Luzon	Bicol High Standard Highway II	Legaspi City-Matnog	76.72	55		4.3	3.6	13.8	✔	✔			0～23					✔	9	Natural Park		✔		1
24	Visayas	Panay High Standard Highway 1	Iloilo City-Pototan	35.28	2.9	0.7		4.6	27			✔	✔	1.5-15	Iloilo City	Iloilo River			✔	10 ≤				✔	10 ≤
25	Visayas	Panay High Standard Highway 2	Pototan-Roxas City	76.87	12.3	1.3		12.2	51			✔	✔	2.6-10 ≤	Roxsas City	Jalaur River		✔		1.3	National Park			✔	10 ≤
26	Visayas	Panay High Standard Highway 3	Panitan-Numancia	56.5	26.8	0.8		3.4	25.5			✔		6-11		Aklan River			✔	10 ≤				✔	10 ≤
27	Visayas	Panay High Standard Highway 4	Numancia-Malay	51.85	39	0.3		0.5	12			✔		0.1-4.5		Ibajay River	✔		✔		Natural Park			✔	10 ≤
28	Visayas	Negros High Standard Highway 1	Silay City-Valladolid	52.22		0.1		16.1	36		✔			0.6-6	Bacolod			✔		7.2	Watershed			✔	10 ≤
29	Visayas	Negros High Standard Highway 2	Valladolid-Kabankalan City	57.32	0.6				56.7		✔			5.6-7.2				✔		8,6	Watershed			✔	10 ≤
30	Visayas	Metro Cebu High Standard Highway	Naga City-Danao City	58.67	15	0.1		22.5	21.1		✔	✔		1.4-7	Ceb City		✔				Landscape			✔	10 ≤
31	Visayas	Samar-Leyte High Standard Highway 1	Allen-Catbalogan City	104.43	93.2	0.4		0.3	10.5			✔	✔	0.3-11		Jibatang River		✔		3	Landscape, Natural Park(9.5km)			✔	10 ≤
32	Visayas	Samar-Leyte High Standard Highway 2	Catbalogan City-Santa Rita	72.01	64.4	0.1		0.2	7.3			✔		1.0-11			✔				Natural Park			✔	10 ≤
33	Visayas	Samar-Leyte High Standard Highway 3	Santa Rita-Tacloban City	14.82	2.1		0.7	6.9	5.1	✔	✔			0-2.2	Along exting road				✔	10 ≤				✔	10 ≤
34	Visayas	Samar-Leyte High Standard Highway 4	Tacloban City-Mahaplag	77.24	26.2	0.7		4.8	45.6	✔	✔	✔		0.8-16				✔		2	National Park			✔	10 ≤
35	Visayas	Samar-Leyte High Standard Highway 5	Mahaplag-San Ricardo	88.74	81.6	0.3	1.3	0.3	5.3			✔	✔	0-4		Subangdku River		✔		2	National Park			✔	10 ≤
36	Mindanao	Surigao-Butuan High Standard Highway	Surigao City-Butuan City	106.38	70.3	1.5		3.6	30.9			✔		0.1-17		Cabadbaran River, Taguibao River		✔		3.9	Watershed	✔			
37	Mindanao	Butuan-Tagum High Standard Highway 1	Tagum City-Trento	83.35	52.7	1.4		3	26.2			✔		8.7-52		Sarawark River			✔	10 ≤		✔			
38	Mindanao	Butuan-Tagum High Standard Highway 2	Trento-Butuan City	117.9	68	1		0.7	48.2				✔	10 ≤				✔		1.8	Wildlife Sanctuary	✔			
39	Mindanao	Tagum-Davao-Digos High Standard Highway 1	Digos City-Panabo City	76.62	48.4	0.2		2.6	25.4			✔		0.3-8				✔		1	Natural Park		✔		1
40	Mindanao	Tagum-Davao-Digos High Standard Highway 2	Panabo City-Tagum City	26.52		0.1		26.4			✔			1-5.9	Within existing ROW				✔	10 ≤				✔	10 ≤
41	Mindanao	Digos-Gen. San High Standard Highway	Digos City-Gen Santos City	77.42	20.5	0.2		13.9	42.8		✔			1.5-10 ≤	General Santos		✔			1.5	Landscape	✔			
42	Mindanao	North Mindanao High Standard Highway I - 1	Cagayan De Oro City-Gingoog City	82.65	26.4	0.4		5.3	50.5			✔	✔	1.7-10 ≤	Cagayan De Oro		✔	✔			Natural Park, Watershed(0.5km)	✔			
43	Mindanao	North Mindanao High Standard Highway I - 2	Gingoog City-Butuan City	75.3	42.9	0.8		2	29.6			✔	✔	3.5-17		Aguson River			✔	7	Natural Park			✔	3
44	Mindanao	North Mindanao High Standard Highway II - 1	Cagayan De Oro City-Iligan City	61.65	28.9	5.3		7.1	20.3			✔	✔	2-10 ≤	Iligan City	Mandulog River				10 ≤				✔	10 ≤
45	Mindanao	North Mindanao High Standard Highway II - 2	Iligan City-Pagadian City	107.23	80.5	0.2		6	20.5			✔	✔	0-10 ≤					✔	5.9	Natural Park			✔	3.2
46	Mindanao	Central Mindanao High Standard Highway 1	Cagayan De Oro City-Malaybalay City	66.19	4.3			1.9	59.9			✔	✔	0.8-10 ≤					✔	7	Natural Park	✔			
47	Mindanao	Central Mindanao High Standard Highway 2	Malaybalay City-Davao City	142.01	42.3	2.4		1.9	95.4				✔	7-10 ≤			✔				Watershed	✔			
48	Mindanao	Gen. San-Cotabato High Standard Highway 1	Gen. Santos City-Isulan	90.17	21.3	0.7		9.8	58.4				✔	6.5-10 ≤						6.7	Landscape	✔			
49	Mindanao	Gen. San-Cotabato High Standard Highway 2	Isulan-Cotabato City	78.85	11	0.6		1.3	65.9				✔	10 ≤		Dio Grande Mimdanao			✔	10 ≤				✔	10 ≤
50	Mindanao	Cotabato-Zamboanga High Standard Highway 1	Zamboanga City	34.92	18.6			6.2	10.1			✔	✔	4.5-7.5				✔		1.5	Natural Park, Landscape			✔	10 ≤
51	Mindanao	Cotabato-Zamboanga High Standard Highway 2	Zamboanga City-Ipil	78.99	50.4			0.1	28.5				✔	4.5-10					✔	5.2	Marine Protected Area			✔	10 ≤
52	Mindanao	Cotabato-Zamboanga High Standard Highway 3	Ipil-Pagadian City	116.15	84.8			0.8	30.6			✔		4.7-10 ≤			✔				Biologic, Landscape(4.6km)	✔			
53	Mindanao	Cotabato-Zamboanga High Standard Highway 4	Labangan-Cotabato City	138.17	16.9	0.3		0.8	120.2			✔		1.8-10 ≤					✔	5	Natural Park			✔	10 ≤

Source: JICA Study Team

(2) Evaluation of Environmental and Social Impact

Table 12.9-4 presents the evaluation of negative impact on surrounding natural and social environment due to the HSH development activities based on the evaluation criteria shown in **Table 12.2-3**. Total score is calculated based on scoring idea: A=point 0, B=point 1, C=point 2, D=point 3.

Table 12.9-4 Evaluation of Environmental and Social Impact due to HSH

No.	Island	Expersway Name	Road Section	Length (km)	Impact Level (Possbility of negative impact)				
					Natural Environment and Biodiversity	Social Environment (Resettlement)	Protected Area	Indigenous Peoples (CADTs)	Total Points
1	Luzon	Ilocos Expressway 1 (TPLEX Extension)	Rosario-San Fernando City	48.17	C	C	C	C	8
2	Luzon	Ilocos Expressway 2	San Fernando City-Tagudin	46.81	C	B	D	B	7
3	Luzon	Ilocos Expressway 3	Tagudin-Laoag City	142.86	B	A	A	C	3
4	Luzon	Northern East-West Expressway 1	Laoag City-Claveria	89.18	A	B	A	C	3
5	Luzon	Northern East-West Expressway 2	Claveria-Lal-lo	92.12	B	B	A	D	5
6	Luzon	Cagayan Valley Expressway 1	Bayombong-Tuguegarao City	175.35	C	C	C	C	8
7	Luzon	Cagayan Valley Expressway 2	Tuguegarao City-Allacapan	60.07	C	C	A	C	6
8	Luzon	Dalton Pass East Alignment Alternative Road Project	San Jose City-Bayombong	89.82	B	D	A	A	4
9	Luzon	NLEE Phase 1 and Phase 2	Quezon City-San Rafael	46.48	C	A	D	D	8
10	Luzon	NLEE Phase 1 and Phase 2	San Rafael-Cabanatuan City	62.06	D	C	D	D	11
11	Luzon	Central Luzon Link Expressway (CLLEX) Phase II	Cabanatuan City-San Jose City	31.05	D	C	D	D	11
12	Luzon	2nd Central Luzon Link Expressway	Angeles City-San Miguel	41.34	D	C	B	D	9
13	Luzon	NLEX Phase 3	San Fernando City-Dinalupihan	34.12	D	A	D	D	9
14	Luzon	C6 Expressway (South East Metro Manila Expressway)	Metro Manila-Rizal-Bulacan	41.08	B	A	A	D	4
15	Luzon	C5 Expressway	Taguig City-Quezon City	15.5	B	B	D	D	8
16	Luzon	Laguna Lakeshore Expressway	Taguig City-Pila	82.59	A	B	B	D	5
17	Luzon	Laguna De Bay Crossing Expressway 1	Taytay-Pila	59.56	A	C	D	D	8
18	Luzon	Laguna De Bay Crossing Expressway 2	Pila-Lucena City	43.73	C	C	C	D	9
19	Luzon	Cavite-Tagaytay Expressway	Tagaytay City-CALAEx	31.68	D	D	B	D	10
20	Luzon	Quezon-Bicol Expressway 1	Lucena City-Lopez	71.84	B	D	B	D	8
21	Luzon	Quezon-Bicol Expressway 2	Lopez-Naga City	137.38	A	A	B	D	4
22	Luzon	Bicol Expressway I	Naga City-Legaspi City	81.79	C	C	D	D	10
23	Luzon	Bicol Expressway II	Legaspi City-Matnog	76.72	A	C	D	B	6
24	Visayas	Panay Expressway 1	Iloilo City-Pototan	35.28	D	C	D	D	11
25	Visayas	Panay Expressway 2	Pototan-Roxas City	76.87	C	B	C	D	8
26	Visayas	Panay Expressway 3	Panitan-Numancia	56.5	C	C	D	D	10
27	Visayas	Panay Expressway 4	Numancia-Malay	51.85	B	D	A	D	7
28	Visayas	Negros Expressway 1	Silay City-Valladolid	52.22	D	A	D	D	9
29	Visayas	Negros Expressway 2	Valladolid-Kabankalan City	57.32	D	D	D	D	12
30	Visayas	Metro Cebu Expressway	Naga City-Danao City	58.67	C	A	A	D	5
31	Visayas	Samar-Leyte Expressway 1	Allen-Catbalogan City	104.43	A	D	C	D	8
32	Visayas	Samar-Leyte Expressway 2	Catbalogan City-Santa Rita	72.01	A	D	A	D	6
33	Visayas	Samar-Leyte Expressway 3	Santa Rita-Tacloban City	14.82	B	B	D	D	8
34	Visayas	Samar-Leyte Expressway 4	Tacloban City-Mahaplag	77.24	C	C	C	D	9
35	Visayas	Samar-Leyte Expressway 5	Mahaplag-San Ricardo	88.74	A	D	C	D	8
36	Mindanao	Surigao-Butuan Expressway	Surigao City-Butuan City	106.38	A	C	C	A	4
37	Mindanao	Butuan-Tagum Expressway 1	Tagum City-Trento	83.35	B	C	D	A	6
38	Mindanao	Butuan-Tagum Expressway 2	Trento-Butuan City	117.9	A	D	C	A	5
39	Mindanao	Tagum-Davao-Digos Expressway 1 (Davao City By-Pass)	Digos City-Panabo City	76.62	B	C	B	B	5
40	Mindanao	Tagum-Davao-Digos Expressway 2	Panabo City-Tagum City	26.52	D	A	D	D	9
41	Mindanao	Digos-Gen. San Expressway	Digos City-Gen Santos City	77.42	C	A	C	A	4
42	Mindanao	North Mindanao Expressway I - 1	Cagayan De Oro City-Gingoog City	82.65	C	C	A	A	4
43	Mindanao	North Mindanao Expressway I - 2	Gingoog City-Butuan City	75.3	B	C	D	C	8
44	Mindanao	North Mindanao Expressway II - 1	Cagayan De Oro City-Iligan City	61.65	B	B	D	D	8
45	Mindanao	North Mindanao Expressway II - 2	Iligan City-Pagadian City	107.23	A	B	D	C	6
46	Mindanao	Central Mindanao Expressway 1	Cagayan De Oro City-Malaybalay City	66.19	D	C	D	A	8
47	Mindanao	Central Mindanao Expressway 2	Malaybalay City-Davao City	142.01	B	C	A	A	3
48	Mindanao	Gen. San-Cotabato Expressway 1	Gen. Santos City-Isulan	90.17	C	B	D	A	6
49	Mindanao	Gen. San-Cotabato Expressway 2	Isulan-Cotabato City	78.85	C	C	D	D	10
50	Mindanao	Cotabato-Zamboanga Expressway 1	Zamboanga City	34.92	C	B	C	D	8
51	Mindanao	Cotabato-Zamboanga Expressway 2	Zamboanga City-Ipil	78.99	B	D	D	D	10
52	Mindanao	Cotabato-Zamboanga Expressway 3	Ipil-Pagadian City	116.15	A	D	A	A	3
53	Mindanao	Cotabato-Zamboanga Expressway 4	Labangan-Cotabato City	138.17	C	D	C	D	10

Note: Impact Level/Rank
A: Large negatiev Impact, 0 point
B: Smaller than Rank A, 1 point
C: Larger then D and smaller than B, 2 point
D: Small negative impact, 3 point

Source: JICA Study Team

12.10 Formulation of Project Implementation Program

12.10.1 Project Implementation Program for HSH Class-1

The formulation of project implementation for HSH Class-1 is considered based on the basic idea described below.

<Estimate Point of Prioritization Criteria for HSH Class-1>

The selected 33 sections from the proposed HSH Class-1 network were evaluated through the criteria discussed in **Section 12.2**. The evaluation idea and method of scoring is mentioned between **Section 12.3** and **Section 12.9**. The result of criteria evaluation is shown in **Table 12.10-2**. The projects are arranged in descending order of the total score.

<The Outline of Implementation Schedule for HSH Class-1>

The outline of implementation schedule: Short-term, Mid-term and Long-term is allocated based on the project cost. In term of allocation, projects equivalent to 31% of the total project cost is allocated as a short-term. Next 26% budget of total project is allocated in middle term implementation projects. The rest 43% of total project cost will be allocated to long-term projects. The mapping of the outline of implementation schedule for HSH Class-1 is shown in **Figure 12.10-1**. **Figure 12.10-2** indicates the expansion of HSH Class-1 network by implementation term.

<The Summary of Budget Allocation for HSH Class-1 Projects>

The allocation of budget and expansion length by term and by area is summarized in **Table 12.10-1**. The detailed implementation schedule of HSH Class-1 Projects is shown in **Table 12.10-3**.

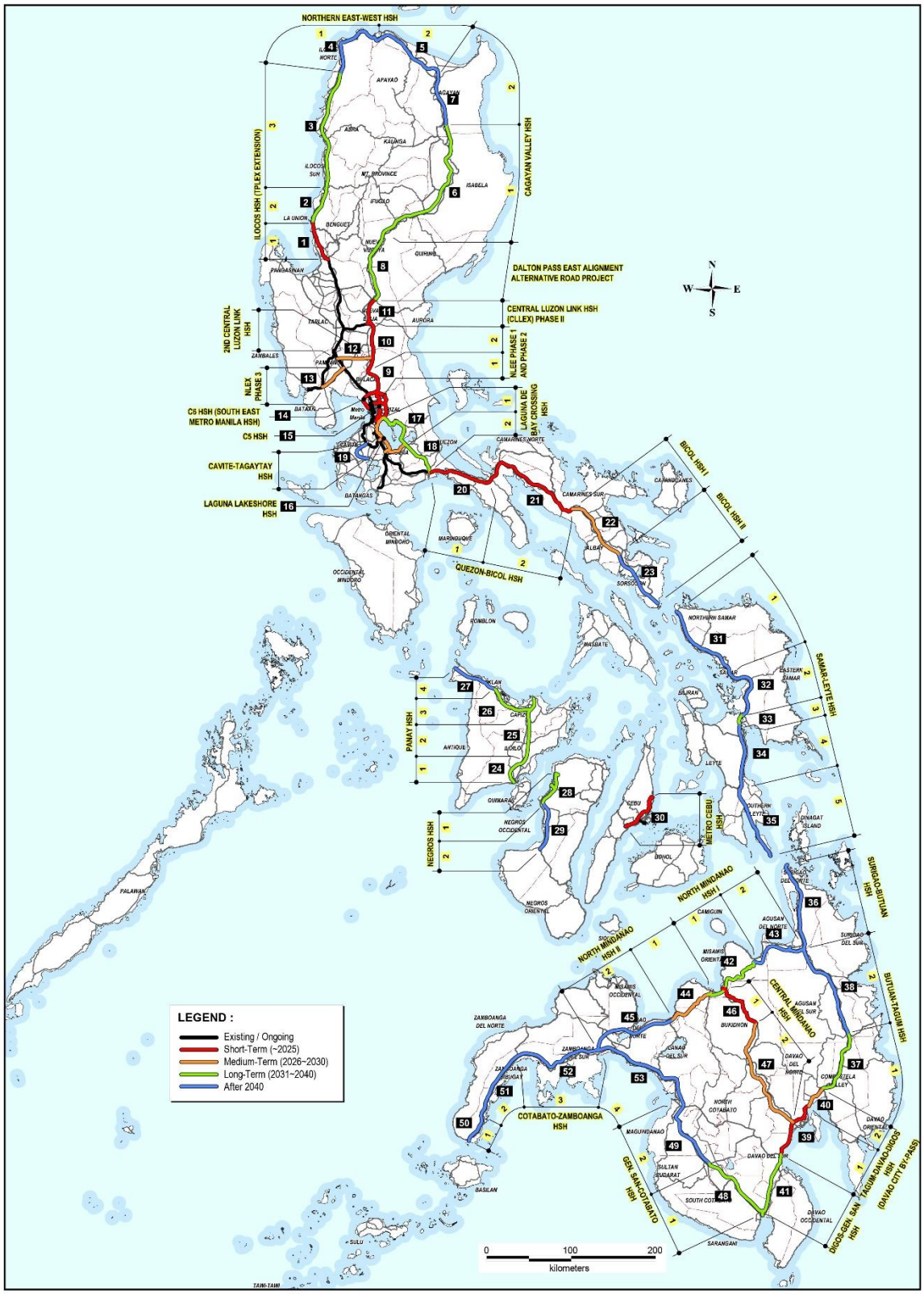
Table 12.10-1 Summary of Budget Allocation for HSH Class-1 Projects

Term	No.of Section	Project Cost (M.peso)		Length (km)	
Short term 2025	11	394,583	31%	718	31%
Luzon	*8*	*288,089*	*23%*	*516*	*22%*
Visayas	*1*	*50,889*	*4%*	*59*	*3%*
Mindanao	*2*	*55,604*	*4%*	*143*	*6%*
Middle term 2030	7	323,801	26%	470	20%
Luzon	*4*	*193,967*	*15%*	*240*	*10%*
Mindanao	*3*	*129,834*	*10%*	*230*	*10%*
Long term 2040	15	543,878	43%	1,127	49%
Luzon	*6*	*322,936*	*26%*	*558*	*24%*
Visayas	*5*	*90,364*	*7%*	*236*	*10%*
Mindanao	*4*	*130,579*	*10%*	*334*	*14%*
Total	*33*	1,262,262	*100%*	2,315	100%

Source: JICA Study Team

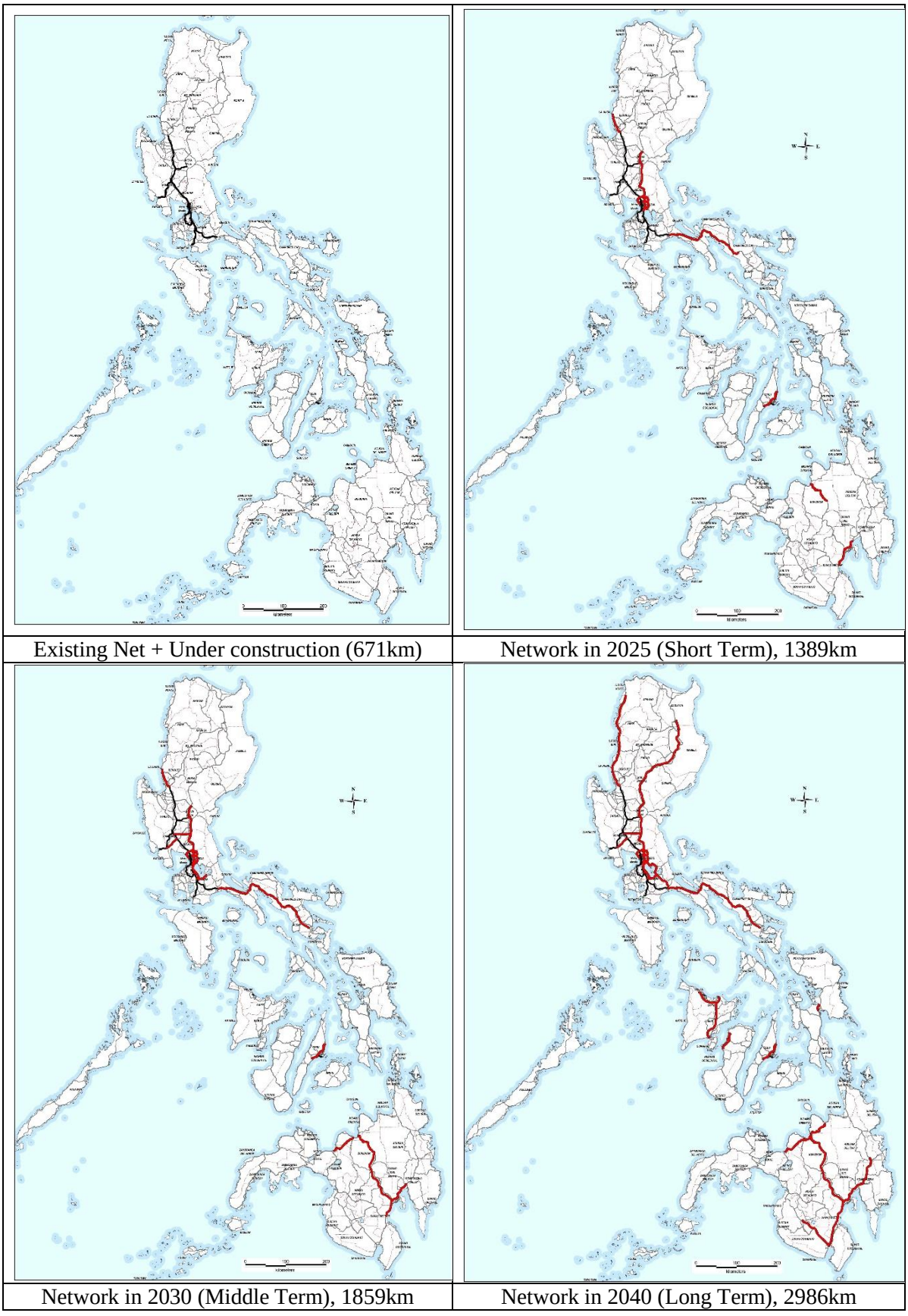
Table 12.10-2 Result of Criteria Evaluation for HSH Class-1 Projects

Section No.	Road Name	AADT 2040	1 Development	2 Traffic	3 EIRR	4 Environment & Social	5 Project readiness	6 FIRR	Total points (100)	Rank	Schedule	Length(km)	Project Cost (Million Pesos)
			Total (40)	Total (20)	Total (16)	Total (12)	Total (8)	Total (4)					
9	NLEE Phase 1 and Phase 2	38,305	25	20	16	8	6	4	79	1	Short	46.48	20,247
10	NLEE Phase 1 and Phase 2	38,872	21	20	16	11	6	4	78	2	Short	62.06	29,092
30	Metro Cebu High Standard Highway	23,014	30	18	12	5	4	2	71	3	Short	58.67	50,889
39	Tagum-Davao-Digos High Standard Highway 1 (Davao City By-Pass)	21,630	33	12	6	5	8	4	68	4	Short	76.62	16,791
1	Ilocos High Standard Highway 1 (TPLEX Extension)	19,734	21	16	16	8	4	2	67	5	Short	48.17	19,211
46	Central Mindanao High Standard Highway 1	18,533	24	16	16	8	2		66	6	Short	66.19	38,813
11	Central Luzon Link High Standard Highway (CLLEX) Phase II	29,140	12	15	16	11	8	4	66	6	Short	31.05	14,140
15	C5 High Standard Highway	63,870	15	20	12	8	8	2	65	8	Short	23.03	57,680
14	C6 High Standard Highway (South East Metro Manila High Standard Highway)	37,915	15	20	16	4	8	2	65	8	Short	96.07	59,392
20	Quezon-Bicol High Standard Highway 1	19,674	20	16	12	8	8		64	10	Short	71.84	31,885
21	Quezon-Bicol High Standard Highway 2	10,743	30	10	3	10	8		61	11	Short	137.38	56,444
44	North Mindanao High Standard Highway II - 1	19,700	23	16	12	8			59	12	Middle	61.65	47,966
40	Tagum-Davao-Digos High Standard Highway 2	17,066	19	13	12	9		2	55	13	Middle	26.52	12,524
16	Laguna Lakeshore High Standard Highway	33,162	20	17	6	5	6		54	14	Middle	82.59	128,196
12	2nd Central Luzon Link High Standard Highway	18,840	13	16	16	9			54	14	Middle	41.34	19,204
47	Central Mindanao High Standard Highway 2	16,587	17	16	16	3		2	54	14	Middle	142.01	69,344
13	NLEX Phase 3	28,304	13	15	16	9			53	17	Middle	34.12	18,955
22	Bicol High Standard Highway I	12,153	21	10	12	10			53	17	Middle	81.79	27,612
17	Laguna De Bay Crossing High Standard Highway 1	16,571	20	16	6	8	2		52	19	Long	59.56	108,054
48	Gen. San-Cotabato High Standard Highway 1	11,611	29	7	3	6			45	20	Long	90.17	29,123
41	Digos-Gen. San High Standard Highway	16,690	13	13	12	4		2	44	21	Long	77.42	36,557
18	Laguna De Bay Crossing High Standard Highway 2	17,508	15	10	6	9	2		42	22	Long	43.73	19,914
42	North Mindanao High Standard Highway I - 1	11,557	13	13	12	4			42	22	Long	82.65	40,297
6	Cagayan Valley High Standard Highway 1	14,274	7	13	12	8			40	24	Long	175.35	63,577
37	Butuan-Tagum High Standard Highway 1	13,087	4	16	12	6		2	40	24	Long	83.35	24,602
24	Panay High Standard Highway 1	14,292	13	7	6	11			37	26	Long	35.28	12,317
25	Panay High Standard Highway 2	13,424	13	10	3	8			34	27	Long	76.87	26,090
3	Ilocos High Standard Highway 3	10,582	11	13	6	3			33	28	Long	142.86	50,569
8	Dalton Pass East Alignment Alternative Road Project	16,569	12	13	3	4			32	29	Long	89.82	61,890
2	Ilocos High Standard Highway 2	13,489	2	10	12	7			31	30	Long	46.81	18,932
28	Negros High Standard Highway 1	10,910	13	7	0	9			29	31	Long	52.22	20,076
26	Panay High Standard Highway 3	10,694	2	10	3	10			25	32	Long	56.50	19,837
33	Samar-Leyte High Standard Highway 3	11,592	6	7	3	8			24	33	Long	14.82	12,044



Source: JICA Study Team

Figure 12.10-1 Implementation Schedule for HSH Class-1 Projects

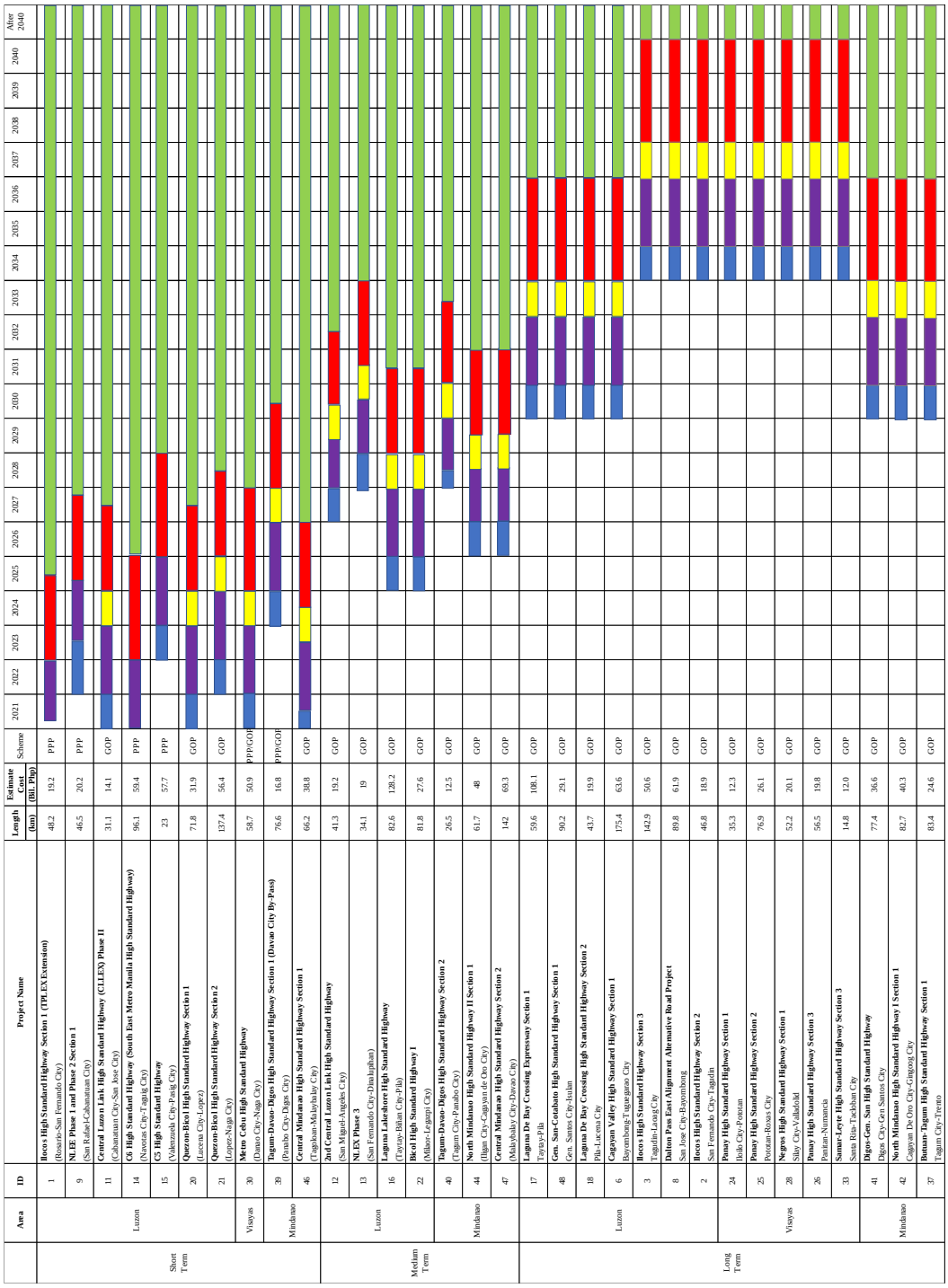


Existing Net + Under construction (671km)	Network in 2025 (Short Term), 1389km
Network in 2030 (Middle Term), 1859km	Network in 2040 (Long Term), 2986km

Source: JICA Study Team

Figure 12.10-2 HSH Class-1 Network Expansion Planning

Table 12.10-3 Proposed Implementation Schedule of HSH Class-1 Projects



12.10.2 Project Implementation Program for HSH Class-2

The formulation of project implementation for HSH Class-2 is considered based on the basic idea described below.

<Criteria for Prioritization HSH Class-2>

Basically, projects for HSH Class-2 consists of projects to upgrade existing national highways within the ROW by road widening from two lanes to four lanes including additional bridges or improvement of road alignment for both horizontal alignment and vertical alignment. In case of congested road section in urbanized area, which has difficulty of road widening and has a lot of transit traffic, construction of bypass road or flyover at major intersections is planned as a measure for HSH Class-2 development to secure average service level of road section more than 60km/hr. HSH Class-2 is a high standard highway that will perform a network function while complementing with the HSH Class-1.

Based on the above basic requirements, the prioritization of HSH Class-2 is considered as follows:

- ✓ Future traffic volume, high traffic and congested section is considered as urgent section,
- ✓ In delay of construction of HSH Class-1 in Visayas and Mindanao area, HSH Class-2 will be implemented in short and medium term.
- ✓ Development of HSH Class-2 shall be adjusted with opening of HSH Class-1 development section.

<The outline of implementation schedule for HSH Class-2>

The mapping of the outline of implementation schedule for HSH Class-2 is shown in **Figure 12.10-3**. The allocation of construction cost is summarized in **Table 12.10-4** and the expansion length by term is summarized in **Table 12.10-5**.

Table 12.10-4 Summary of Construction Cost for HSH Class-2 Projects

Unit: PhP million

Area	Short (2021-2025)	Medium (2026-2030)	Long (2031-040)	Total
Luzon	15,213	69,849	218,458	303,520
Visayas	36,564	13,770	106,937	157,271
Mindanao	76,183	55,492	7,833	139,508
Total	127,960 (21%)	139,111 (23%)	333,228 (56%)	600,299 (100%)

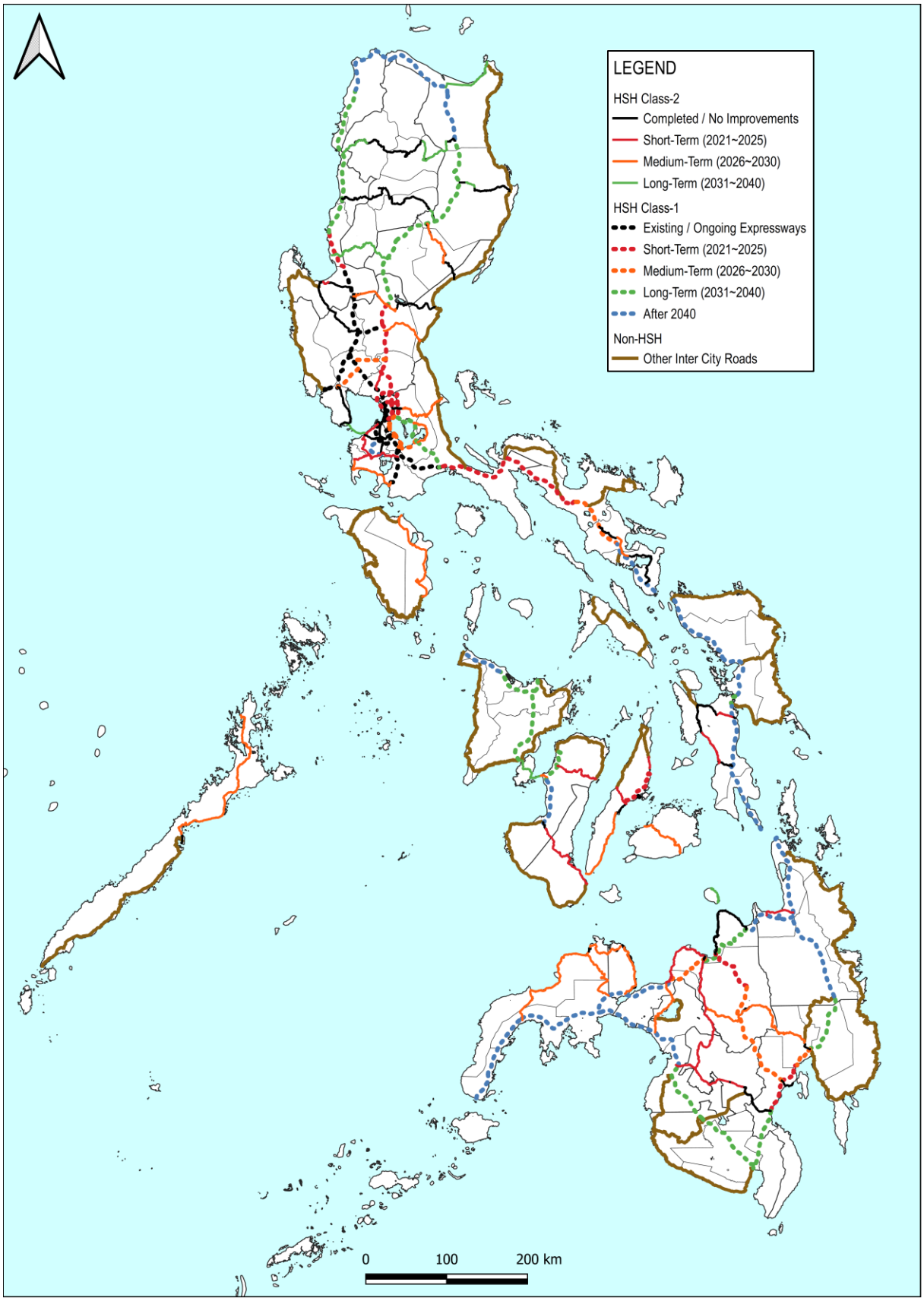
Source: JICA Study Team

Table 12.10-5 Summary of Construction Length of HSH Class-2 Projects

Unit: km

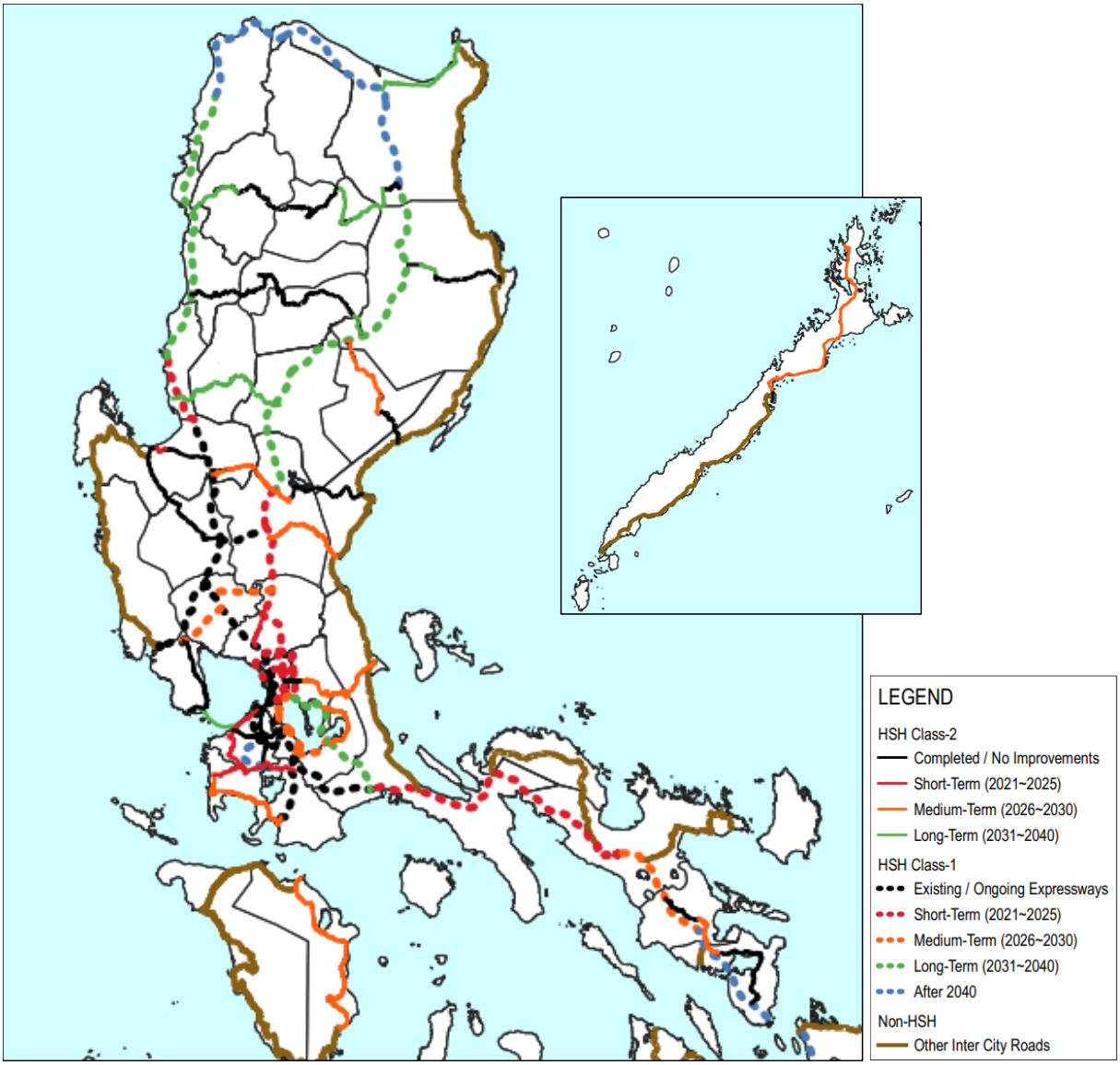
Area	No improvement	Short (2021-2025)	Medium (2026-2030)	Long (2031-2040)
Luzon	343	203	1141	799
Visayas	-	413	213	51
Mindanao	111	501	760	24
Total	453	1,117	2,113	875

Source: JICA Study Team



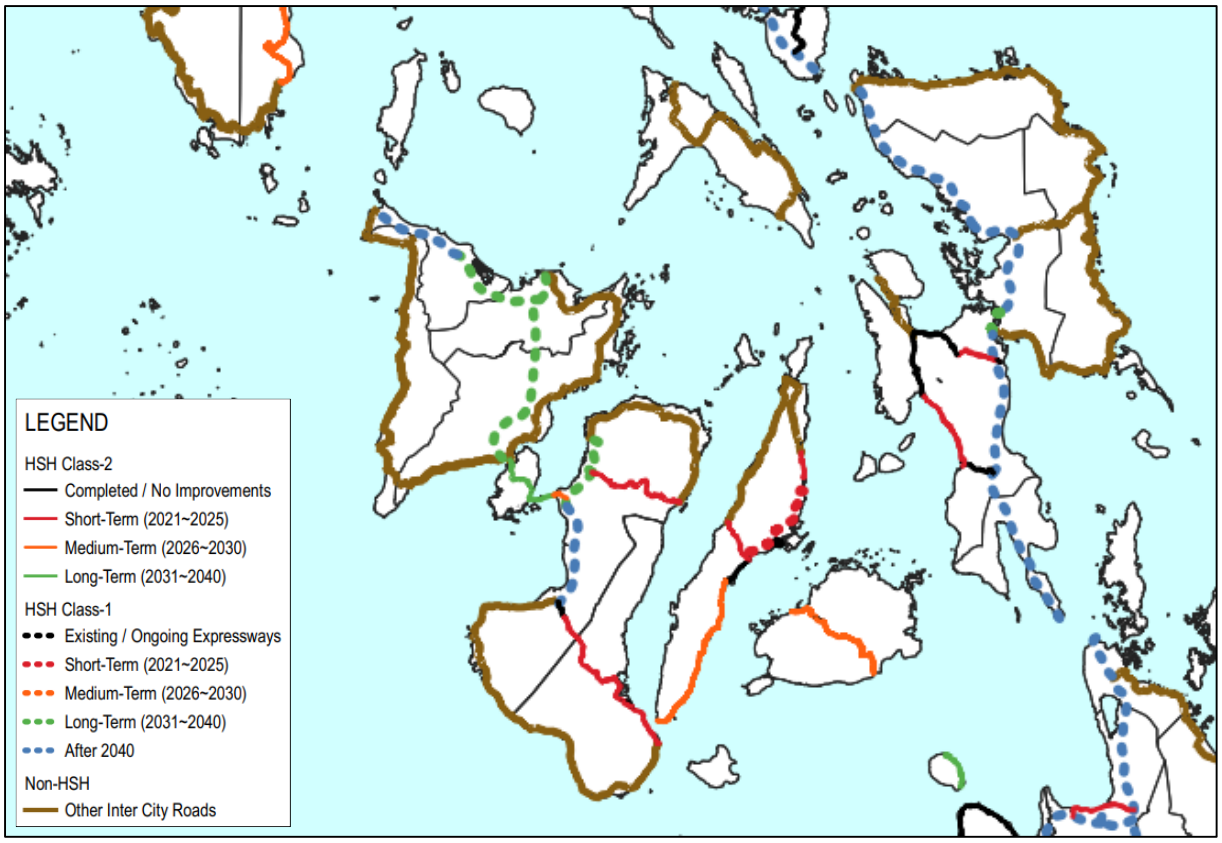
Source: JICA Study Team

Figure 12.10-3 Implementation Schedule for HSH Class-2 Projects of Nationwide



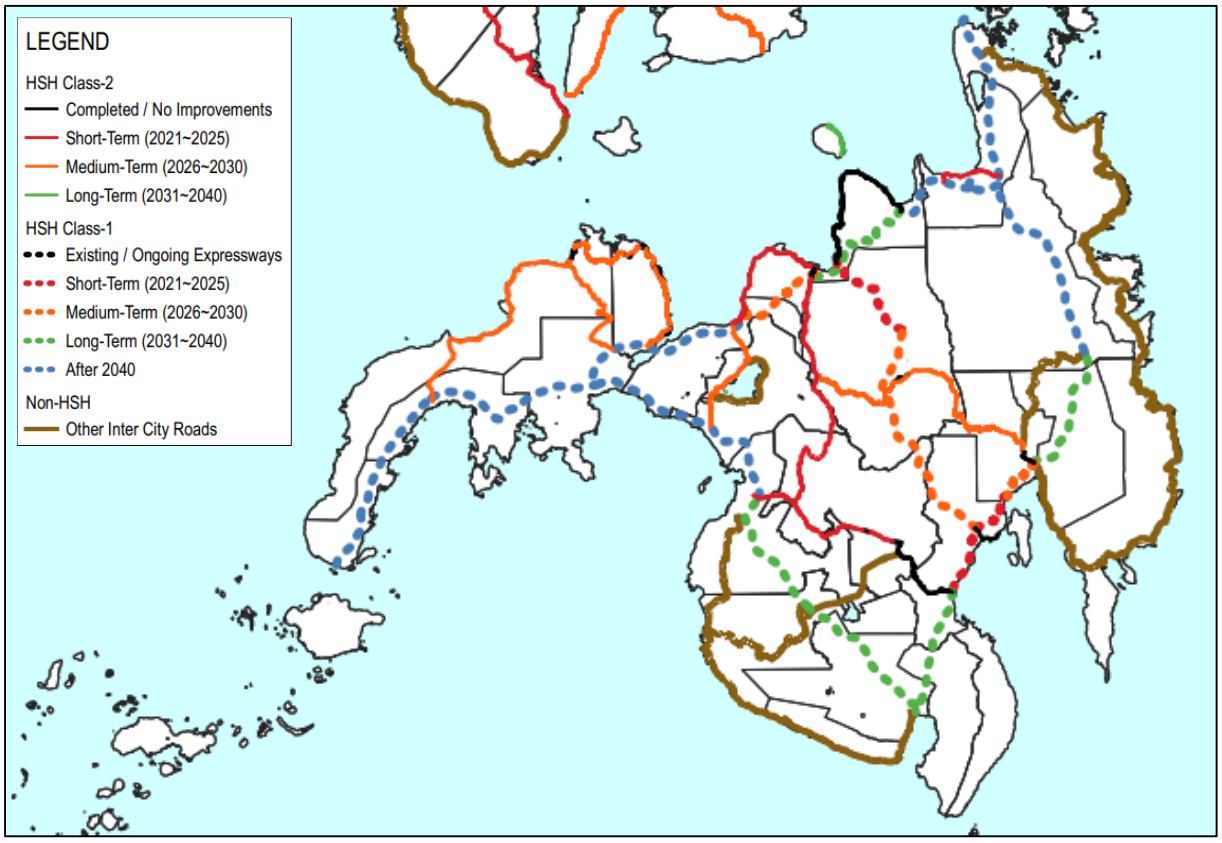
Source: JICA Study Team

Figure 12.10-4 Implementation Schedule for HSH Class-2 Projects in Luzon Area



Source: JICA Study Team

Figure 12.10-5 Implementation Schedule for HSH Class-2 Projects in Visayas Area



Source: JICA Study Team

Figure 12.10-6 Implementation Schedule for HSH Class-2 Projects in Mindanao Area

12.11 Evaluation of Master Plan

The proposed Master Plan: the HSH network in 2040, was evaluated from the viewpoint of (1) Improvement of transport efficiency, (2) Upgrading the regional connectivity, (3) Response to climate change, (4) Economic benefit. This assessment is targeted at the 2040 HSH network, which includes HSH Class 1 and Class 2.

12.11.1 Improvement of Traffic

In order to evaluate the proposed Master Plan in term of traffic improvement, these indicators are calculated based on the traffic assignment in 2040 of the With-case which is the Master Plan network case and the Do-nothing case which was explained in Chapter VI. The used OD-table is the future OD table of the year 2040.

(1) Reduction of Total Travel Time

(2) Improvement of Travel Speed

(1) Reduction of Total Travel Time

The reduction of total travel time by vehicles, which has unit of veh. -hour, is estimated based on the traffic assignment in 2040. Total travel time is calculated by aggregating the travel time of all links on the traffic assignment network. The links to be calculated are all HSH, primary national road and secondary national road. The idea of calculation is as follows:

$Reduction\ of\ Travel\ Time\ (veh.-hour/day):\ RTT = TT_{D/N} - TT_w$

$Total\ Travel\ Timet\ (veh.-hour/day): TT_i = \sum_j \sum_i (Q_{ijl} \times L_l / V_{ijl})$

Q_{ijl}: $Traffic\ Volume\ of\ vheicle\ type\ j\ on\ link\ l\ in\ case\ of\ i\ (veh./day)$

V_{ijl}: $Travel\ Time\ on\ link\ l\ (km/hour)$

L_l: $length\ of\ link\ l\ (km)$

i: $Do\ nothing\ Case\ D/N, With\ case\ W$

j: Vehicle type (Car, Jeepney, Bus and Truck)

l: $link\ (road\ link\ on\ traffic\ assignment\ road\ network)$

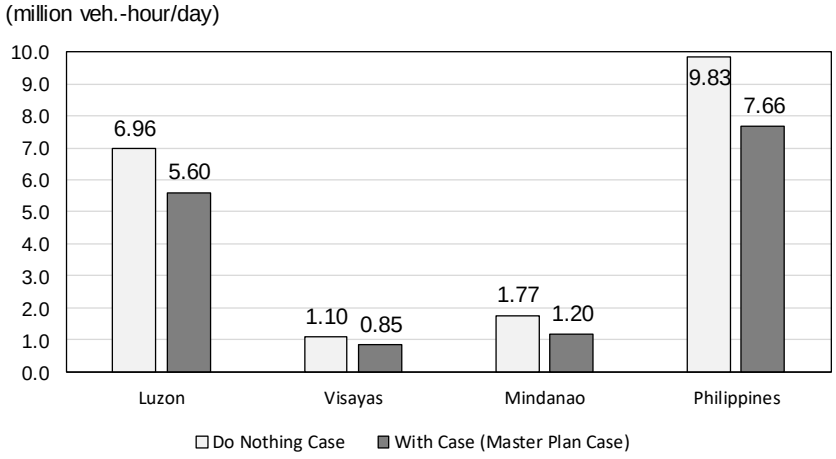
The estimated total travel time in 2040 by vehicle is shown in **Table 12.11-1**. It is expected that 2.2 million veh. -hour of nationwide total travel time, the reduction ratio is 22 %, and would be reduced daily by the development of the HSH network in 2040. According to the result by area, the most reduction effect is expected in Luzon and the travel time reduction is 1.4 million veh.-hour per day which corresponds to 20% reduction ratio. The 23% reduction in Visayas and 32% reduction in Mindanao are expected.

Table 12.11-1 Reduction of Total Travel Time by Vehicle in 2040

Unit: million veh.-hour/day

	Do Nothing Case	With Case	Reduction (DN case-W case)	Reduction rate
Luzon	6.96	5.60	1.36	20%
Visayas	1.10	0.85	0.25	23%
Mindanao	1.77	1.20	0.56	32%
Philippines	9.83	7.66	2.17	22%

Source: Estimation by JICA Study Team



Source: JICA Study Team

Figure 12.11-1 Reduction of Travel Time by Vehicle in 2040

(2) Improvement of Travel Speed

The average travel speed of all arterial roads in 2040 is estimated based on the traffic assignment in 2040. Road network to be considered for calculation is all arterial roads: Hs, and National roads. The estimated average travel speed is shown in **Table 12.11-2**.

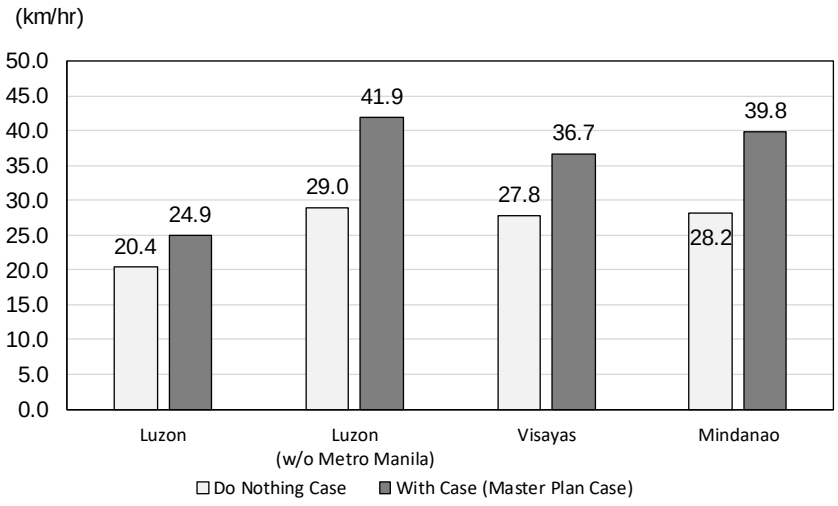
According to the result by area, the most effect is expected in Luzon area without Metro Manila and the travel speed would be improved by 13 km/hr from 29 km/hr to 42 km/hr by the development of new HSH network in 2040, which corresponds to 31% improvement ratio. The 24% improvement in Visayas and 29% improvement in Mindanao are expected.

Table 12.11-2 Improvement of Travel Speed by Vehicle in 2040

Unit: km/hour

	Do Nothing Case	With Case	Improved Travel Speed	Improvement ratio
Luzon	20.4	24.9	4.5	-18%
Luzon (w/o Metro Manila)	29.0	41.9	12.9	-31%
Visayas	27.8	36.7	8.9	-24%
Mindanao	28.2	39.8	11.6	-29%

Source: Estimation by JICA Study Team



Source: JICA Study Team

Figure 12.11-2 Improvement of Travel Speed by Vehicle in 2040

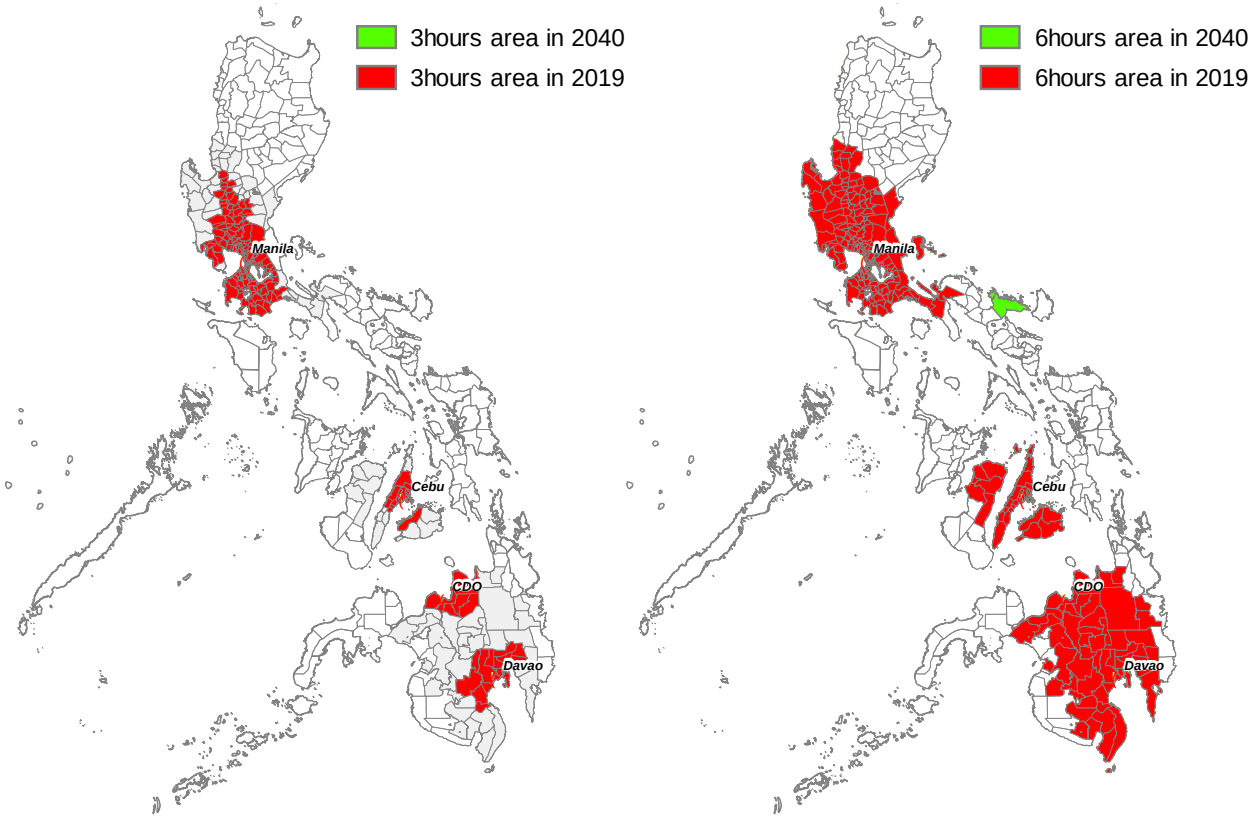
12.11.2 Improvement of regional connectivity

(1) Expansion of Service Area from Metropolitan Centers

Figure 12.11-3 shows the service area of Metropolitan centers: Manila, Cebu, Davao and Cagayan de Oro. The figure on the left shows the expansion of 3 hours service areas from Metropolitan center, which is one day trip areas.

The figure on the right shows the expansion of 6 hours service areas. By the extension of the high standard highway, the service areas from Metropolitan centers are certainly expanded. In particular, it is expected that the coverage areas of Metro Manila, Davao and CDO will expand. This greatly contributes to the growth of exchange of people and activation of logistics.

This figure is made from the result of road network analysis and result of traffic assignment. The 2019 case is estimated based on the road length of existing road network and road velocity from the traffic assignment result. For year 2040 case, the proposed HSH road network including HSH Class-1 and Class-2 is applied to the network analysis and the traffic assignment result.



<Expansion of 3 Service hours Area> **<Expansion of 6 hours Service Area>**

Figure 12.11-3 Expansion of Service Areas from Metropolitan Centers

Table 12.11-3 Increase of Accessible Population to Metropolitan Centers in 3 or 6 hours

	2019	2040	Increase of Ratio
3 hours service area	40 million (40%)	77 million (55%)	15%
6 hours service area	65 million (65%)	112 million (80%)	15%

**Population figure in 2040 is estimated in Social-Economic framework.*

(2) Expansion of Service Area from Major Regional Centers

Figure 12.11-4 shows the 1.5 hours service area of Major Regional Centers which function as the urban centers of the Regions. In the figure below, the green-colored area shows the current 1.5 hours service area in 2019 and the orange-colored area shows the 1.5 hours area to be expanded by 2040 by HSH network extension. The estimation method is same to the previous item about the service area of Metropolitan center. Although the high accessibility to regional centers is required for ordinary life, the accessibility of areas where access was disadvantaged would be greatly improved by HSH network development. Especially, the improvement of accessibility in inland areas in North Luzon, Bicol and Mindanao is expected. This greatly contributes to the increase of access opportunity to urban services for regional people with low-cost trip and short time trip.

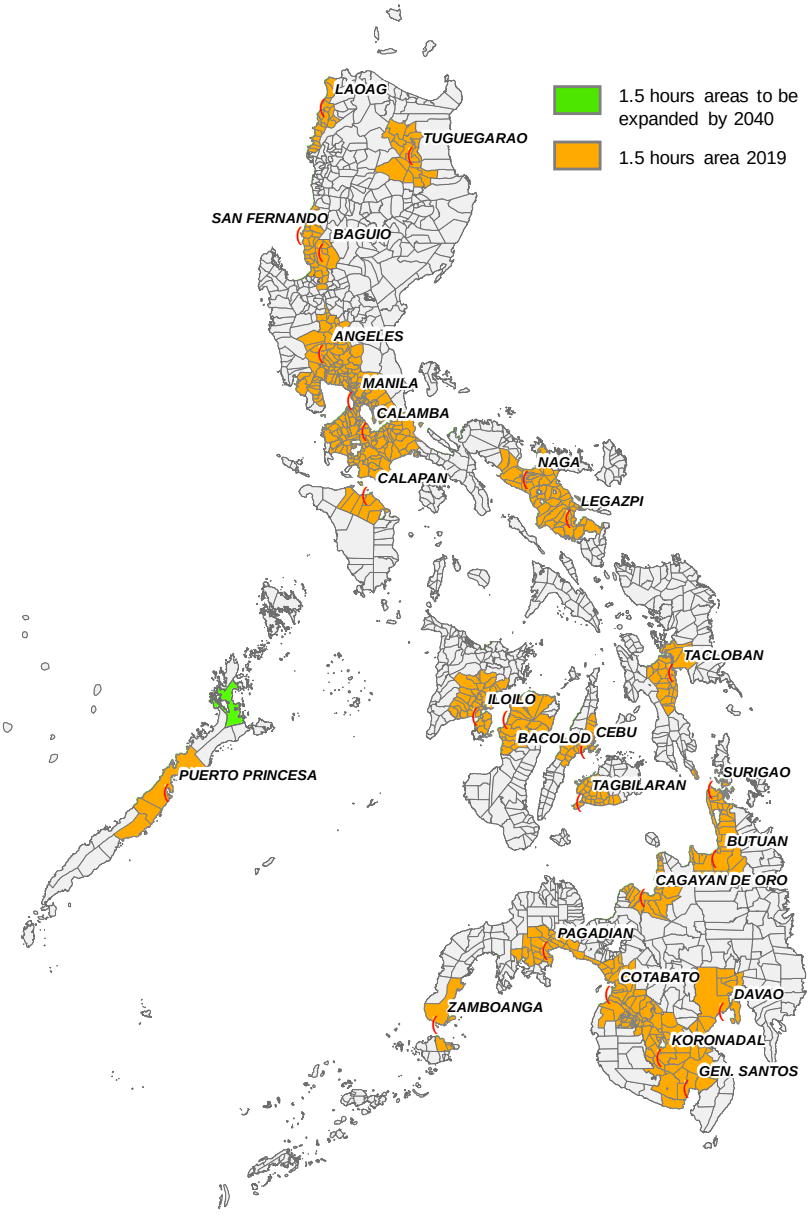


Figure 12.11-4 Expansion of 1.5 hours Service Area from Major Regional Centers

Table 12.11-4 Increase of Accessible Population to Regional Centers in 1.5 hour

	2019	2040	Increase (Growth rate)
All population	50 million	84 million	34 million
Ratio	50 %	60 %	10%

**Population is figure in 2040 estimated in Socio-Economic framework.*

Table 12.11-5 Number of Accesible Regional Centers along HSH Class 1

	2019	2040	Increase
Number of Regional Centers	8	27	19
Ratio	19%	64%	45%

**Total number of regional centers is 42.*

**Population is figure in 2040 estimated in Socio-Economic framework.*

12.11.3 Response to Climate Change Issues

The development of HSH network enables vehicles to reduce the exhaust gas by reduction of traffic congestion and by an improvement of travel speed. The reduction of exhaust gas from vehicles contributes to reduce Greenhouse Gas such as CO2 and emission gas that causes air pollution, such as NOx, SPM (Suspended Particulate Matter). As a result, the development of the road network will also help solve climate- change issues.

(1) Reduction of Greenhouse Gas (CO_2)

The reduction of greenhouse gas: carbon dioxide CO2 by vehicles is estimated as difference of emission volume between With case and Do-nothing case by traffic assignment in 2040. Total volume of exhaust gas from vehicles is calculated by aggregating the exhaust gas of all links on the traffic assignment network. The links to be calculated are all HSH, primary national roads and secondary national roads. The calculation of CO2 emission volume is as follows.

$Reduction\ Volume\ of\ CO2 \quad : \ RG = RG_{D/N} - RG_w$

$Emission\ Volume\ of\ CO2 \quad : RG_i = \sum_j \sum_i (Q_{ijl} \times L_l \times \beta_j) \times 365$

$RG: Reduction\ volume\ of\ CO2\ (g\text{-}CO2/year)$

$RG_i: Emission\ Volume\ of\ CO2\ (g\text{-}CO2/year)$

$Q_{ijl}: Traffic\ Volume\ of\ vheicle\ type\ j\ on\ link\ l\ in\ case\ of\ i\ (veh./day)$

$L_l: length\ of\ link\ l\ (km)$

$\beta_j: Emission\ factor\ by\ vheicle\ type\ j\ (g\text{-}CO2/veh \cdot km)$

$i: Do\ nothing\ Case\ D/N, With\ case\ W$

$j: V$ehicle type (Car, Jeepney, Bus and Truck)

$l: link\ (road\ link\ on\ traffic\ assignment\ road\ network)$

Table 12.11-6 CO2 Emission Factor

Unit: g-CO2/km*veh

km/h	Car	Large size vehicle (Jeepney, Bus and Truck
5	437	1,646
10	329	1,372
15	237	1,099
20	210	1,014
25	188	929
30	171	856
35	159	794
40	150	742
45	142	700
50	137	668
55	133	645
60	131	632
65	130	629
70	131	634
75	133	649
80	136	674
85	140	707
90	146	750
95	152	793
100	158	836

Source: National Institute for Land and Infrastructure Management (NILIM) in Japan, 2010

The estimated CO2 emission volume is shown in **Table 12.11-7**. It is expected that 3.48 million ton per year or 16.9% of total nationwide CO2 emission would be reduced annually with the development of new HSH network beginning in 2040.

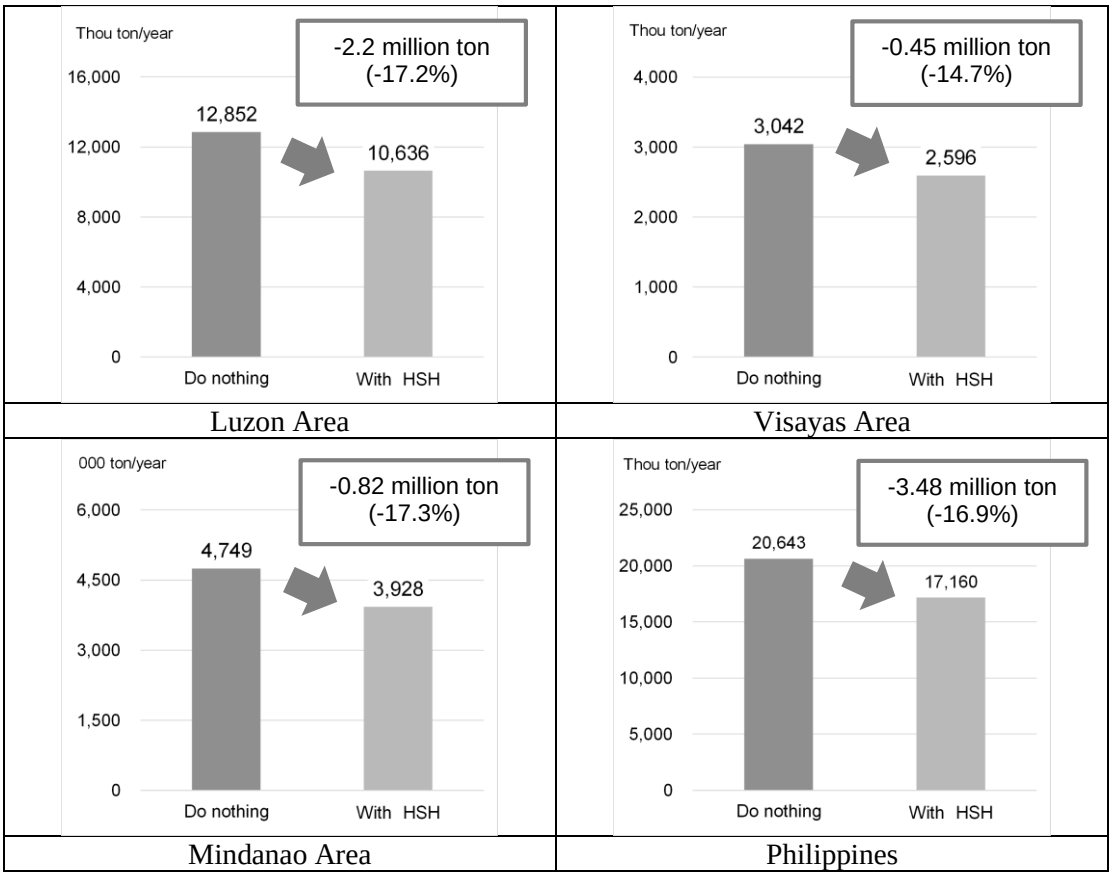
According to the result by area, the most reduction effect is expected in Luzon and the reduction of CO2 emission is 2.216 million ton per year which corresponds to 17.2% reduction ratio. The 14.7% reduction in Visayas and 17.3% reduction in Mindanao are also expected.

Table 12.11-7 Summary of Reduction of CO2 Emission in 2040

Unit: Thousand ton/year

		Luzon	Visayas	Mindanao	Philippines
CO2 Emissions	Do nothing	12,852	3,042	4,749	20,643
	With HSH	10,636	2,596	3,928	17,160
	Reduction	2,216	446	821	3,484
	(%)	17.2%	14.7%	17.3%	16.9%

Source: JICA Study Team



Source: JICA Study Team

Figure 12.11-5 Reduction of CO_2 Emission in 2040

This reduction volume of CO_2 emission reduction is equivalent to the amount of CO_2 absorption by 328,658 ha of forest.

Table 12.11-8 Reduction CO_2 Emission in 2040

Area	CO_2 Emission (Thousand ton/year)		Reduction of CO_2 (Thousand ton/year)	Carbon Dioxide Absorption by Forest Area (ha)
	Do Nothing	With HSH		
Philippines	20,643	17,160	3,484	328,658
Luzon	12,852	10,636	2,216	209,081
Visayas	3,042	2,596	446	42,080
Mindanao	4,749	3,928	821	77,496

Note: CO_2 absorption factor by forest (10.6 ton-CO_2/ha/year).

Source: Estimated by JICA Study Team

(2) Reduction of Pollution Gas (NOx and SPM)

Based on the same idea of calculation of reduction of CO_2 emission, the reduction of pollution gas: NOx, SPM is estimated. The calculation of NOx and SPM emission volume is as follows.

$Reduction\ Volume\ of\ NOx\ or\ SPM \quad : \quad RG = RG_{D/N} - RG_w$

$Emission\ Volume\ of\ NOx\ or\ SPM \quad : RG_i = \sum_j \sum_i (Q_{ijl} \times L_l \times \beta_j) \times 365$

$RG: Reduction\ volume\ of\ NOx\ or\ SPM\ (g/year)$

$RG_i: Emission\ Volume\ of\ NOx\ or\ SPM\ (g/year)$

$Q_{ijl}: Traffic\ Volume\ of\ vheicle\ type\ j\ on\ link\ l\ in\ case\ of\ i\ (veh./day)$

$L_l: length\ of\ link\ l\ (km)$

$\beta_j: Emission\ factor\ by\ vheicle\ type\ j\ (g/km \cdot veh.)$

$i: Do\ nothing\ Case\ "D/N", With\ case\ "W"$

$j: V$ehicle type $(Car, Jeepney, Bus\ and\ Truck)$

$l: link\ (road\ link\ on\ traffic\ assignment\ road\ network)$

Table 12.11-9 NOx Emission Factor

Unit: g/km*veh

km/h	Car	Large size vehicle (Jeepney, Bus and Truck
5	0.215	7.161
10	0.193	5.826
20	0.168	4.084
30	0.133	3.115
40	0.107	2.472
50	0.090	2.109
60	0.084	2.010
70	0.088	2.168
80	0.103	2.580
90	0.128	3.244
100	0.164	3.970

Source: National Institute for Land and Infrastructure Management (NILIM) in Japan, 2010

Table 12.11-10 SPM Emission Factor

Unit: g/km*veh

km/h	Car	Large size vehicle (Jeepney, Bus and Truck
5	0.021757	0.052162
10	0.015453	0.391885
20	0.009810	0.236774
30	0.006971	0.179832
40	0.005183	0.143874
50	0.004194	0.121167
60	0.003919	0.109131
70	0.004323	0.106662
80	0.005386	0.113207
90	0.007100	0.128459
100	0.009458	0.145861

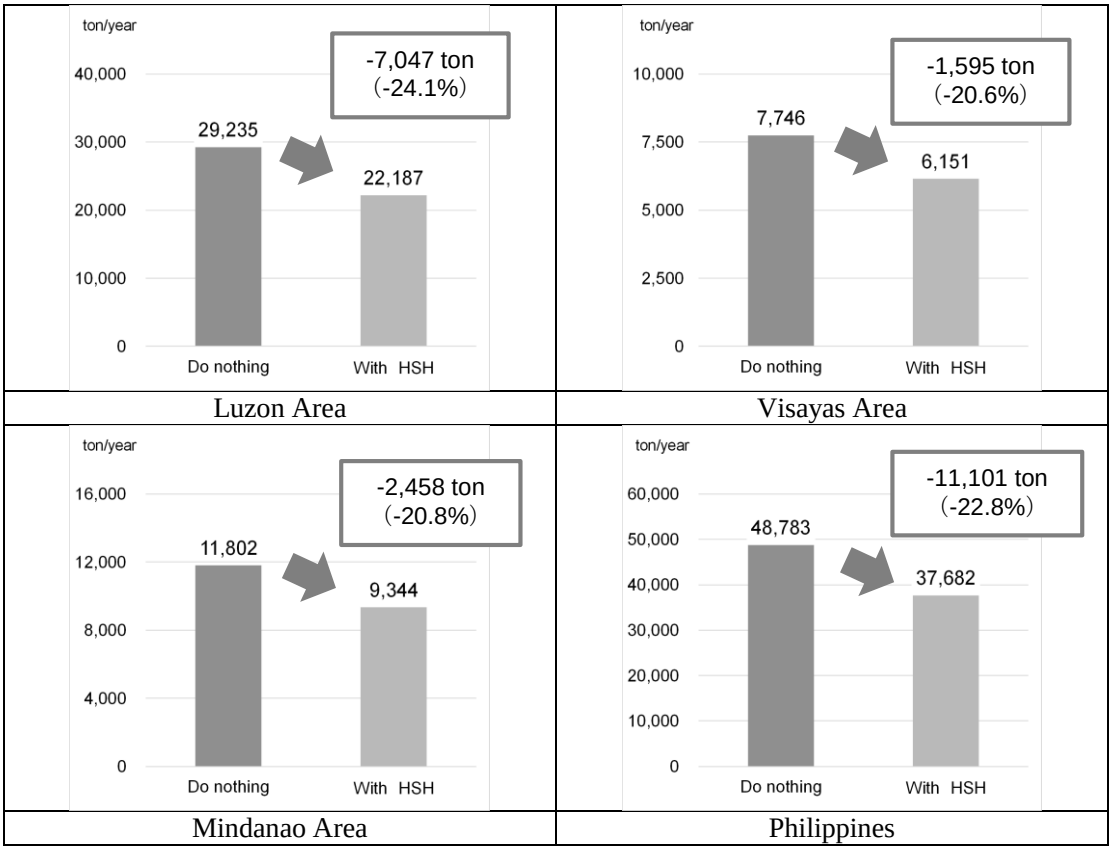
Source: National Institute for Land and Infrastructure Management (NILIM) in Japan, 2010

Table 12.11-11 Reduction of NOx Emission in 2040

Unit: ton/year

		Luzon Area	Visayas Area	Mindanao Area	Philippines
NOx Emission	Do nothing	29,235	7,746	11,802	48,783
	With HSH	22,187	6,151	9,344	37,682
	Reduction	7,047	1,595	2,458	11,101
	(%)	24.1%	20.6%	20.8%	22.8%

Source: JICA Study Team



Source: JICA Study Team

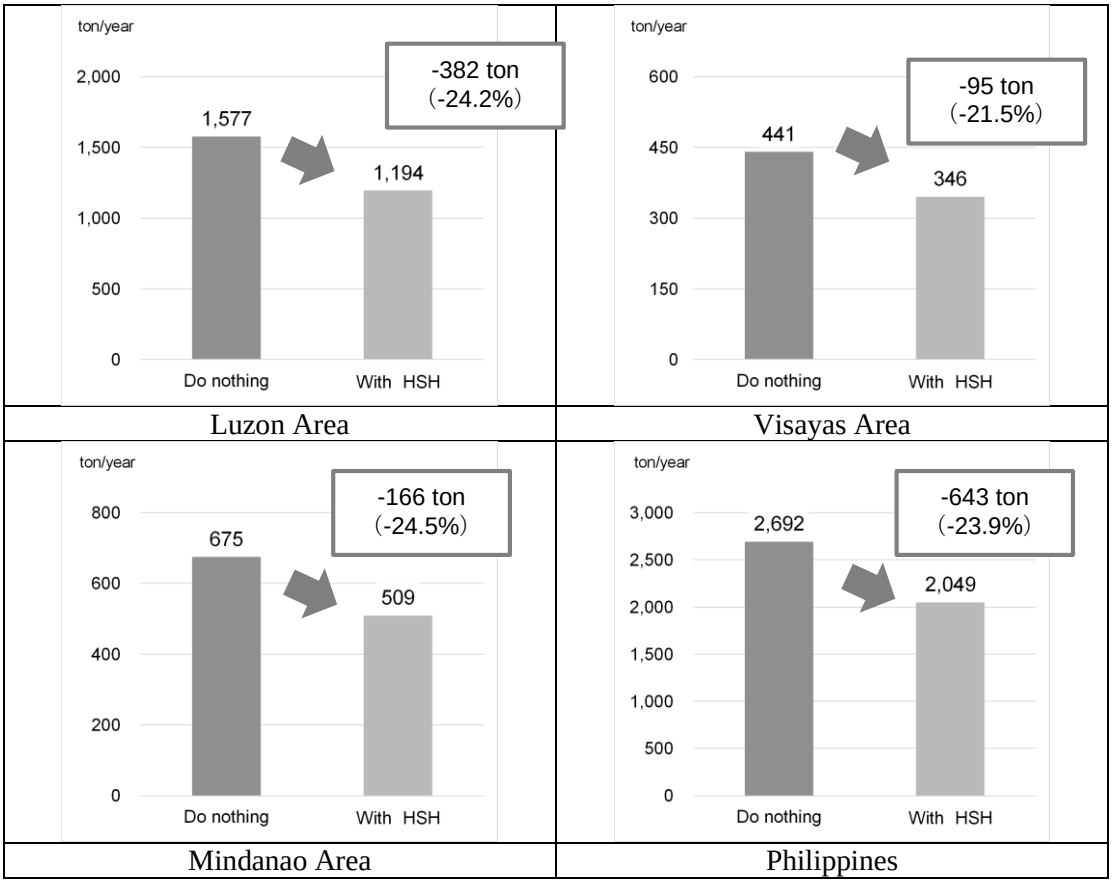
Figure 12.11-6 Reduction of NOx Emission in 2040

Table 12.11-12 Summary of Reduction of SPM Pollution in 2040

Unit: ton/year

		Luzon Area	Visayas Area	Mindanao Area	Philippines
SPM Emission	Do nothing	1,577	441	675	2,692
	With HSH	1,194	346	509	2,049
	Reduction	382	95	166	643
	(%)	24.2%	21.5%	24.5%	23.9%

Source: JICA Study Team



Source: JICA Study Team

Figure 12.11-7 Reduction of SPM Pollution in 2040

12.11.4 Total Economic Benefit by HSH Master Plan Implementation

(1) Benefit of Travel Time Cost Reduction

The benefit of travel time cost reduction is calculated from the difference of total travel time cost between the Do-nothing case and the With case in 2040 estimated by traffic assignment. The calculation of benefit of travel time cost reduction is as follows.

$$Benefit\ of\ Travel\ Time\ Cost\ Reduction:\ BT = BT_{D/N} - BT_w$$

$$Total\ Travel\ Time\ Cost: BT_i = \sum_j \sum_i (Q_{ijl} \times T_{ijl} \times \alpha_j) \times 365$$

$BT: Benefit\ of\ Travel\ Time\ Cost\ Reduction\ (PHP/year)$

$BT_i: Total\ Travel\ Time\ Cost\ (PHP/year)$

$Q_{ijl}: Traffic\ Volume\ of\ vheicle\ type\ j\ on\ link\ l\ in\ case\ of\ i\ (veh./day)$

$T_{ijl}: Travel\ Time\ on\ link\ l\ (min.)$

$\alpha_j: Unit\ TTC\ (peso/min.\text{-}veh)\ *This\ unit\ is\ shown\ in\ 12.5$

$i: Do\ nothing\ Case\ D/N, With\ case\ W$

$j: V$ehicle type (Car, Jeepney, Bus and Truck)

$l: link\ (road\ link\ on\ traffic\ assignment\ road\ network)$

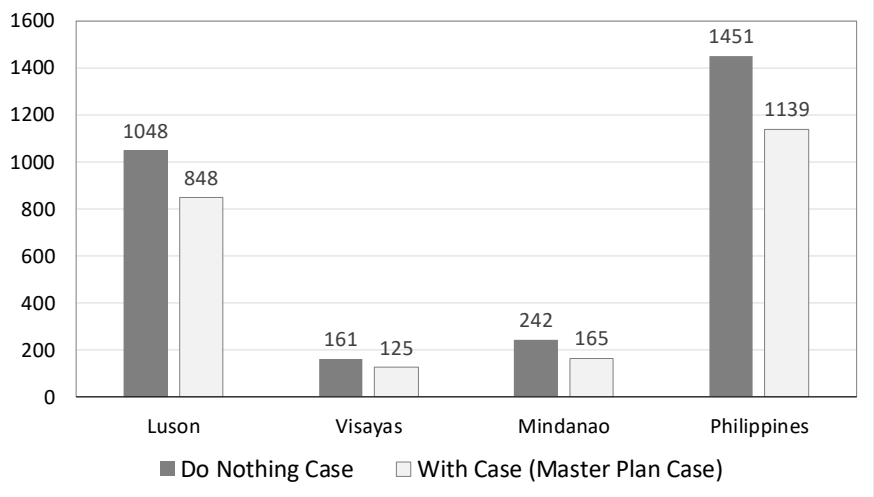
Table 12.11-13 Benefit of Travel Time Cost Reduction in 2040

Unit: PhP Billion/year

	Travel Time Cost Do Nothing Case	Travel Time Cost With Case	Benefit	Reduction ratio of travel time cost
Luzon	1,048	848	200	19%
Visayas	161	125	36	22%
Mindanao	242	165	77	32%
Philippines	1,451	1,139	312	22%

Source: Estimation by JICA Study Team

Unit: PhP Billion/year



Source: Estimation by JICA Study Team

Figure 12.11-8 Benefit of Travel Time Cost Reduction in 2040

(2) Benefit of Vehicle Operating Cost Reduction

The benefit of vehicle operating cost reduction is calculated from the difference of total vehicle operating cost between the Do-nothing case and the With case in 2040 estimated by traffic assignment. The calculation of benefit of vehicle operating cost reduction is as follows:

$$Benefit\ of\ Vehicle\ Operating\ Cost\ Reduction:\ BR = BR_{D/N} - BR_w$$

$$Total\ Vehicle\ Operating\ Cost:$$

$$BR_i = \sum_j \sum_i (Q_{ijl} \times L_l \times \beta_j) \times 365$$

$BR: Benefit\ of\ Vehicle\ Operating\ Cost\ Reduction\ (PHP/year)$

$BR_i: Total\ Vehicle\ Operating\ Cost\ (PHP/year)$

$Q_{ijl}: Traffic\ Volume\ of\ vehicle\ type\ j\ on\ link\ l\ in\ case\ of\ i\ (veh./day)$

$L_l: Lenght\ of\ link\ l\ (km)$

$\beta_j: Unit\ VOC\ (peso/veh.\text{-}km) \quad *This\ unit\ is\ shown\ in\ 12.5$

$i: Do\ nothing\ Case\ D/N, With\ case\ W$

$j: Vehicle\ type\ (Car, Jeepney, Bus\ and\ Truck)$

l: $link$ $(road\ link\ on\ traffic\ assignment\ road\ network)$

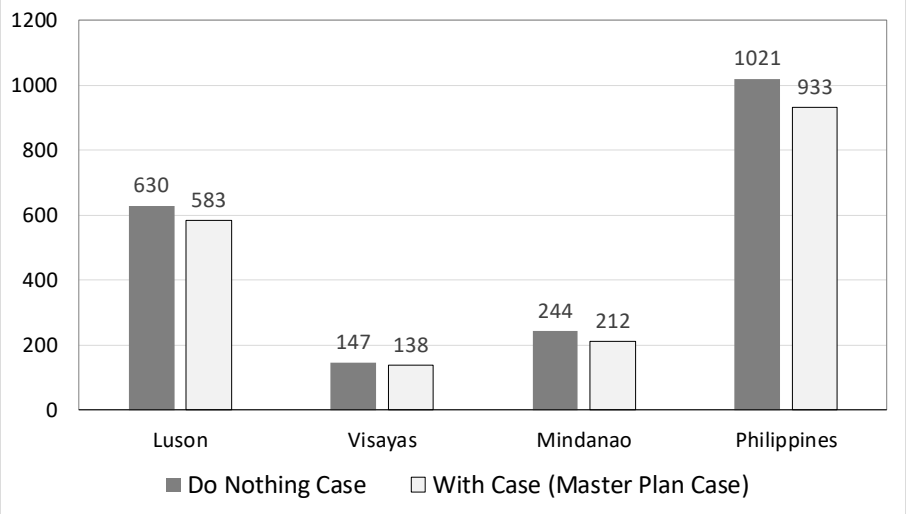
Table 12.11-14 Benefit of Vehicle Operating Cost Reduction in 2040

Unit: PhP Billion/year

	VOC Do Nothing Case	VOC With Case	Benefit	Reduction ratio of VOC
Luzon	630	583	47	7%
Visayas	147	138	9	6%
Mindanao	244	212	33	14%
Philippines	1,021	933	88	9%

Source: Estimation by JICA Study Team

Unit: PhP Billion/year



Source: Estimation by JICA Study Team

Figure 12.11-9 Benefit of Vehicle Operating Cost Reduction in 2040

(3) Total Benefit and EIRR

As a result of calculation of two types of benefit, the total benefit by HSH network development by 2040 is summarized in **Table 12.11-15**. The estimated total benefit in 2040 is around PhP 400 billion per year.

EIRR of the HSH network development proposed in the Master Plan was calculated based on benefits, estimated project cost and O&M cost. The evaluation period is 30 years. EIRR here is a rough estimation and result is shown in **Table 12.11-16.** The EIRR of all projects of HSH proposed in the Master Plan 2040 is around 17%.

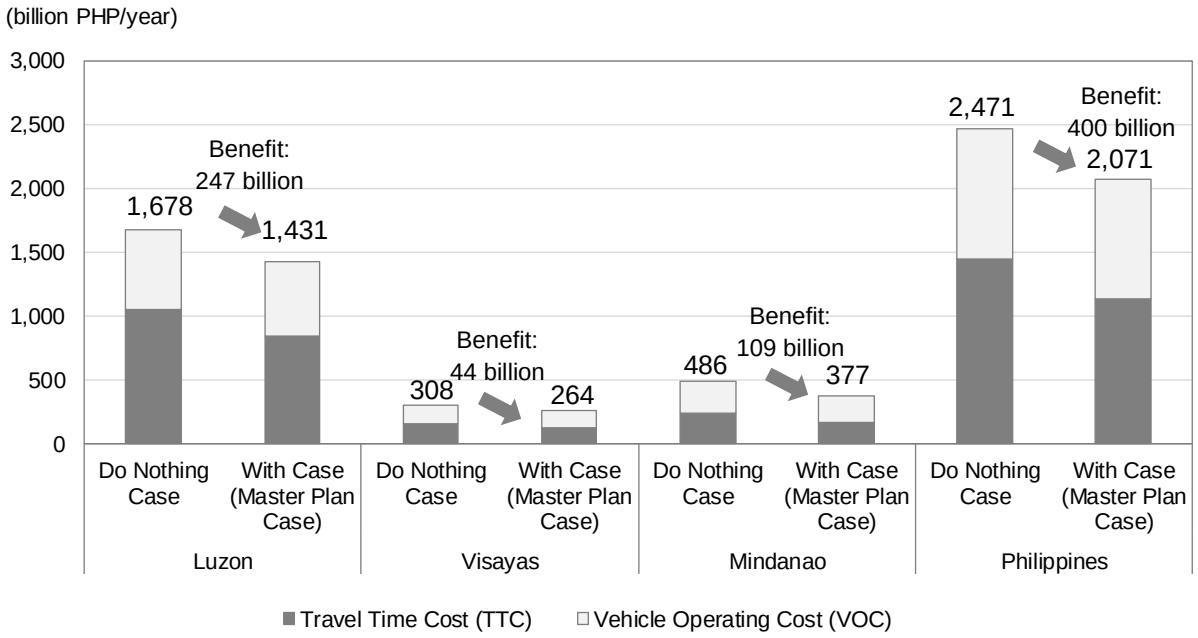
Table 12.11-15 Vehicle User's Cost Reduction by Implementation of HSH Master Plan

Unit: PhP Billion/year

Area	Type of Cost	Cost Do Nothing Case	Cost With Case	Benefit	Cost Reduction Ratio
Luzon	TTC	1,048	848	200	19%
	VOC	630	583	47	8%
	Total Cost	1,678	1,431	247	15%
Visayas	TTC	161	125	36	22%
	VOC	147	138	9	6%
	Total Cost	308	264	44	14%
Mindanao	TTC	242	165	77	32%
	VOC	244	212	33	13%
	Total Cost	486	377	109	22%
Philippines	TTC	1,451	1,139	312	21%
	VOC	1,021	933	88	9%
	Total Cost	2,472	2,071	400	16%

* Benefit and Cost at present value

Source: Estimation by JICA Study Team



Source: Estimation by JICA Study Team

Figure 12.11-10 Vehicle User's Cost Reduction by Implementation of HSH Master Plan

Table 12.11-16 EIRR and Cash Flow

Unit: PhP Million/year

	year	Project Cost	O&M	Total Cost	Benefit TTC saving	Benefit VOC saving	Total Benefit	Cash Flow
Base year	2020	0	0	0	0	0	0	0
-4	2021	36,117	0	36,117	0	0	0	-36,117
-3	2022	65,010	0	65,010	0	0	0	-65,010
-2	2023	86,680	0	86,680	0	0	0	-86,680
-1	2024	86,680	0	86,680	0	0	0	-86,680
Open	2025	86,680	17,257	103,937	22,106	77,971	100,076	-3,861
1	2026	86,909	21,410	108,319	26,527	93,565	120,092	11,772
2	2027	92,559	25,832	118,391	30,948	109,159	140,107	21,716
3	2028	98,575	30,542	129,117	35,369	124,753	160,122	31,005
4	2029	104,982	35,559	140,541	39,790	140,348	180,138	39,597
5	2030	111,806	40,901	152,707	44,211	155,942	200,153	47,446
6	2031	119,074	46,591	165,664	48,632	171,536	220,168	54,504
7	2032	126,813	52,650	179,463	53,054	187,130	240,184	60,720
8	2033	135,056	59,103	194,159	57,475	202,724	260,199	66,040
9	2034	143,835	65,976	209,811	61,896	218,318	280,214	70,404
10	2035	153,184	73,295	226,479	66,317	233,913	300,229	73,750
11	2036	163,141	81,090	244,231	70,738	249,507	320,245	76,013
12	2037	173,745	89,392	263,137	75,159	265,101	340,260	77,123
13	2038	185,039	98,233	283,272	79,580	280,695	360,275	77,003
14	2039	197,066	107,650	304,716	84,001	296,289	380,291	75,575
15	2040	209,875	117,678	327,553	88,423	311,883	400,306	72,753
16	2041	0	117,678	117,678	91,959	324,359	416,318	298,640
17	2042	0	117,678	117,678	95,638	337,333	432,971	315,293
18	2043	0	117,678	117,678	99,463	350,826	450,290	332,612
19	2044	0	117,678	117,678	103,442	364,859	468,301	350,623
20	2045	0	117,678	117,678	107,580	379,454	487,033	369,356
21	2046	0	117,678	117,678	111,883	394,632	506,515	388,837
22	2047	0	117,678	117,678	116,358	410,417	526,775	409,097
23	2048	0	117,678	117,678	121,012	426,834	547,846	430,168
24	2049	0	117,678	117,678	125,853	443,907	569,760	452,082
25	2050	0	117,678	117,678	130,887	461,664	592,551	474,873
26	2051	0	117,678	117,678	136,122	480,130	616,253	498,575
27	2052	0	117,678	117,678	141,567	499,335	640,903	523,225
28	2053	0	117,678	117,678	147,230	519,309	666,539	548,861
29	2054	0	117,678	117,678	153,119	540,081	693,200	575,523
30	2055	0	117,679	117,679	73,763	66,041	139,804	22,125
Total		2,462,827.8	2,728,326.5	5,191,154	2,640,102.1	9,118,015.1	11,758,117.3	6,566,963.0
NPV	*10%*	779,334.6	352,219.0	1,131,553.6	341,625.1	1,198,697.7	1,540,322.8	408,769.2
							B/C	**1.36**
							EIRR	**17.42%**

*Social Discount Rate is 10% based on the NEDA-ICC Guidelines

Source: Estimation by JICA study team

CHAPTER 13

STRATEGIC ENVIRONMENTAL ASSESSMENT

CHAPTER 13
STRATEGIC ENVIRONMENTAL ASSESSMENT

13.3 Strategic Environmental Assessment (SEA)

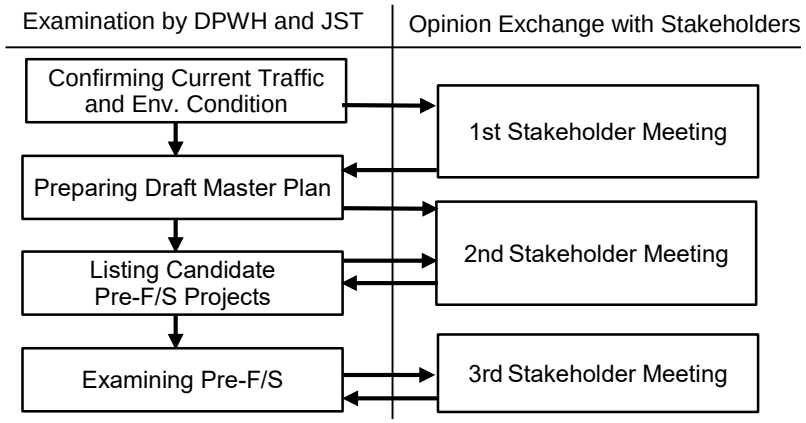
13.3.4 Basic Approaches of SEA

In line with JICA Guidelines for Environmental and Social Considerations, 2010, when conducting Master Plan Studies, JICA always applies a SEA as a systematic process for comprehensively evaluating alternative options for the overall programs initially identified. This is conducted at the earliest appropriate stage of planning, and encourages project proponents to ensure environmental and social considerations from early stage to the monitoring stage. Therefore, SEA is applied in the formulation of the HSH Development Master Plan to integrate potential and existing issues on environmental and social considerations, hence, appropriate mitigation measures may be put forward.

13.3.5 Scope of Work of SEA for the Project

The typical SEA process begins with the identification of potential impacts through the scoping, alternative analysis and evaluation of impacts through multicriteria analysis and ends with the follow-up actions taken as a result of a SEA report. The JICA Guidelines on Environmental and Social Considerations also require that, in environmental and social considerations studies in the master planning, a series of stakeholder meetings has to be conducted during the course of the SEA process.

The result of the preliminary scoping including applicable laws and regulations and specific baseline data in the Philippines and three times stakeholder meetings are explained in this chapter. Multicriteria analysis was mentioned in **Chapter 12** of this report. The SEA procedure applied for the Project is illustrated in **Figure 13.3-1**.



Source: JICA Study Team

Figure 13.3-1 Procedure of SEA for the Project

13.4 Outline of the Project Component

13.4.4 Background

Chronic traffic congestion in large cities and urbanized areas is a great problem in road traffic in the Philippines. The poor state of the transport networks between the centers of economic activities, including Metro Manila and provincial cities, has been an obstacle to the economic development of rural areas and a cause of the increasing disparity between urban and rural areas. A strategic improvement of roads and transport networks in the urban areas and a

nationwide network of HSH, including expressways, should be planned and developed in the Philippines.

JICA implemented a Development Study, "The Study of Master Plan on HSH Network Development (HSH Phase 1)" from April 2009 to May 2010. The Study had three target areas: the areas within the 200-km radius from Metro Manila, Metro Cebu and Metro Davao.

However, the HSH Phase 1 network development focused mainly on Metro Manila and its suburbs, and the Government of the Republic of the Philippines (GRP) has no nationwide HSH network development plan yet. Knowing the importance of the improvement of access to rural areas as an important issue to be addressed in the country, the GRP requested the Government of Japan (GOJ) to conduct "The Study of Master Plan on High Standard Highway Network Development in the Republic of the Philippines (HSH Phase2)" as a follow-through study of HSH Phase 1.

13.4.5 Output

- Defined and clarified overall HSH network focusing on nationwide network.
- Formulation of the HSH Master Plan with implementation program of up to 2040.
- Conduct of Four (4) Pre-Feasibility Studies.

13.4.6 Definition of HSH

"Highways which provide high level traffic services by assuring high speed mobility, safe and comfortable travel in order to vitally support socio-economic activities for sound development of strategic regions and the country as a whole."

13.4.7 Functions of HSH Class-1 and Class-2

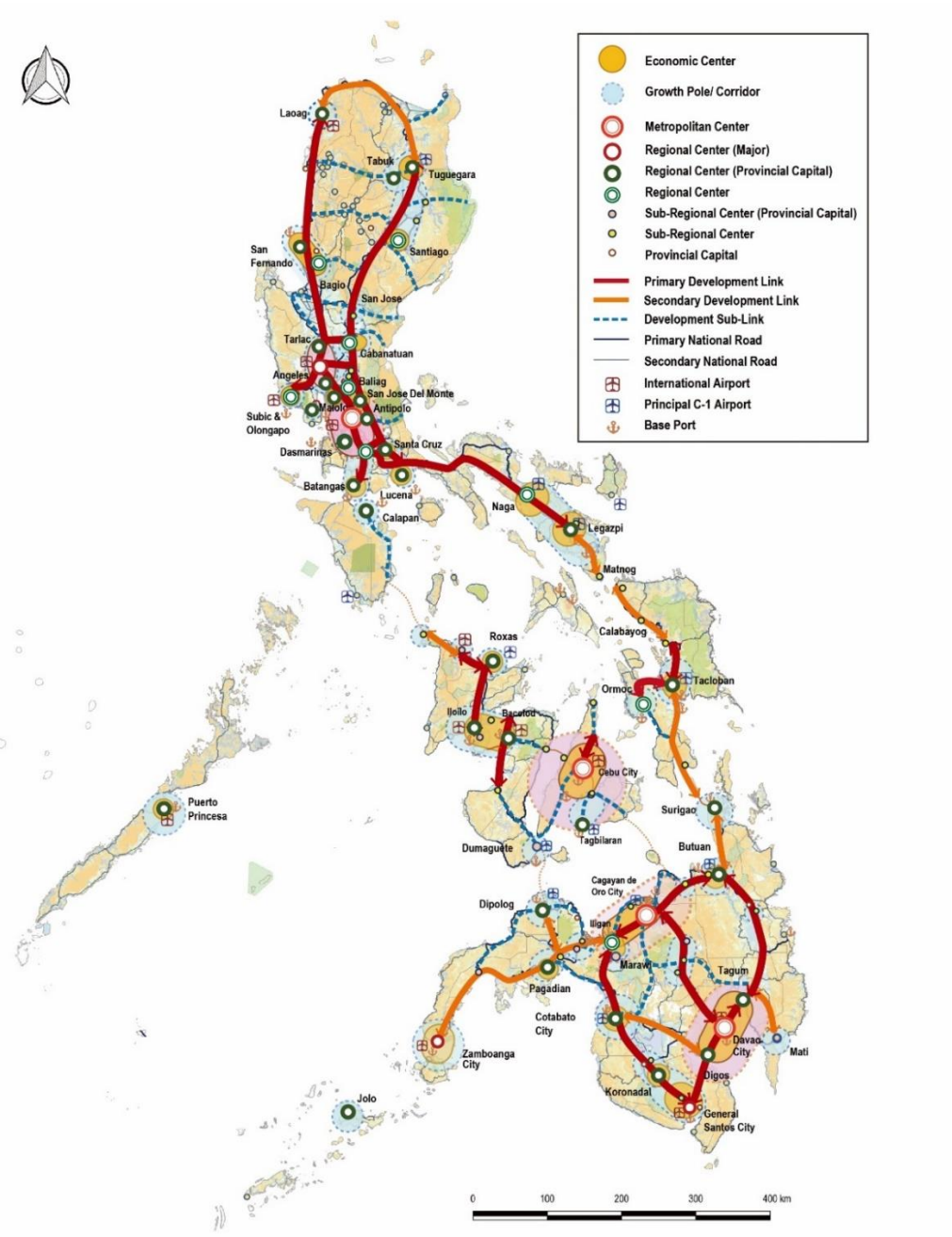
HSH Type		Function
Arterial High Standard Highway (HSH1)	Class 1(IU) **(Inter Urban HSH)**	To connect major urban centers, strategic development areas, major transport facilities each other with highly efficient and reliable means of transportation.
	Class 1 **(Urban HSH)**	To connect traffic generating sources, economic development centers and major transport facilities each other with highly efficient and reliable means of transportation
Regional High Standard Highway (HSH Class-2)		▪ To connect HSH Class-1 with each other ▪ To function as supplementary to HSHClass-1

Features	HSH Class-1	HSH Class -2
Access Control	▪ Full access control	▪ Partial access control or no access control
Usage of Highway	▪ Exclusive for 4 or more-wheel vehicles. Slow moving vehicles such as jeepneys and tricycles are not allowed	▪ All vehicles are allowed to use this road including slow moving vehicles such as jeepneys, tricycles, bicycles, etc.
Toll or Not	▪ Basically toll road	▪ Non-toll road
Design Speed (km/hr)	Inter Urban ▪ 80 ~ 120 (Flat terrain) ▪ 60-80 (Mountainous terrain)	▪ 60 (Flat terrain) ▪ 50 (Mountainous terrain)
	▪ 60- 80 (Urban)	
Inter-secting Road	▪ Interchange for major road	▪ Grade separation for major road
	▪ Over bridge or underpass for minor rd.	▪ At-grade intersection for minor road

Features	HSH Class-1	HSH Class -2
HSH Facility	▪ Full access-controlled High Standard Highway (Soft open as bypasses in some cases)	▪ Arterial road w/ Bypass(es)
		▪ Arterial road w/ frontage roads
		▪ Art. rd. w/ grade sep. at intersection
		▪ Multi-lane Arterial road

13.4.8 Regional Development Strategy

Three alternatives were studied in Luzon, Visayas, Mindanao and Greater Capital Region in **Chapter 4.2.4**. The alternative study was selected as "Balanced Development Scenario" illustrated in **Figure 13.4-1**. It was explained by JST and agreed with DPWH.



Source: JICA Study Team

Figure 13.4-1 Regional Development Strategy Map

13.4.9 HSH Development Strategy

To achieve the development policy and strategy, HSH development strategies were established.

Development Objectives

- ✓ To achieve balanced development of the country
- ✓ To improve international competitiveness of the country
- ✓ To mitigate chronic traffic congestion in and around major urban centers
- ✓ To vitally support urban socio-economic activities for development
- ✓ To improve international competitiveness
- ✓ To improve the urban environment
- ✓ To accelerate regional development.
- ✓ To strengthen linkages between regional urban centers and rural areas
- ✓ To accelerate development of underdeveloped areas
- ✓ To develop roads which bypass congested urban areas to assure smooth travel throughout the trip route.

⇨

Development Strategies

- ✓ To form backbone transport axes
- ✓ To decongest traffic in Metropolitan centers, Regional Centers and their suburbs
- ✓ To provide efficient transport facilities for logistics corridors
- ✓ To provide transport facilities for sound urban expansion

13.4.10 Overall HSH Network

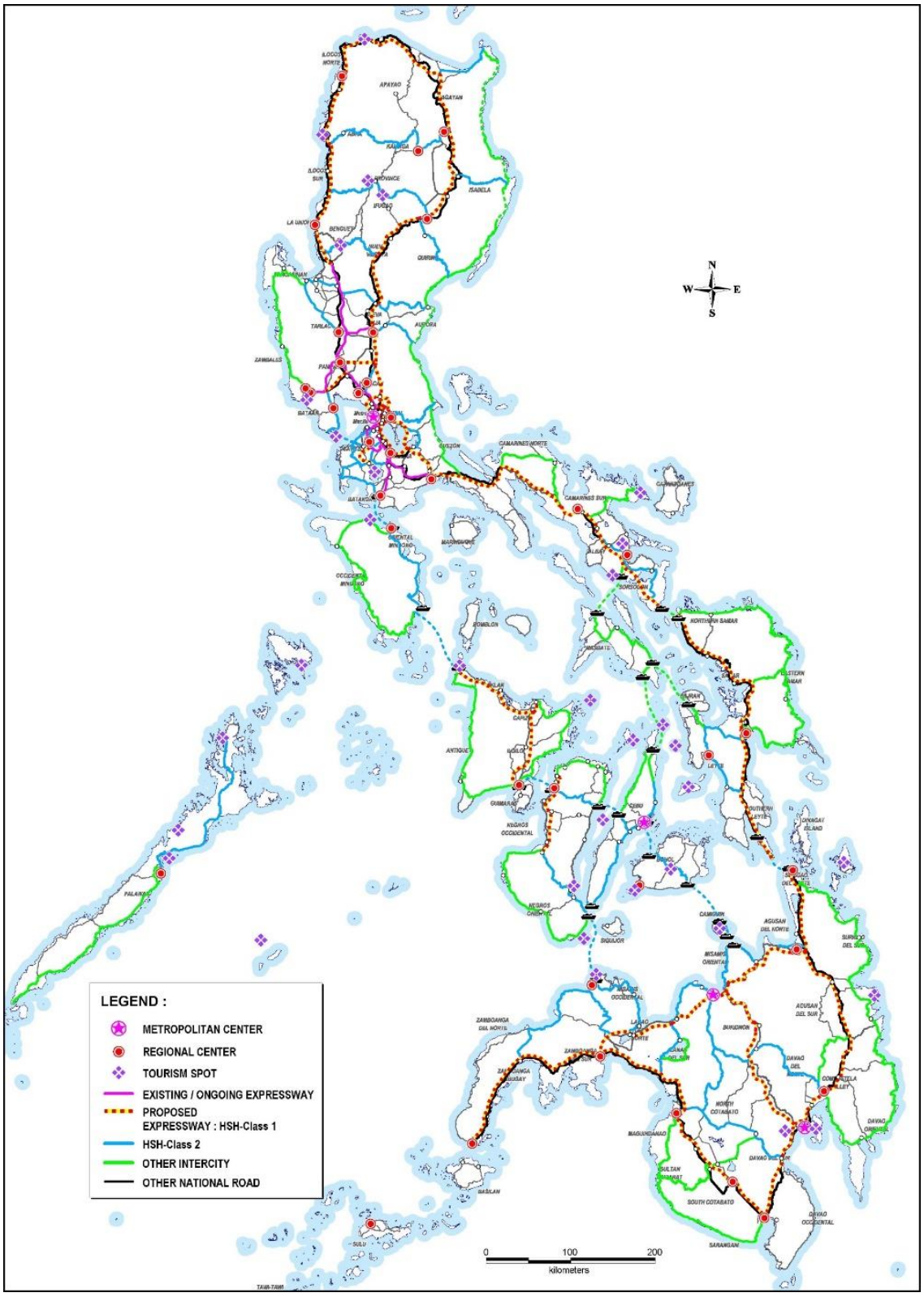
To consider the road traffic and network issues and regional development strategies, Overall HSH network (including sections to be developed beyond 2040) shown in **Figure 13.4-2** is proposed with approximately a total of 9,000 km. Its HSH Class-1 will connect four (4) Metropolitan Centers and twenty-nine (29) Regional Centers. HSH Class-2 will connect HSH Class-1 and Sub-regional Centers and supplement the function of HSH Class-1.

Table 13.4-1 Overall HSH Length (km)

Area	HSH Class 1※	HSH Class 2	Total
Luzon	2,100	2,500	4,500
Visayas	700	700	1,400
Mindanao	1,600	1,400	2,900
Total	**4,400**	**4,600**	**9,000**

※Note: Including existing expressways (406km) and under construction expressways (265km)

Source: JICA Study Team



Note: HSH = High Standard Highway
Source: JICA Study Team

Figure 13.4-2 Overall HSH Network

13.4.11 HSH Network in 2040

Alternative study was conducted to HSH Class-1 Network in 2040 from Overall HSH Network. Alternative network was prepared with the following two cases.

As mentioned in **Chapter 11**, the proposal for the suitable zero option is not easy. Since it is difficult to find the zero option that can achieve the purpose of HSH network development M/P which is to provide high-speed land transport service nationwide that does not need large-scale infrastructure development.

The detailed alternative study was described in **Section 11.5.4**.

Alternative 1 : Nationwide basis	Top 65 % high traffic projects were selected among all HSH Class-1 projects. In case of Alternative-1, 33 projects were selected as section traffic was more than 10,000 vehicle/day in 2040.
Alternative 2 : Regional basis	Top 65 % high traffic projects were selected in each Area (Luzon, Visayas and Mindanao) to consider the area balance development. In case of Alternative-2, 34 projects were selected as section traffic was more than 8,000 vehicle/day in 2040.

Alternative 1: Nationwide is recommended due to the following reasons:

- Basically, HSH class-1 shall be selected among nationwide, although regional balance is necessary. Projects of over 10,000 vehicle/day in 2040 were selected.
- It is almost the same network which was studied in the development scenario in **Chapter 4**.
- Selected section covers the same Luzon Spine Expressway Network Program of DPWH concept. It can be harmonized with the current DPWH Plan.

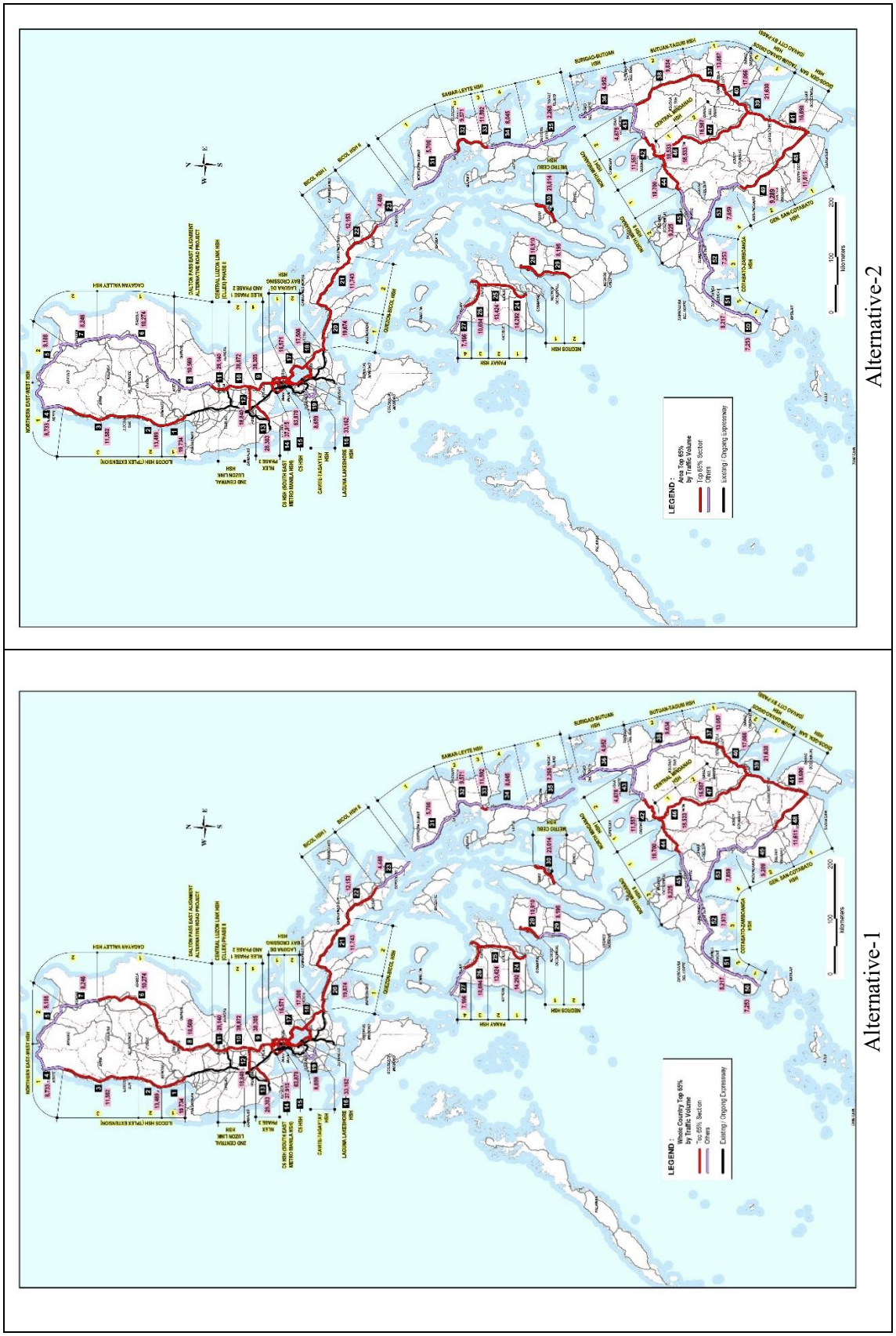


Figure 13.4-3 Proposed HSH for Alternative-1 and Alternative-2

Source: JICA Study Team

13.4.12 Priority of HSH Project (HSH Class-1)

The following table shows the proposed prioritization multi-criteria indicators and points. Based on the criteria, HSH Class-1 projects were prioritized into short-term, middle-term, and long-term implementation. The detailed study result of prioritization is described in **Section 12.2.2**.

Table 13.4-2 Proposed Multi-Criteria Items and Points for Prioritizing HSH Class-1

	Major Items	Indicator	Points
1	Contribution to Regional Economic Growth and Development	(1) Connect SEZs (operation and planned), tourism attractions, and production centers with ports, airports, and markets. (2) Connect Weak Regional Centers / Strong Sub-Regional Centers (3) Strengthen connection to Metropolitan Centers and Regional Centers (4) Development potential identified in the existing development plans	40
2	Contribution to traffic decongestion and usage of HSH-1	(1) Reduction of total travel time (2) Reduction of traffic volume along HSH Class-1	20
3	Economic Viability	EIRR	16
4	Environmental and Social Impact	Avoid Protected Area, IP area, etc.	12
5	Project Readiness	F/S, Business Case Study, etc.	8
6	Financial Viability	Project FIRR	4
	Total		100

Source: JICA Study Team

Table 13.4-3 shows the detailed indicators and points.

Table 13.4-3 Proposed Multi-criteria Items, Criteria and Points for Prioritizing HSH Class-1

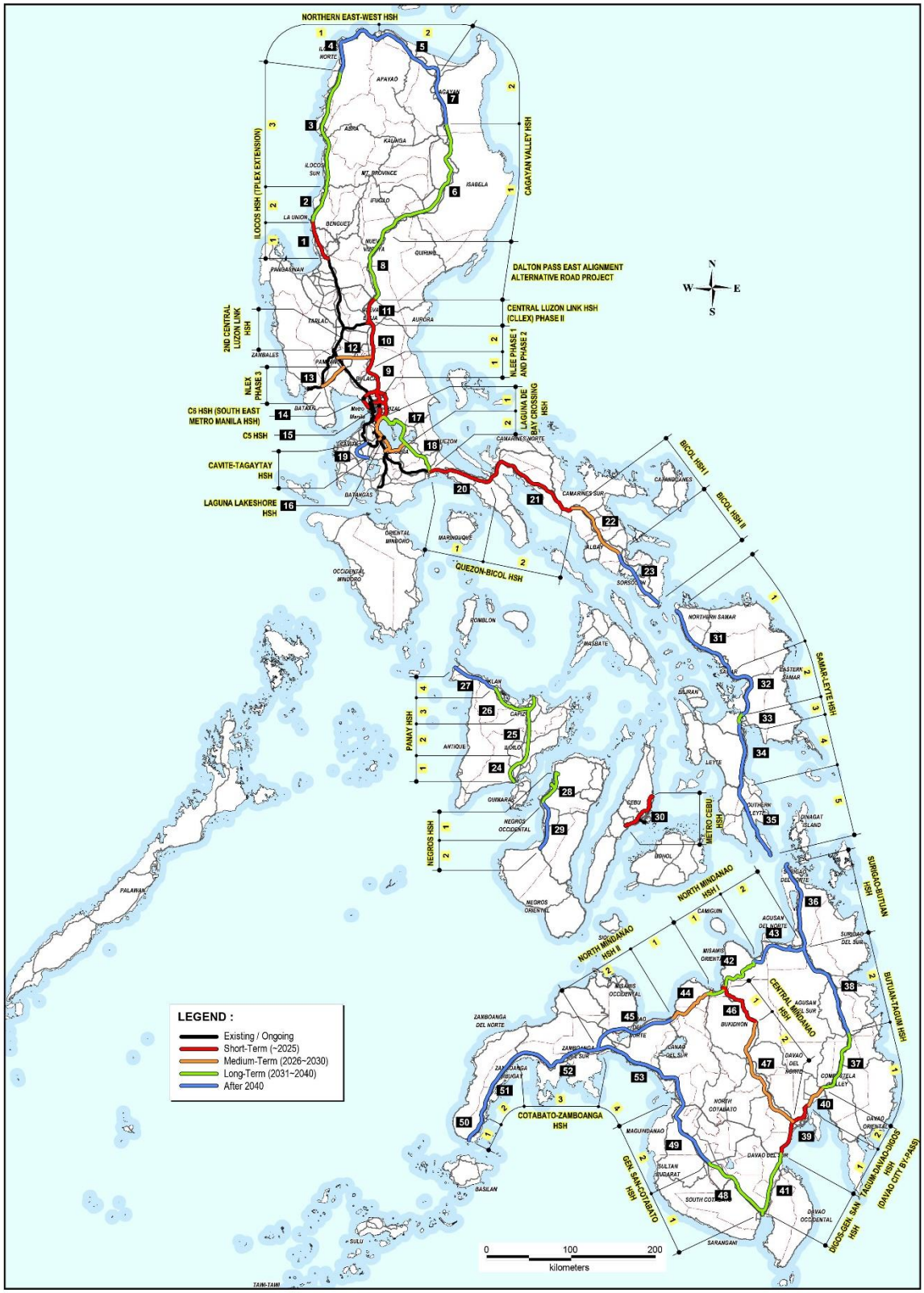
Major Items	Indicator	Points
1. Contribution to Regional Economic Growth and Development **(40)**	- Connect SEZs with ports, airports, and markets. - Connect tourism attractions with ports, airports, and markets. - Connect Production Centers with ports, airports, and markets.	Max. 10 5 5
	- Connect Weak Regional Centers / Strong Sub-Regional Centers	5
	- Strengthen connection to Metropolitan Centers and Regional Centers	5
	- Development potential identified in the existing development plans	10
2. Contribution to traffic decongestion and usage of HSH-1 **(20)**	1) Reduction of total travel time [veh.*hour/day] in 2040 Over 100,000 50,001-100,000 20,000-50,000 Less than 20,000 (3)	 12 9 6 3
	2) Reduction of traffic volume along HSH Class-1 [veh./day] in 2040 Over 30,000 20,001-30,000 10,001-20,000 Less 10,000	 8 6 4 2
3. Economic Viability **(16)**	EIRR Over 25% 15.1-25% 10.1-15% 5-10% Less than 5%	16 12 8 4 0
4. Environmental and Social Impact **(12)**	1. Nature, Ecosystem 2. Affected Buildings 3. Protected Area 4. IP Area Evaluation A=Point 0 Evaluation B=Point 1 Evaluation C=Point 2 Evaluation D=Point 3	0~3 0~3 0~3 0~3
5. Project Readiness **(8)**	- Waiting for NEDA ICC Approval - F/S or Business Case Study - Concept Plan	8 6 2
6. Financial Viability **(4)**	- Project FIRR is Over 6% --- BOT Scheme - Project FIRR is 3-6% ---- Subsidy or PPP Scheme - Project FIRR is less than 3%, --- Government Project	4 2 0
Total		100

The formulation of project implementation for HSH Class-1 is considered based on the basic idea described below.

The selected 33 sections from the proposed HSH Class-1 network were evaluated using the above criteria. The result of criteria evaluation is shown in **Table 13.4-4**. The projects are arranged in descending order of the total scores. Based on the total points, implementation schedule (Short-term, Mid-term and Long-term) was determined for each project. The mapping of the outline of implementation schedule for HSH Class-1 is illustrated in **Figure 13.4-4**.

Table 13.4-4 Result of Criteria Evaluation for HSH Class-1 Projects

Section No.	Road Name	AADT 2040	1 Development	2 Traffic	3 EIRR	4 Environment & Social	5 Project readiness	6 FIRR	Total points (100)	Rank	Schedule	Length(km)	Project Cost (Million Pesos)
			Total (40)	Total (20)	Total (16)	Total (12)	Total (8)	Total (4)					
9	NLEE Phase 1 and Phase 2	38,305	25	20	16	8	6	4	79	1	Short	46.48	20,247
10	NLEE Phase 1 and Phase 2	38,872	21	20	16	11	6	4	78	2	Short	62.06	29,092
30	Metro Cebu High Standard Highway	23,014	30	18	12	5	4	2	71	3	Short	58.67	50,889
39	Tagum-Davao-Digos High Standard Highway 1 (Davao City By-Pass)	21,630	33	12	6	5	8	4	68	4	Short	76.62	16,791
1	Ilocos High Standard Highway 1 (TPLEX Extension)	19,734	21	16	16	8	4	2	67	5	Short	48.17	19,211
46	Central Mindanao High Standard Highway 1	18,533	24	16	16	8	2		66	6	Short	66.19	38,813
11	Central Luzon Link High Standard Highway (CLLEX) Phase II	29,140	12	15	16	11	8	4	66	6	Short	31.05	14,140
15	C5 High Standard Highway	63,870	15	20	12	8	8	2	65	8	Short	23.03	57,680
14	C6 High Standard Highway (South East Metro Manila High Standard Highway)	37,915	15	20	16	4	8	2	65	8	Short	96.07	59,392
20	Quezon-Bicol High Standard Highway 1	19,674	20	16	12	8	8		64	10	Short	71.84	31,885
21	Quezon-Bicol High Standard Highway 2	10,743	30	10	3	10	8		61	11	Short	137.38	56,444
44	North Mindanao High Standard Highway II - 1	19,700	23	16	12	8			59	12	Middle	61.65	47,966
40	Tagum-Davao-Digos High Standard Highway 2	17,066	19	13	12	9		2	55	13	Middle	26.52	12,524
16	Laguna Lakeshore High Standard Highway	33,162	20	17	6	5	6		54	14	Middle	82.59	128,196
12	2nd Central Luzon Link High Standard Highway	18,840	13	16	16	9			54	14	Middle	41.34	19,204
47	Central Mindanao High Standard Highway 2	16,587	17	16	16	3		2	54	14	Middle	142.01	69,344
13	NLEX Phase 3	28,304	13	15	16	9			53	17	Middle	34.12	18,955
22	Bicol High Standard Highway I	12,153	21	10	12	10			53	17	Middle	81.79	27,612
17	Laguna De Bay Crossing High Standard Highway 1	16,571	20	16	6	8	2		52	19	Long	59.56	108,054
48	Gen. San-Cotabato High Standard Highway 1	11,611	29	7	3	6			45	20	Long	90.17	29,123
41	Digos-Gen. San High Standard Highway	16,690	13	13	12	4		2	44	21	Long	77.42	36,557
18	Laguna De Bay Crossing High Standard Highway 2	17,508	15	10	6	9	2		42	22	Long	43.73	19,914
42	North Mindanao High Standard Highway I - 1	11,557	13	13	12	4			42	22	Long	82.65	40,297
6	Cagayan Valley High Standard Highway 1	14,274	7	13	12	8			40	24	Long	175.35	63,577
37	Butuan-Tagum High Standard Highway 1	13,087	4	16	12	6		2	40	24	Long	83.35	24,602
24	Panay High Standard Highway 1	14,292	13	7	6	11			37	26	Long	35.28	12,317
25	Panay High Standard Highway 2	13,424	13	10	3	8			34	27	Long	76.87	26,090
3	Ilocos High Standard Highway 3	10,582	11	13	6	3			33	28	Long	142.86	50,569
8	Dalton Pass East Alignment Alternative Road Project	16,569	12	13	3	4			32	29	Long	89.82	61,890
2	Ilocos High Standard Highway 2	13,489	2	10	12	7			31	30	Long	46.81	18,932
28	Negros High Standard Highway 1	10,910	13	7	0	9			29	31	Long	52.22	20,076
26	Panay High Standard Highway 3	10,694	2	10	3	10			25	32	Long	56.50	19,837
33	Samar-Leyte High Standard Highway 3	11,592	6	7	3	8			24	33	Long	14.82	12,044



Note: HSH = High Standard Highway
Source: JICA Study Team

Figure 13.4-4 Priority of HSH Project Map (HSH Class-1)

13.4.13 Priority of HSH Project (HSH Class-2)

The formulation of project implementation for HSH Class-2 has been considered based on the following idea.

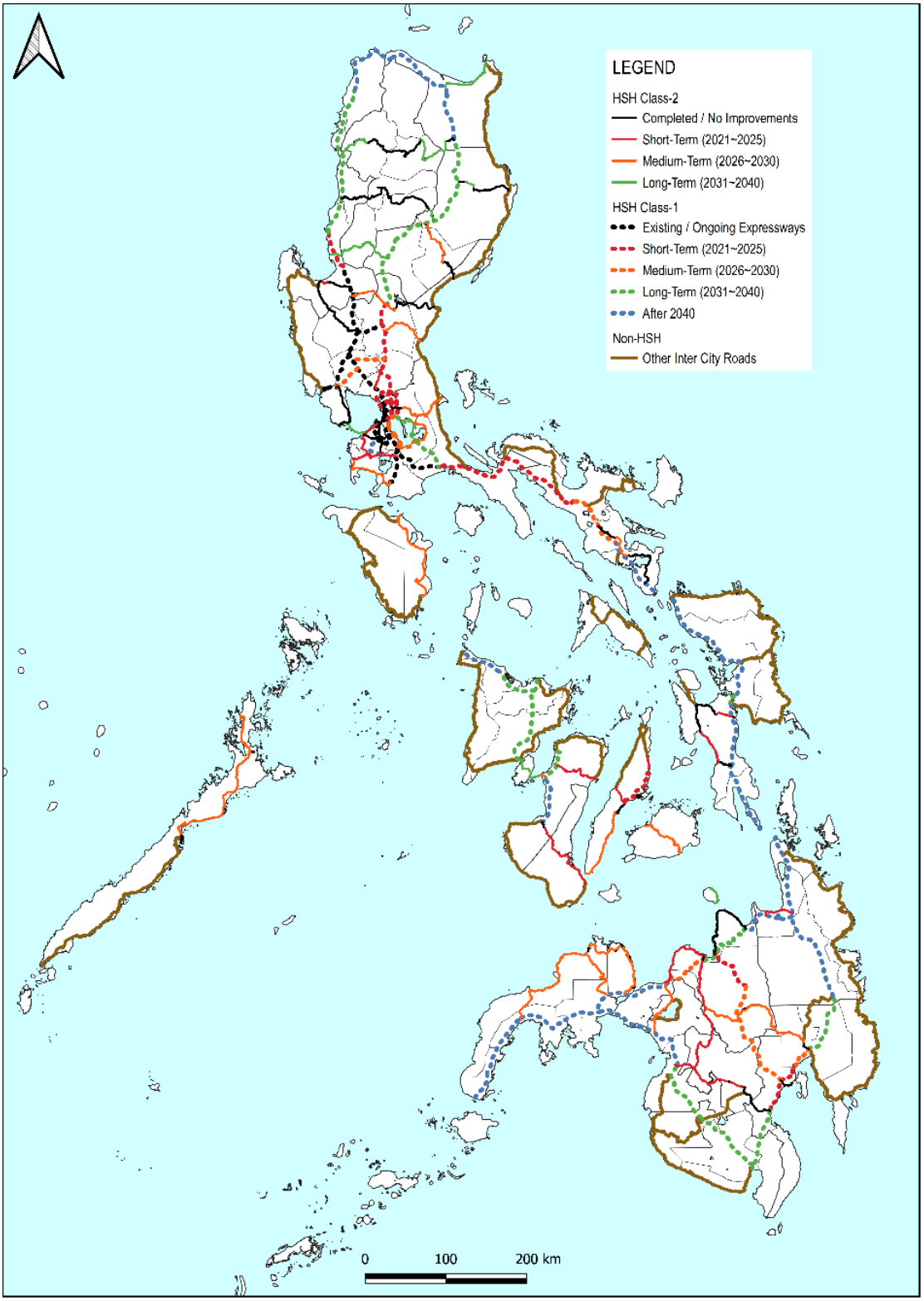
<Criteria for Prioritization of HSH Class-2>

Basically, projects for HSH Class-2 consist of upgrading existing national highway within the ROW through road widening from two lanes to four lanes including additional of necessary bridges or improvement of road alignment for both horizontal and vertical alignments. In case of congested road section in an urban area, where road widening will be difficult and has a lot of transit traffic, construction of bypass road or flyover at major intersections is planned as a measure for HSH Class-2 development. This is to ensure that the average service level of that road section may allow a vehicle speed of even more than 60km/hr. HSH Class-2 is a high standard highway that will perform a network function while complementing with the HSH Class-1.

Based on the above basic requirements, the prioritization of HSH Class-2 is anchored on the following conditions:

- ✓ Future traffic volume, high traffic and congested section is considered as urgent section,
- ✓ In case of delay in the construction of HSH Class-1 in Visayas and Mindanao areas, HSH Class-2 will be implemented in short and medium terms.
- ✓ Development of HSH Class-2 shall be adjusted with opening of HSH Class-1 development section.

The mapping of the outline of implementation schedule for HSH Class-2 is shown in **Figure 13.4-5**.



Note: HSH = High Standard Highway
Source: JICA Study Team

Figure 13.4-5 Priority of HSH Project Map (HSH Class-2)

13.5 Baseline Information of the Project Area

The Philippines is composed of about 7,100 islands and has a total land area of approximately 300,000 km^2. The country is divided into three major areas such as Luzon (141,000 km^2), Visayas (57,000 km^2) and Mindanao (102,000 km^2). The climate of the Philippines has characteristics of northeast monsoon and southwest monsoon tropics since the archipelagos are located near the equator. Baseline information on environmental and social conditions and validated from available secondary data are presented below.

13.5.4 Physical Environment

(1) Geography

The Philippines is an evolving archipelago in the Southeast Asia comprising 7,641 islands with a total land area of 298,170 km2 – a tectonically active region with a center subject to the large strike-slip Philippine Fault Zone (PFZ). It is divided into three major island groups: Luzon, Visayas, and Mindanao. There are two tectonostratigraphic terranes: (1) the Philippine Mobile Belt (PMB); and (2) the Palawan Micro-continental Block (PCB) which is based on the seismicity and volcanism as shown in **Figure 2.1-2** in **Section 2.1.1**. Detailed information is shown in **Section 2.1.1**.

(2) Potential Earthquake Generators

There are two types of earthquakes: the tectonic and the volcanic earthquakes. Tectonic earthquakes are produced by sudden movements along faults and plates boundaries; while volcanic earthquakes are earthquakes induced by rising lava or magma beneath active volcanoes.

The Philippines, which is located in latitude 5° to 19°45' North and longitude 116° to 128° East - being in the "Pacific Ring of Fire", has many potential earthquake generators that are distributed all over the country. Generators of tectonic and volcanic earthquakes are shown in **Figure 2.1-3** and **Figure2.1-4**, respectively. At present, the Philippine Institute of Volcanology and Seismology (PHIVOLCS)[1] has identified twenty-four (24) active volcanoes which are potential earthquake generators. Detailed information about these active volcanoes is presented in **Section 2.1.2**.

(3) Climate

The climate in the Philippines is tropical and maritime, characterized by relatively high temperature, high humidity and abundant rainfall. The most important elements are Temperature, Humidity, and Rainfall. Detailed information about the climate is shown in **Section 2.1.3**.

(4) River and Water Resource

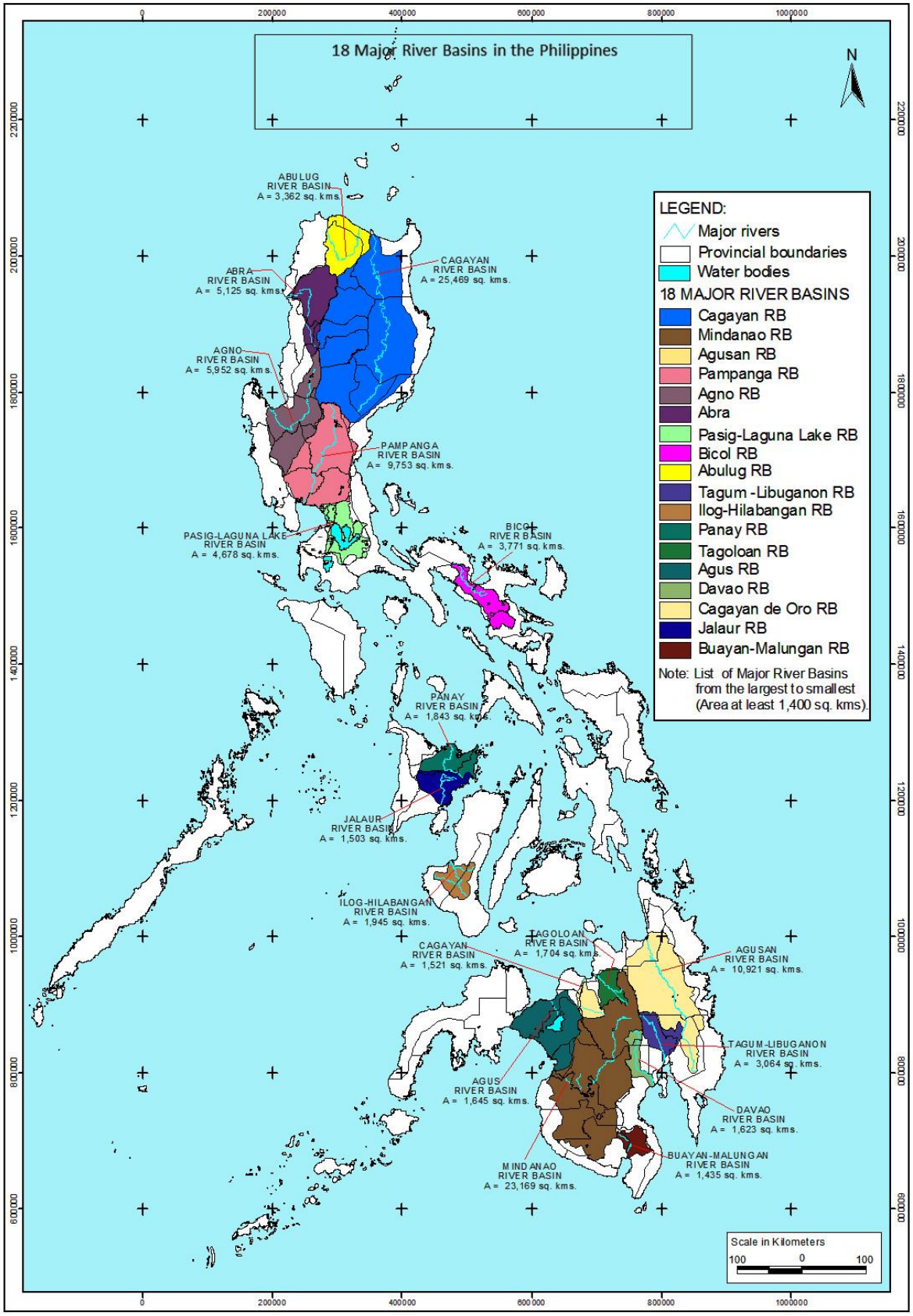
The country has 18 major river basins (**Table 13.5-1**) and 421 principal rivers as defined by the National Water Resources Board (NWRB). The area occupied by the river basins is 108,923 sq km, which represents more than one-third of the country's total land area. The largest river basin is the Cagayan River Basin with a catchment area of 25,649 sq km. It encompasses Cordillera Administrative Region (CAR), Region 2 and the province of Aurora in Region 3. It is utilized primarily for hydroelectric power by constructing several dams and power plants.

[1] PHIVOLCS is a service institute of the Department of Science and Technology (DOST).

Table 13.5-1 Major River Basins in the Philippines

No	River name	Catchment Area (sq km)	River Length(km)
1	Cagayan	25,649	505
2	Mindanao	23,169	373
3	Agusan	10,921	350
4	Pampanga	9,759	260
5	Aguno	5,952	206
6	Abra River	5,125	178
7	Pasig─Raguna	4,678	78
8	Bicol	3,771	136
9	Abulug	3,372	175
10	Tagum-Libuganon River	3,064	89
11	Ilog-Hilabangan River	1,945	124
12	Panay River	1,843	132
13	Agus River	1,890	36
14	Tagoloan River	1,704	106
15	Davao River	1,623	150
16	Cagayan de Oro River	1,521	90
17	Jalaur River	1,503	123
18	Buayan-Malungan River	1,434	60
	Total	108,923	

Source: National Water Quality Status Report 2009-2013



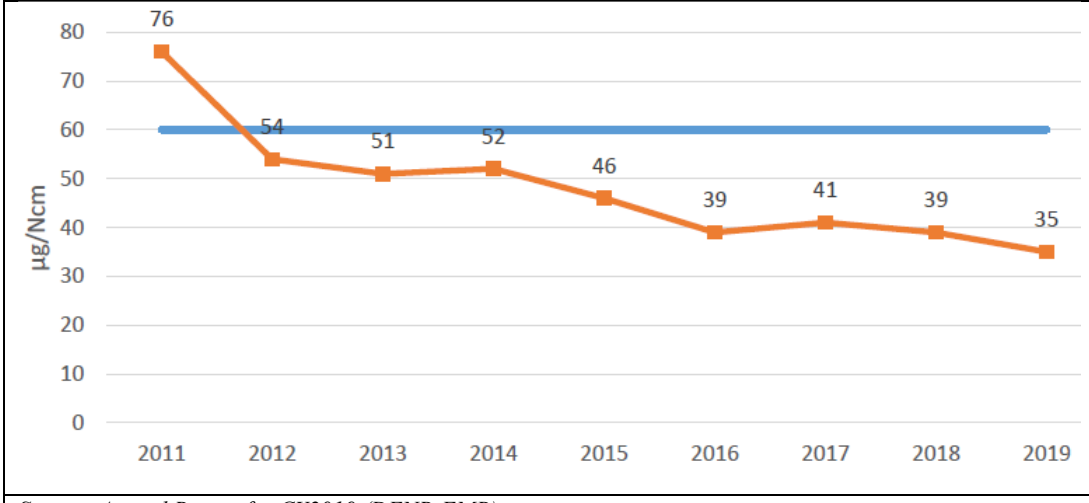
Source: JICA Study Team

Figure 13.5-1 Location of Major Rivers

13.5.5 Pollution

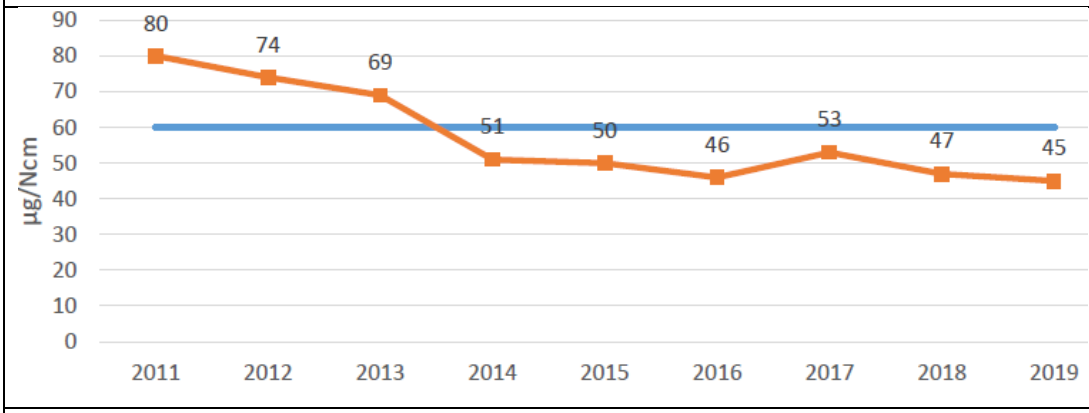
(1) Air Quality

The nationwide results of the ambient air quality monitoring in terms of PM10 decreased from 76 ug/Ncm in CY 2011 to 35ug/Ncm in CY 2019. However, there was a significant increase in CY 2017 compared to CY 2016 which is due to the increase of volume of vehicles traversing along the EDSA road and other major thoroughfares in Metro Manila.



Source: Annual Report for CY2019 (DENR-EMB)

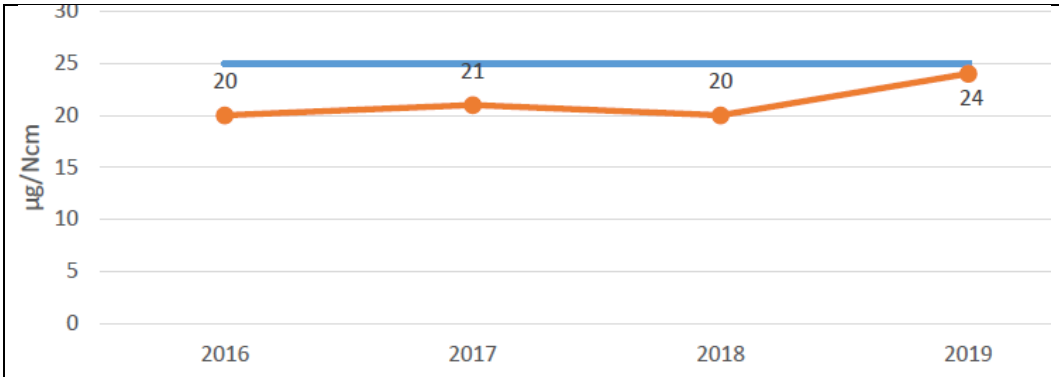
Figure 13.5-2 Nationwide Air Quality Status (PM10)



Source: Annual Report for CY2019 (DENR-EMB)

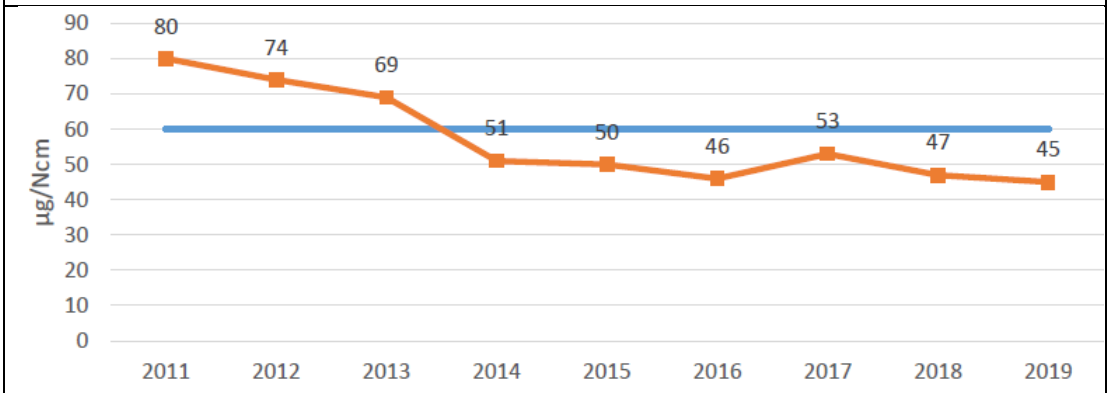
Figure 13.5-3 Metro Manila Air Quality Status (PM10)

The nationwide results of the ambient air quality monitoring in terms of PM2.5 showed that it is within the air quality guideline value of 25µp/Ncm. A slight increase in the concentration was noted due to increased number of vehicles along major thoroughfares, construction of high- rise buildings near the monitoring stations and infrastructure projects under the "Build-Build-Build" program of the government. The occurrence of haze concentration in the neighboring countries of Malaysia and Indonesia in the 3rd quarter of CY2019 also affected the air quality in the Philippines.



Source: Annual Report for CY2019 (DENR-EMB)

Figure 13.5-4 Nationwide Air Quality Status (PM2.5)



Source: Annual Report for CY2019 (DENR-EMB)

Figure 13.5-5 Metro Manila Air Quality Status (PM2.5)

Based on the 2012 emission inventory, mobile sources contributed 69% to the total emission in the national level and 90% of the total emission in Metro Manila, compared to area source and stationary source. Several measures and activities were carried out to reduce mobile emissions. For brand new motor vehicles, all vehicle types must meet the emission standard before they are introduced in the market for sale. They should be evaluated for their compliance with the prescribed exhaust emission limits/standards before a Certificate of Conformity (COC) is issued.

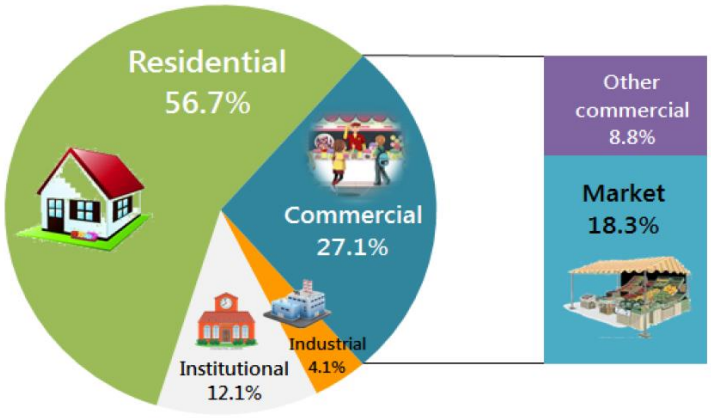
(2) Waste Management

Solid waste management remains a challenge for the Philippines.

In 2010, waste generation rates vary from as low as 0.10 kg/capita/day in the municipalities outside of Metro Manila to 1.00 kg/capita/day in Metro Manila and Highly Urbanized Cities (HUCs). The rates are dependent on household income, local economic activity and waste avoidance policies and incentives. The average per capita per day generation rate for the Philippines is 0.40 kg.

Municipal Solid Waste (MSW) comes from residential, commercial, institutional and industrial sources. Residential waste constitutes the bulk (56.7%) of MSW and includes kitchen scraps, yard waste, paper and cardboards, glass bottles, plastic containers and sando bags, foils, soiled tissues and diapers, and special wastes such as containers of household cleaning agents, batteries and waste electrical and electronic equipment (WEEE), etc.

Commercial sources which include commercial establishments and public or private markets contribute 27.1% of which, in some regions, about two- thirds of commercial wastes come from the latter. Institutional sources such as government offices, educational and medical institutions account for about 12.1% while the remaining 4.1% are wastes coming from the industrial or manufacturing sector.



Source: National Solid Waste Management Status Report [2008-2018]

Figure 13.5-6 Source of Municipal Solid Wastes in the Philippines (2008-2013)

(3) Water Pollution

The Philippines is lavishly endowed with water resources with plenty of surface water and groundwater resources. However, concentration of population at the urban areas and continuous urbanization cause tremendous stress to the water quality. Water pollution affects fresh, marine, coastal, and even groundwater resources. Especially, water quality is poorest in the rivers running in the National Capital Region (NCR), and the main sources of pollution in these water bodies are untreated discharges of industrial, agricultural and domestic wastewater. Although groundwater resources are generally abundant, over-abstraction and poor environmental management of extractive resource industries have polluted downstream water courses and aquifers, caused siltation, and lowered water tables.

Table 13.5-2 and **Table 13.5-3** show the monitoring results of the 19 priority rivers initially identified by the EMB for its Sagip Ilog Program in 2003-2008.

Results of assessment revealed that all 19 priority rivers have improved significantly from CY 2003 - 2008 in terms of Dissolved Oxygen (DO) level. Of which, only two rivers namely, Anayan River and Sapangdaku River were assessed to conform with both DO and Biochemical Oxygen Demand (BOD) criteria standard in 2008. Almost all the rivers that run into the Manila Bay failed the DENR criteria standards of both DO and BOD.

A rapid inventory of pollution sources in 2001-2005 revealed that domestic wastes are a major source of pollution (33%), followed by agriculture including livestock (29%) and industrial sources (27%)[2]. Nonpoint sources of pollution account for 11% of the organic load in water bodies.

Low sanitation coverage is a leading cause of water pollution in the Philippines. It was reported that more than 90% of the sewage generated nationwide is not treated properly and less than 10% of the population have access to piped sewerage systems.

[2] National State of the Brown Environment Report (2005-2007), EMB (2009)

Table 13.5-2 Summary of DO Results for the 19 Priority Rivers

Region	Water Body	Class	Average DO (mg/L)			Passed/Failed in 2008	Connected River/Bay
			2003	2006	2008		
NCR	Marikina River	C	**3.1**	**2.2**	**2.6**	Failed	Pasig River
	San Juan River	C	**2.4**	**1.1**	**1.9**	Failed	Pasig River
	Paranaque River	C	**2.5**	**1.6**	**1.6**	Failed	Manila Bay
	Pasig River	C	**3.1**	**2.5**	**3.2**	Failed	Manila Bay
CAR	Balili River	A	**4.6**	6.9	**4.6**	Failed	Naguilian River
III	Meycauayan River	C		**0.0**	**2.5**	Failed	Manila Bay
	Marilao River	A	**0.8**	**1.0**	**2.4**	Failed	Manila Bay
	Bocaue River	C	**1.9**	**1.9**	**5.0**	Failed	Manila Bay
IV-A	Imus River	C	**3.0**	**4.7**	**4.1**	Failed	Manila Bay
	Ylang-Ylang River	C	**4.5**	5.1	**4.0**	Failed	Manila Bay
IV-B	Mogpong River	C	**4.9**	7.9			Calcancan Bay
	Calapan River	C	7.3	**2.2**	**3.1**	Failed	Calapan Bay
V	Anayan River	D	5.6	6.7	6.5	Passed	Bico River
	Malaguit River	C	**4.6**	6.3	7.4	Passed	Malaguit Bay
	Panique River	C	**2.7**	7.9	6.9	Passed	Balawing Cove
VI	Iloilo River	C	**4.2**	5.3	**4.5**	Failed	Iloilo Strait
VII	Luyang River	C		7.5	6.9	Passed	Coastal Water of Cebu
	Sapangdaku River	C		7.6	6.9	Passed	Tanon Strait
X	Cagayan de Oro River	A	8.6		8.1	Passed	Macajalar Bay

Note: Blank means no available data. Dissolved Oxygen is an indicator of how well the water can support aquatic life. DO criteria standard is 5.0 mg/L (minimum) for Class 'AA to C' and 3.0 mg/L (minimum) for Class D.
Bold-faced number means that it was failed to reach the criteria standard.
Source: Compendium of Basic ENR Statistics for Operations and Management (Second Edition) (2000-2008), DENR (2011)

Table 13.5-3 Summary of BOD Results for the 19 Priority Rivers

Region	Water Body	Class	Average BOD (mg/L)			Passed/Failed in 2008	Connected River/Bay
			2003	2006	2008		
NCR	Marikina River	C	**18.2**	**15.0**	**18.2**	Failed	Pasig River
	San Juan River	C	**54.8**	**33.4**	**44.2**	Failed	Pasig River
	Paranaque River	C	**42.0**	**41.0**	**38.2**	Failed	Manila Bay
	Pasig River	C	**10.7**	**13.6**	**20.5**	Failed	Manila Bay
CAR	Balili River	-		**23.3**	**37.4**	Failed	Naguilian River
III	Meycauayan River	C	**38.2**	**144.1**	**35.6**	Failed	Manila Bay
	Marilao River	A	**32.3**	**21.9**	**11.1**	Failed	Manila Bay
	Bocaue River	C	**12.2**	**7.2**	**11.8**	Failed	Manila Bay
IV-A	Imus River	C	**8.0**	**9.1**	**11.1**	Failed	Manila Bay
	Ylang-Ylang River	C	**24.4**	**8.7**	**63.76**	Failed	Manila Bay
IV-B	Mogpong River	C					Calcancan Bay
	Calapan River	C		5.1	3.8	Passed	Calapan Bay
V	Anayan River	D	**8.9**	1.5	2.8	Passed	Bico River
	Malaguit River	C		2.3			Malaguit Bay
	Panique River	C		1.5			Balawing Cove
VI	Iloilo River	C	2.4	2.1	**4.4**	Failed	Iloilo Strait
VII	Luyang River	C		1.1	1.4	Passed	Coastal Water of Cebu
	Sapangdaku River	C		0.7	1.1	Passed	Tanon Strait
X	Cagayan de Oro River	A	1.2				Macajalar Bay

Note: Blank means no available data. BOD criteria standard is 5.0 mg/L (maximum) for Class 'A' and 'B', 7.0 mg/L (maximum) for Class 'C' and 10.0 mg/L (maximum) for Class 'D'.
Bold-faced number means that it was failed to reach the criteria standard.
Source: Compendium of Basic ENR Statistics for Operations and Management (Second Edition) (2000-2008), DENR (2011)

13.5.6 Natural Environment

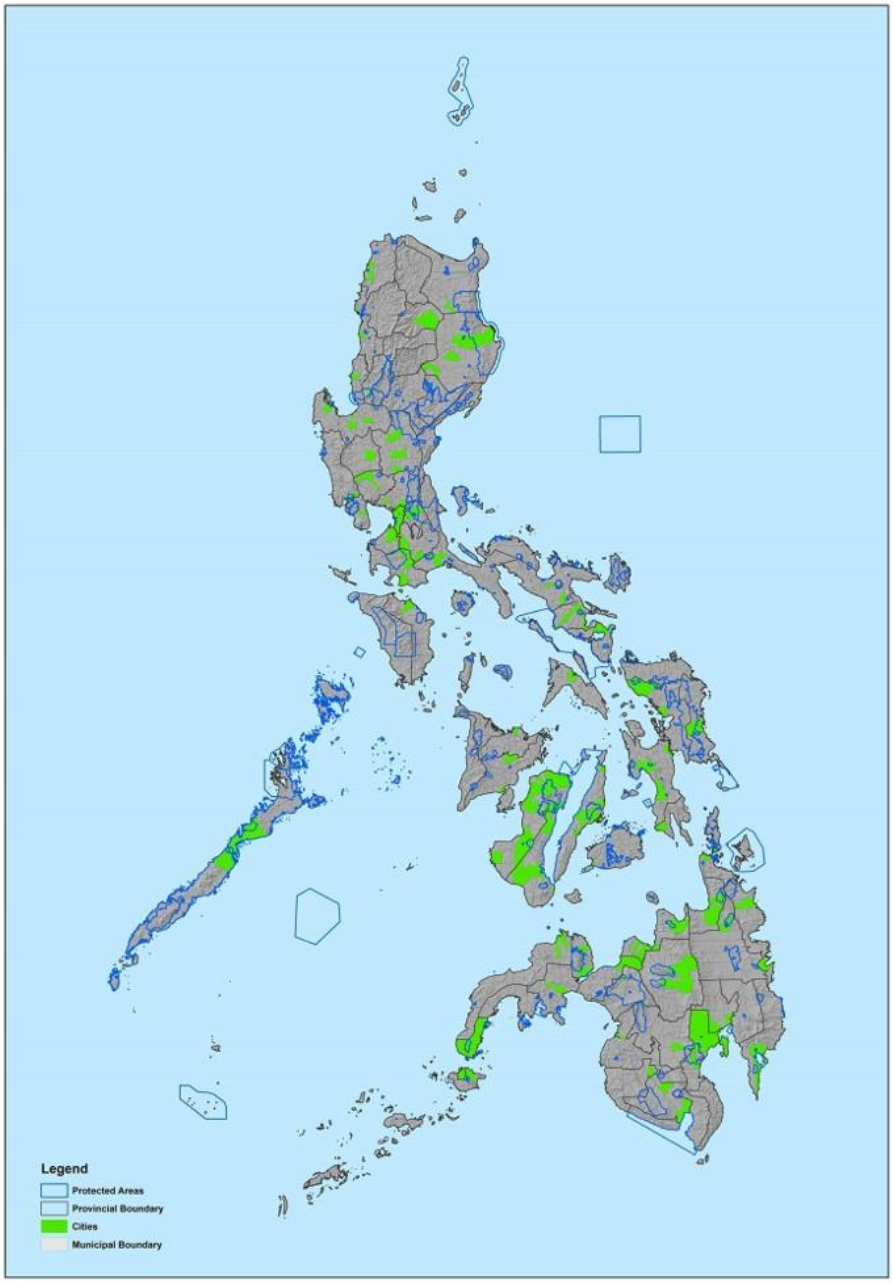
(1) Protected Areas

As of 2013, there are 240 protected areas under the National Integrated Protected Area System (NIPAS) covering a total area of about 5.45 million hectares, or 14.2 % of the total area of the country. Protected areas are administered by the DENR-BMB (Biodiversity Management Bureau) under the NIPAS Act of 1992. Various categorized protected areas defined by regulations shown in **Table 13.5-4** are widely distributed in the Philippines as shown in **Figure 13.5-7**.

Table 13.5-4 Definition of Protected Areas

Terms	Definition
Strict nature reserve	An area possessing some outstanding ecosystem, features and/or species of flora and fauna of national scientific importance maintained to protect nature and maintain processes in an undisturbed state in order to have ecologically representative examples of the natural environmental monitoring, education and for the maintenance of genetic resources in a dynamic and evolutionary state
Natural park	A relatively large area not materially altered by human activity where extractive resource uses are not allowed and maintained to protect outstanding natural and scenic areas of national or international significance for scientific, educational and recreational use.
Natural Monuments/Natural Landmark	A relatively small area focused on protection of small features to preserve nationally significant natural features on account of their special interest or unique characteristics
Wildlife sanctuary	An area which assures the natural conditions necessary to protect nationally significant species, groups of species, biotic communities or physical features of the environment where these may require specific human manipulations for their perpetuation.
Protected landscapes/seascapes	Areas of national significance which are characterized by the harmonious interaction of man and land while providing opportunities for public enjoyment through the recreation and tourism within the normal lifestyle and economic activity of these areas.
Resources reserve	An extensive and relatively isolated and uninhabited area normally with difficult access designated as such to protect natural resources of the area for future use and prevent or contain development activities that could affect the resource pending the establishment of objectives which are based upon appropriate knowledge and planning.
Natural biotic areas/ Anthropological Reserve	An area set aside to allow the way of life of societies living in harmony with the environment to adapt to modern technology at their pace.
Others	Other categories established by law, conventions or international agreements which the Philippine Government is a signatory.

Source: DENR Memorandum Circular 2004-9



*Source: Biodiversity Management Bureau (*https://bmb.gov.ph/index.php/urban-biodiversity-conservation/pas-and-cities*, accessed on 2 March 2021)*

Figure 13.5-7 Protected Areas

(2) Ramsar Sites

The Ramsar Convention entered into force in the Philippines on 8 November 1994. The Philippines has eight (8) sites designated as Wetlands of International Importance (Ramsar Sites) covering the area of 247,684 ha. The summary of each site is shown in **Table 13.5-5**.

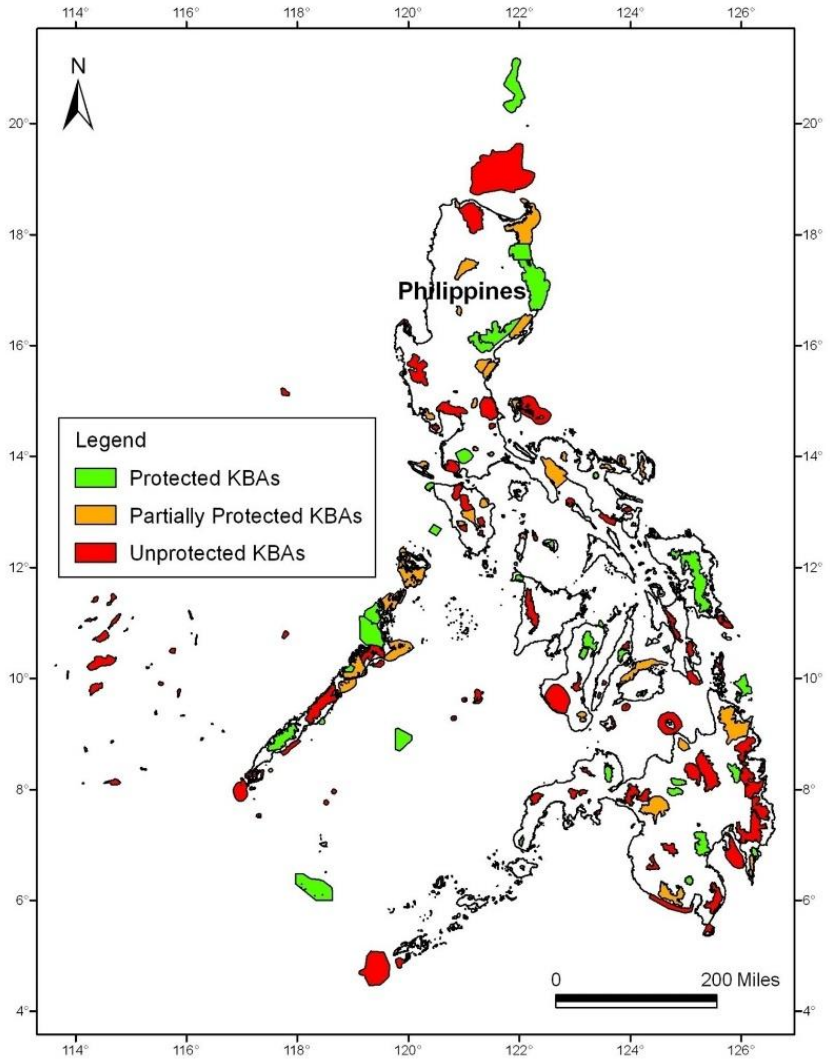
Table 13.5-5 Summary of the Eight (8) Ramsar Sites

No.	Name	Location	Outline
1	Agusan Marsh Wildlife Sanctuary	Mindanao	・Designated on 12 November 1999. ・The site is in the hills of eastern Mindanao. ・The Marsh supports the largest expanses left in the Philippines of seven habitat types and includes a very large area of swamp forest and a peat swamp forest.
2	Las Piñas-Parañaque Critical Habitat and Ecotourism Area	Manila	・Designated on 15 March 2013. ・The site comprises two interconnected, mangrove-covered islands, shallow lagoons and coastline. ・At least 5,000 individuals of migratory and resident birds have been recorded at the site, including about 47 migratory species.
3	Naujan Lake National Park	Oriental Mindoro	・Designated on 12 November 1999. ・The 5th largest lake in the Philippines. ・The lake has 14 species of fish, 5 of them migratory, and is an important feeding or wintering area for large numbers of ducks and other waterbirds.
4	Negros Occidental Coastal Wetland Conservation Area	Negros Island	・Designated on 20 October 2016. ・The Site lies along 110 km of coastline of the island of Negros. ・It hosts vulnerable turtles, waterbird species, etc.
5	Olango Island Wildlife Sanctuary	Cebu	・Designated on 1 July 1994. ・The site is one of the most important areas for significant numbers of migratory waterbirds, providing habitat for staging, wintering, roosting and feeding birds.
6	Puerto Princesa Subterranean River National Park	Palawan Island	・Designated on 30 June 2012. ・The site is biogeographically unique because it connects a range of important ecosystems from the mountain to the sea. ・It is home to about 800 plant and 233 animal species including vulnerable species.
7	Sasmuan Pampanga Coastal Wetlands	Pampanga	・Designated on 2 February 2021. ・The site is in Manila bay. ・These wetlands include mudflats, mangroves and riverine habitats that serve as important stopover points for migratory waterbirds with over 50,000 individuals counted in 2020.
8	Tubbataha Reefs Natural Park	Sulu Sea	・Designated on 12 November 1999. ・The site is a National Marine Park and World Heritage Site located in the center of the Sulu Sea. ・The site has high diversity with equivalent to about 80% of all coral reefs in the Philippines.

Source: JICA Study Team based on the Ramsar Website (available from https://www.ramsar.org/wetland/philippines, accessed on 4 Feb. 2021)

(3) Key Biodiversity Areas (KBAs)

The DENR, Conservation International Philippines and Haribon Foundation delineated terrestrial Key Biodiversity Areas (KBAs) in the Philippines in 2006 and marine priority conservation areas in 2009. As of 2009, a total of 228 sites covering over 106,000 sq. km. were identified as KBAs in the Philippines. These sites are the host to 855 species including 396 globally threatened, 398 restricted-range and 61 congregatory species. Among the 228 KBAs, 50 are the protected KBAs, 41 are the partially protected KBAs and 137 are unprotected KBAs, as shown in the figure below.

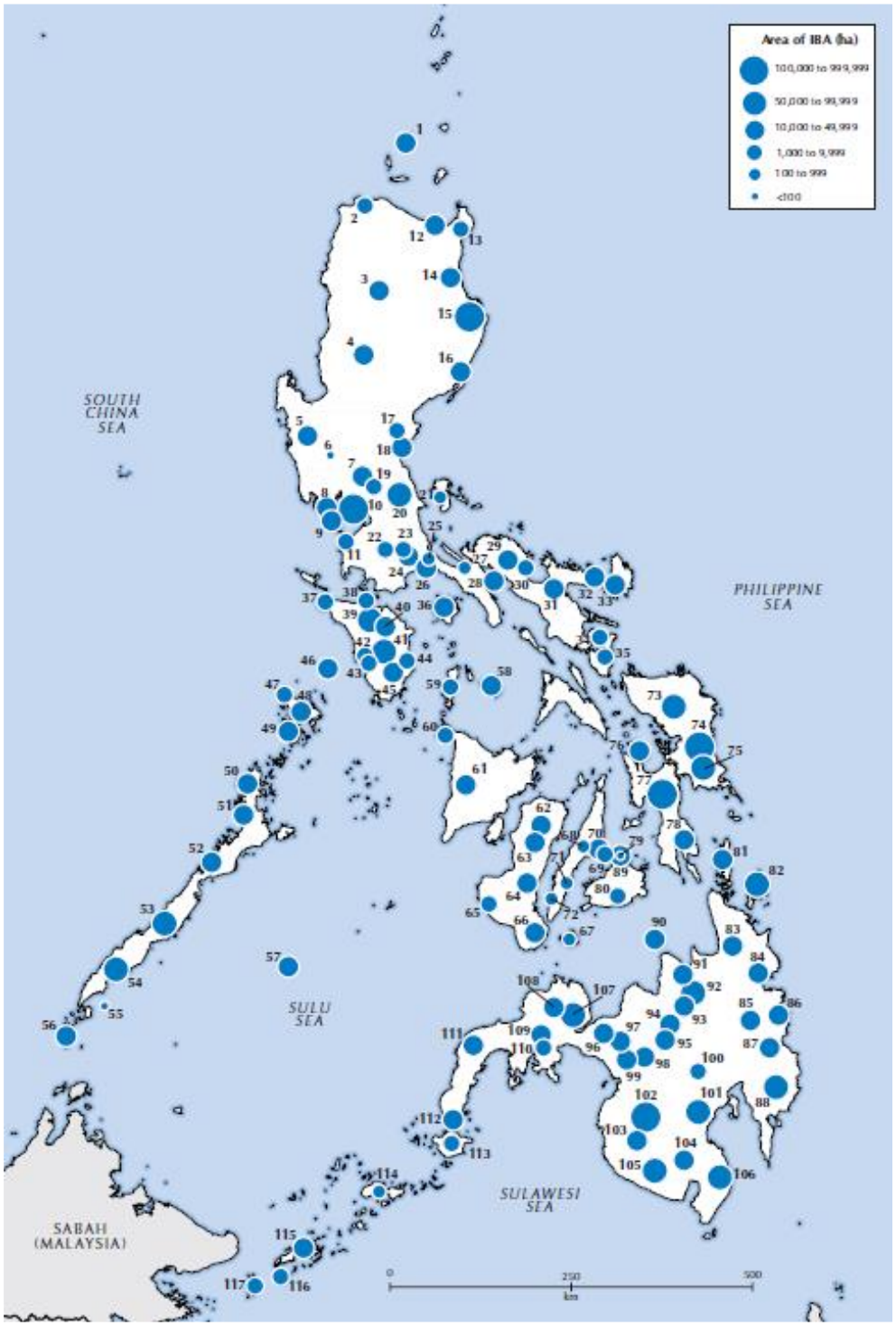


Source: Foundation for the Philippine Environment (available from https://fpe.ph/biodiversity.html/view/the-philippine-key-biodiversity-areas-kbas, accessed on 5 Feb. 2021)

Figure 13.5-8 Location of KBAs

(4) Important Bird Areas (IBAs)

There are 117 IBAs in the Philippines. Among them, 10 are the Endemic Bird Areas (EBAs), 115 support globally threatened species, 106 have restricted-range species, 16 have congregatory species. **Figure 13.5-9** shows the location and size of IBAs. Total IBAs area in the Philippine is 3,432,303 ha which covers more than 7% of the total land area of the country. Sixty- four (64) IBAs (55%) contain lowland forest and 36 IBAs (31%) contain montane forest.



Source: Bird Life International (available from http://datazone.birdlife.org/userfiles/file/IBAs/AsiaCntryPDFs/Philippines.pdf, accessed on 4 Feb. 2021)

Figure 13.5-9 Location and Size of IBAs

(5) Forest Areas

The Philippines' total land area of about 30 million hectares is officially classified into alienable and disposable land and forestland. As shown in **Table 13.5-6**, forest land covered 15.81 million ha or 53% of the total land area of the country in 2018.

In case of the need to cut trees for public infrastructure projects, such as road ROW clearing, the project proponent is required to secure the necessary permit from the DENR.

Table 13.5-6 Land Classification in the Philippines (2018)

Land Classification	Area (ha)	% of Area
Alienable and Disposable Land	14,194,675	47.32
Forest Land	15,805,325	52.68
Unclassified Forest Land	755,009	2.52
Classified Forest Land	15,050,316	50.17
Established Timberland	10,056,020	33.52
Established Forest Reserves	3,270,146	10.90
National parks/ Game Refuge and Bird Sanctuaries / Wilderness Area	1,340,997	4.47
Civil Reservations	126,130	0.42
Military Reservations	165,946	0.55
Fishponds	91,077	0.30
TOTAL	30,000,000	100.00

Source: 2018 Philippine Forestry Statistics, DENR-FMB

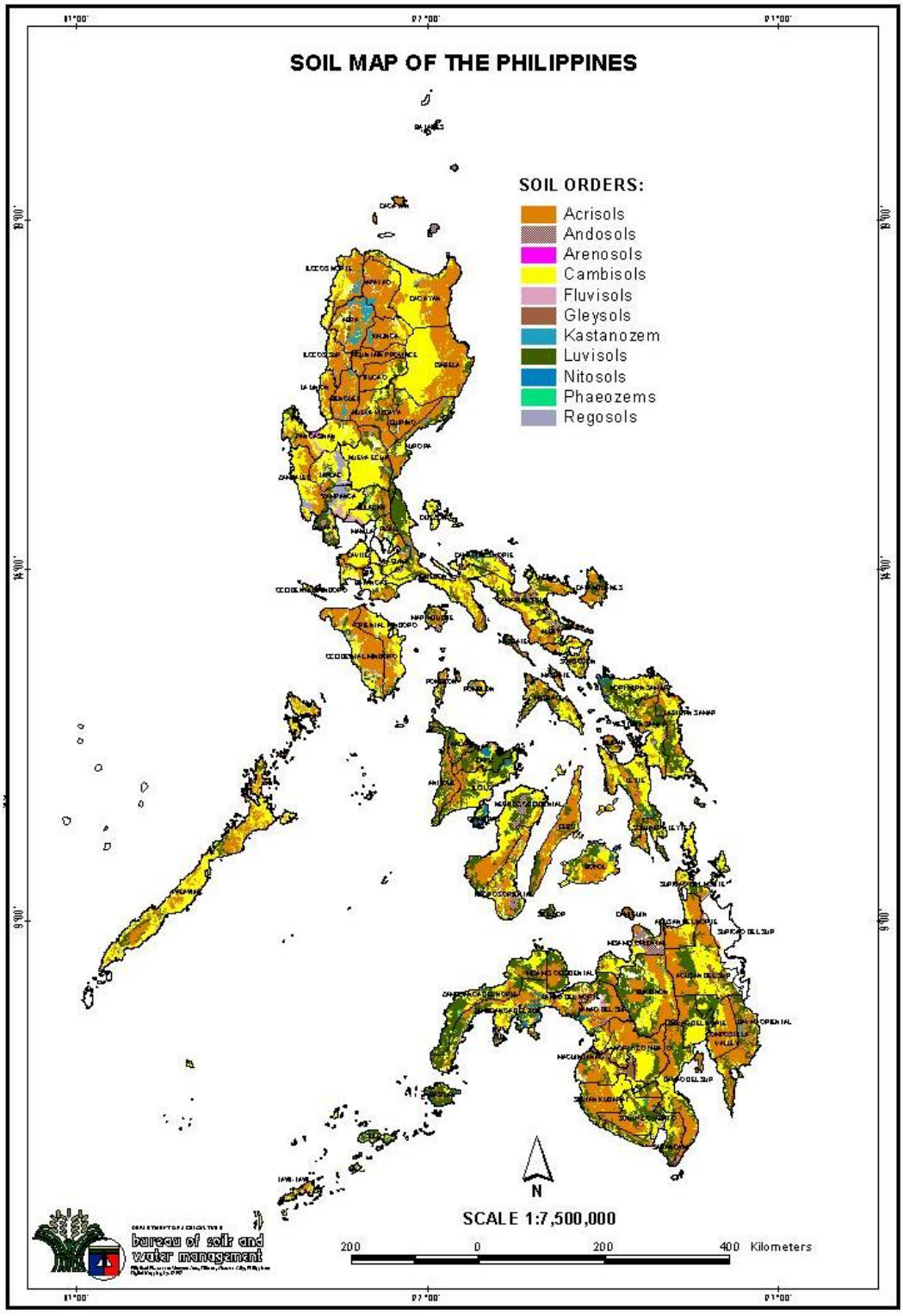
Table 13.5-7 Land Classification by Region (2018)

Region	Total Area	Forest Land	% of Forest Land
CAR	1,829,368	1,487,023	81.29
Region 1	1,284,019	473,097	36.85
Region 2	2,687,517	1,714,695	63.80
Region 3	2,147,036	942,387	43.89
NCR	63,600	15,368	24.16
Region 4-A	1,622,861	570,913	35.18
Region 4-B	2,745,601	1,747,038	63.63
Region 5	1,763,249	541,189	30.69
Region 6	2,022,311	604,333	29.88
Region 7	1,489,077	524,908	35.25
Region 8	2,143,169	1,118,214	52.18
Region 9	1,599,734	837,274	52.34
Region 10	1,714,803	897,134	52.32
Region 11	1,967,183	1,229,550	62.50
Region 12	1,874,946	1,144,400	61.04
Region 13	1,884,697	1,339,800	71.09
TOTAL	30,000,000	15,805,325	52.68

Source: 2018 Philippine Forestry Statistics, DENR-FMB

(6) Soil

Figure 13.5-10 shows the distribution of soils in the Philippines. Acrisols is the dominant soil type, followed by Cambisolos. Acrisolos is a clay-rich subsoil and is associated with humid and tropical climates, which is suitable for crops, such as tea, rubber tree, oil palm, coffee and sugar cane. Cambisolos are developed in medium and fine-textured materials composed of rocks such as alluvial, colluvial and aeolian deposits, and are used for agriculture.



Source: Philippines Bureau of Soil and Water Management

Figure 13.5-10 Soil Classification

According to Profile on Environmental and Social Considerations in Philippines (JICA, September 2011), some sites in the Philippines, such as the National Capital Region, Region 4 and Region 3 are considered as the PCB hotspots.

(7) Biodiversity

1) General Condition

The Philippines is an archipelago of more than 7,100 islands covering an estimated land area of 30 million hectares. Its archipelagic waters cover an estimated 229 million hectares or approximately 88% of the Philippine territory. The country's complex geological history and long period of isolation from the rest of the world have produced varied landforms, water bodies, and climatic conditions. These, in turn, have contributed to the wide array of soil, temperature, moisture, and weather regimes and combined with its former extensive areas of rainforests and its tropical location, have given rise to high species diversity and endemism.

According to the 4th National Report to the Convention on Biological Diversity (2009), the Philippines ranked 5th among countries in the world in the number of plant species and maintains 5% of the world's flora. Species endemism is very high covering at least 25 genera of plants and 49% of terrestrial wildlife. It also ranks 4th in bird endemism. There are about 3,214 (incomplete list) with about 121 endemic and 76 threatened species in terms of fishes.

Unfortunately, Philippines was also one of the fifteen world's hotspots in 1992- with many endangered and threatened species- thus making it one of the top global conservation priority areas. As regards this particular issue, quick and sustainable measures have to be undertaken by concerned agencies and authorities in the country.

2) Issues and Challenges

The Philippines are the habitat for endangered species not found anywhere else on the planet, such as Philippine eagles. The forests in which they live have been largely cut down. Coral reefs off the coast are also under threat. Small-scale gold mining is polluting the rivers. In addition, the post-millennial period has seen the emergence of large-scale highly polluting mining.

Tropical rain forests on the southern island of Mindanao were cleared for pineapple and banana plantations last century. Illegal logging has also led to deforestation. Two large forest areas remain: one in the Sierra Madre mountain range in Luzon and the other in Palawan Island. The International Union for the Conservation of Nature (IUCN) Netherlands supports local communities that help protect the natural environment because they, for example, extract resin, fibres and honey.

According to the Philippine government, one-third of the country is suitable for mining. Forty-six (46) large-scale miners extract minerals such as nickel, gold and copper. But the mining industry in reality contributes less than 1% to the Gross Domestic Product. Raw ore is exported to countries, such as Japan and China where factories process it into products including electronics and automobiles.

(8) Endangered Species

1) IUCN Red List in the Philippines

The International Union for the Conservation of Nature (IUCN) Red Listing is widely recognized as the most comprehensive, objective global approach for evaluating the conservation status of plant and animal species. It categorizes each specie according to its appropriate conservation status being, Extinct (EX), Extinct in the Wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC).

Table 13.5-8 and **Table 13.5-9** show the total numbers of threatened species and high status of threatened endemic species, respectively.

Table 13.5-8 IUCN Red List Category Summary Totals in the Philippines (version 2010.4)

Group	Critically Endangered	Endangered	Vulnerable	Total Threatened Species
Animals	45	82	348	475
Plants	55	35	132	222
TOTAL	100	117	480	697

Source: IUCN website (Accessed in April 2011)

Table 13.5-9 Endemic and threatened endemic species in the Philippines (version 2010.4)

Group	Total Endemics	Threatened Endemics	%
Mammals	111	25	22.5
Birds	196	59	30.1
Amphibians	79	48	60.8
FW Crabs	42	4	9.5
Conifers	3	2	66.7
Cycads	5	5	100.0
TOTAL	436	143	32.8

Source: IUCN website (Accessed in April 2011)

2) Threatened Species by the National Laws

Table 13.5-10 and **Table 13.5-11** show the threatened fauna and plants that are categorized by DAO No.2019-09 and DAO No.2017-11, respectively. They categorize each specie according to its appropriate conservation status being, Critically Endangered (CR), Endangered (EN), Vulnerable (VU), or Other Threatened (OT). The CR species include all species listed under Appendix 1 of the Convention on International Trade on Endangered Species (CITES), and the EN species include all species listed under Appendix II of CITES.

Table 13.5-10 List of Threatened Philippine Fauna and their Categories

Faunal Species	Critically Endangered*	Endangered**	Vulnerable	Other Threatened Species	Total
Mammals	8	9	16	22	55
Birds	32	40	79	33	184
Reptiles	6	5	3	37	51
Amphibians	1	1	21	9	32
Invertebrates	13	6	321	444	784
TOTAL	60	61	440	545	1,106

Source: Compiled by JICA Study Team based on DAO No. 2019-09

Table 13.5-11 Summary of Number of Threatened Philippine plants per Category

Category	Number of Plant Species
Critically endangered	179
Endangered	254
Vulnerable	406
Other Threatened Species	145
TOTAL	984

Source: Compiled by JICA Study Team based on DAO No. 2017-11

3) Bonn Convention or Convention on Migratory Species (CMS)

Table 13.5-12 shows the list of migratory species in the Philippine range included in the CMS appendices.

Table 13.5-12 List of Migratory Species in the Philippine Range included in the CMS Appendices (as of March 2011)

App	Class	Order	Family	Taxon
I	Mammalia	Cetacea	Balaeopteridae	*Balaenoptera musculus*
I	Aves	Ciconiiformes	Ardeidae	*Egretta eulophotes*
I	Aves	Ciconiiformes	Threskiornithidae	*Platalea minor*
I	Aves	Charadriiformes	Laridae	*Sterna bernsteini*
I	Aves	Charadriiformes	Alcidae	*Synthliboramphus wumizusume*
I	Mammalia	Cetacea	Delphinidae	*Orcaella brevirostris*
I	Aves	Charadriiformes	Scolopacidae	*Tringa guttifer*
I/II	Aves	Charadriiformes	Scolopacidae	*Eurynorhynchus pygmeus*
I/II	Aves	Passeriformes	Muscicapidae	*Acrocephalus sorghophilus*
I/II	Reptilia	Testudinata	Cheloniidae	*Chelonia mydas*
I/II	Reptilia	Testudinata	Cheloniidae	*Caretta caretta*
I/II	Reptilia	Testudinata	Cheloniidae	*Lepidochelys olivacea*
I/II	Pisces (Elasmobranchii)	Lamniformes	Lamnidae	*Carcharodon carcharias*
II	Mammalia	Cetacea	Delphinidae	*Sousa chinensis*
II	Mammalia	Cetacea	Delphinidae	*Stenella attenuate* (SEA populations)
II	Mammalia	Cetacea	Delphinidae	*Stenella longirostris* (SEA populations)
II	Mammalia	Cetacea	Delphinidae	*Orcaella brevirostris*
II	Mammalia	Sirenia	Dugongidae	*Dugong dugon*
II	Aves	Ciconiiformes	Threskiornithidae	*Plegadis falcinellus*
II	Aves	Charadriiformes	Laridae	*Sterna albifrons*
II	Reptilia	Crocodylia	Crocodylidae	*Crocodylus porosus*
II	Pisces (Elasmobranchii)	Orectolobiformes	Rhincodontidae	*Rhincodon typus*
II	Pisces (Elasmobranchii)	Lamniformes	Lamnidae	*Isurus oxyrinchus*
II	Pisces (Elasmobranchii)	Swualiiformes	Squalidae	*Squalus acanthias* (Northern Hemisphere populations)
II	Insecta	Lepidoptera	Danaidae	*Danaus plexippus*

Appendix I – Endangered migratory species, Appendix II – Migratory species conserved through agreements
Source: CMS website (Accessed in April 2011)

4) CITES Listing

Table 13.5-13 shows the number of species living in the Philippines categorized in Appendix I of CITES Listing.

Table 13.5-13 Number of the Philippine Fauna and Flora under CITES Appendix I

Class	No. of species
Mammalia	10
Aves	11
Reptilia	9
Insecta	1
Flora	13
TOTAL	44

Source: CITES Website (Accessed in April 2011)

13.5.7 Social Environment

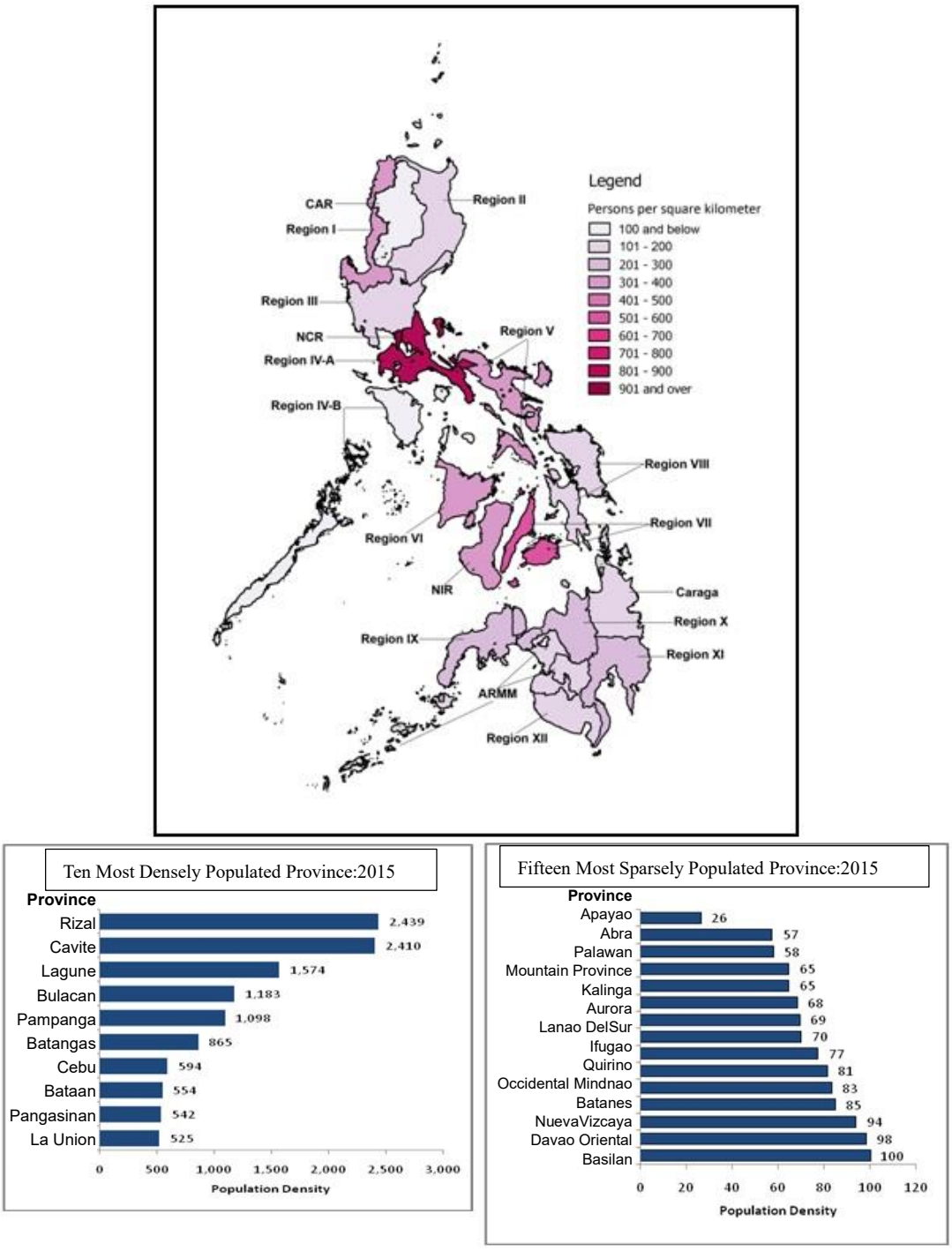
(1) Population and Population Density

The population of the Philippines as of August 1, 2015 based on the 2015 Census of Population (POPCEN 2015) was 100.98 million persons. With a total land area of approximately 300,000 square kilometers (km^2), the population density of the Philippines in 2015 was posted at 337 persons per square kilometer. This represents an increase of 29 persons per square kilometer (9.4 percent) from the population density of 308 persons per square kilometer in 2010. In 2000, there were 255 persons residing in every square kilometer of land. Regional population, population and Ratio of Household Population are shown in **Table 13.5-14** and **Figure 13.5-11**. Population distribution varies from different locations. Metropolitan areas are densely populated. Ratio of Household Population in every region is almost the same with the national average.

Table 13.5-14 Population and Population Density (2015)

Region	Population	Population Density (persons /km2)	Average Household Size (person/unit)
CAR	1,722,006	87	4.33
Region 1	5,026,128	388	4.35
Region 2	3,451,410	116	4.28
Region 3	11,218,177	512	4.36
NCR	12,877,253	20785	4.13
Region 4-A	14,414,774	870	4.23
Region 4-B	2,963,360	100	4.32
Region 5	5,796,989	320	4.75
Region 6	4,477,247	351	4.40
NIR*	4,414,131	329	4.35
Region 7	6,041,903	578	4.33
Region 8	4,440,150	191	4.49
Region 9	3,629,783	215	4.52
Region 10	4,689,302	229	4.47
Region 11	4,893,318	239	4.13
Region 12	4,545,276	199	4.31
Region 13(CARGA)	2,596,709	123	4.51
ARMM**	3,781,387	103	6.08
PHILIPPINES	100,979,303	337	4.38

Source: 2015 Census of Population



Source: Press Release Philippine Population Density, Philippine Statistic Authority, 2016

Figure 13.5-11 Philippine Population Density (2015)

(2) Morbidity and Mortality

Philippines Statistic Authority released the data on registered deaths from 2015 to 2020. According to the data, the largest cause of death was the diseases of the circulatory system followed by neoplasms. Among the diseases of the circulatory system, ischaemic heart diseases and cerebrosvascular diseases were the two largest causes.

Table 13.5-15 Numbers of Registered Deaths by Causes

(Unit: Persons)

	2015	2016	2017	2018	2019	2020
Certain infectious and parasitic diseases	42,475	44,340	41,099	40,929	42,726	30,602
Neoplasms	63,003	64,594	64,125	67,138	68,657	62,289
Diseases of the blood and blood forming organs and certain disorders involving the immune mechanism	3,709	3,889	4,789	4,657	4,339	4,759
Endocrine, nutritional and metabolic diseases	42,728	42,571	41,642	42,654	45,449	48,433
Mental and behavioral disorders	503	654	1,433	1,416	1,986	1,244
Diseases of the nervous system	7,565	7,741	8,915	9,185	10,181	7,833
Diseases of the eye and adnexa	19	5	45	43	45	55
Diseases of the ear and mastoid process	38	10	78	93	75	79
Diseases of the circulatory system	198,077	198,507	196,900	201,483	213,625	211,860
Diseases of the respiratory system	78,859	88,139	87,760	87,720	95,879	57,109
Diseases of the digestive system	22,456	22,803	24,168	24,341	25,165	23,313
Diseases of the skin and subcutaneous tissue	2,327	2,191	2,803	3,339	3,718	3,374
Diseases of the muscuskeletal system and connective tissue	2,210	2,580	3,521	3,959	4,358	4,073
Diseases of the genitourinary system	22,031	23,526	18,759	19,227	20,603	20,171
Pregnancy, childbirth and the puerperium	1,721	1,483	1,484	1,616	1,458	1,335

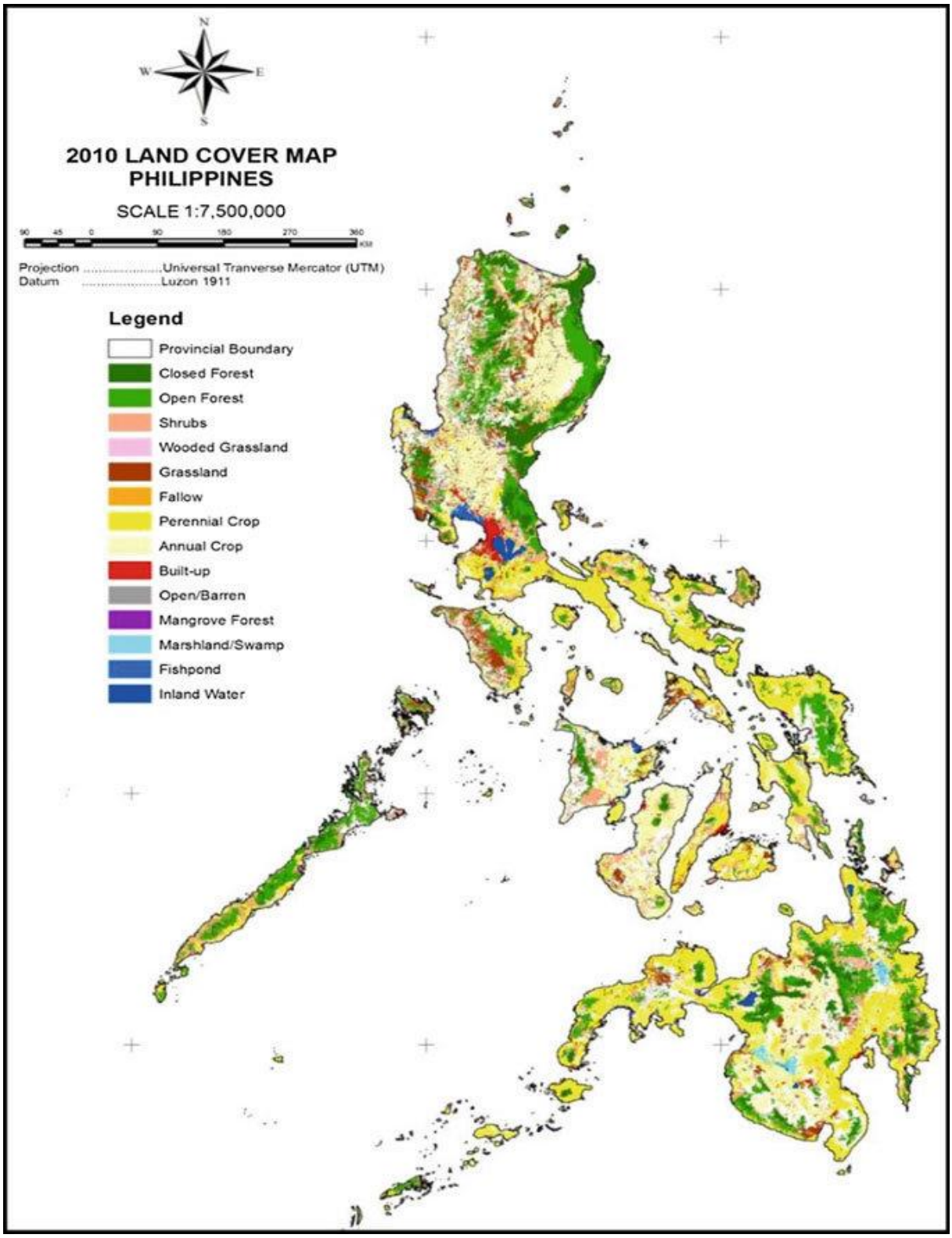
	2015	2016	2017	2018	2019	2020
Certain conditions originating in the perinatal period	9,831	9,785	11,054	11,768	11,260	9,161
Congenital malformations, deformations and chromosonal abnormalities	5,138	5,100	5,336	5,415	5,912	4,421
Symptoms, signs and abnormal clinical and laboratory findings, NEC	18,659	19,839	20,680	21,918	22,918	23,857
External causes of morbidity and mortality	39,256	44,426	44,646	43,808	42,960	33,939
Vaping-related disorder						1
COVID-19						27,967

Notes:
1. 2020 figures was preliminary information as of 26 February 2021.
2. Numbers of COVID-19 in 2020 included both of the confirmed cases of deaths when the person died and those not yet confirmed when the person died. Thus, there may be a difference on the numbers released by Department of Health.
Source: JICA Study Team referring to Philippines Statistic Authority (available from https://psa.gov.ph/content/causes-deaths-philippines-preliminary-january-december-2020*)*

According to the released information on COVID-19 by Department of Health, ranges from 25 to 29 years old had the largest numbers of cases (i.e. counting 14.2%: male 7.3% and female 6.9%) followed by 30 to 34 years old (i.e. counting 12.5%: male 6.7% and female 5.8%). The recoveries also showed the similar tendency of cases, ranges from 25 to 29 years old counting the largest rate (i.e. counting 14.5%: male 7.5% and female 7.0%) followed by 30 to 34 years old (i.e. counting 12.7%: male 6.8% and female 5.9%). Meanwhile, the ratio of death became higher as increasing with advancing age. The range from 65 to 69 years old counted the largest population of death (i.e. counting 14.3%: male 8.4% and female 5.9%) followed by the rage of 70 to 75 years old (counting 13.5%: male 7.8% and female 5.8%).

(3) Land Use

The major land uses in the Philippines are croplands and forestlands, as **Figure 13.5-12** shows, and the built-up areas are concentrated and limited at several places in the regions.



Source: Philippines Forest Statistics (Philippines Forest Management Bureau 2012)

Figure 13.5-12 Land Use Map (2010)

(4) Cultural Property

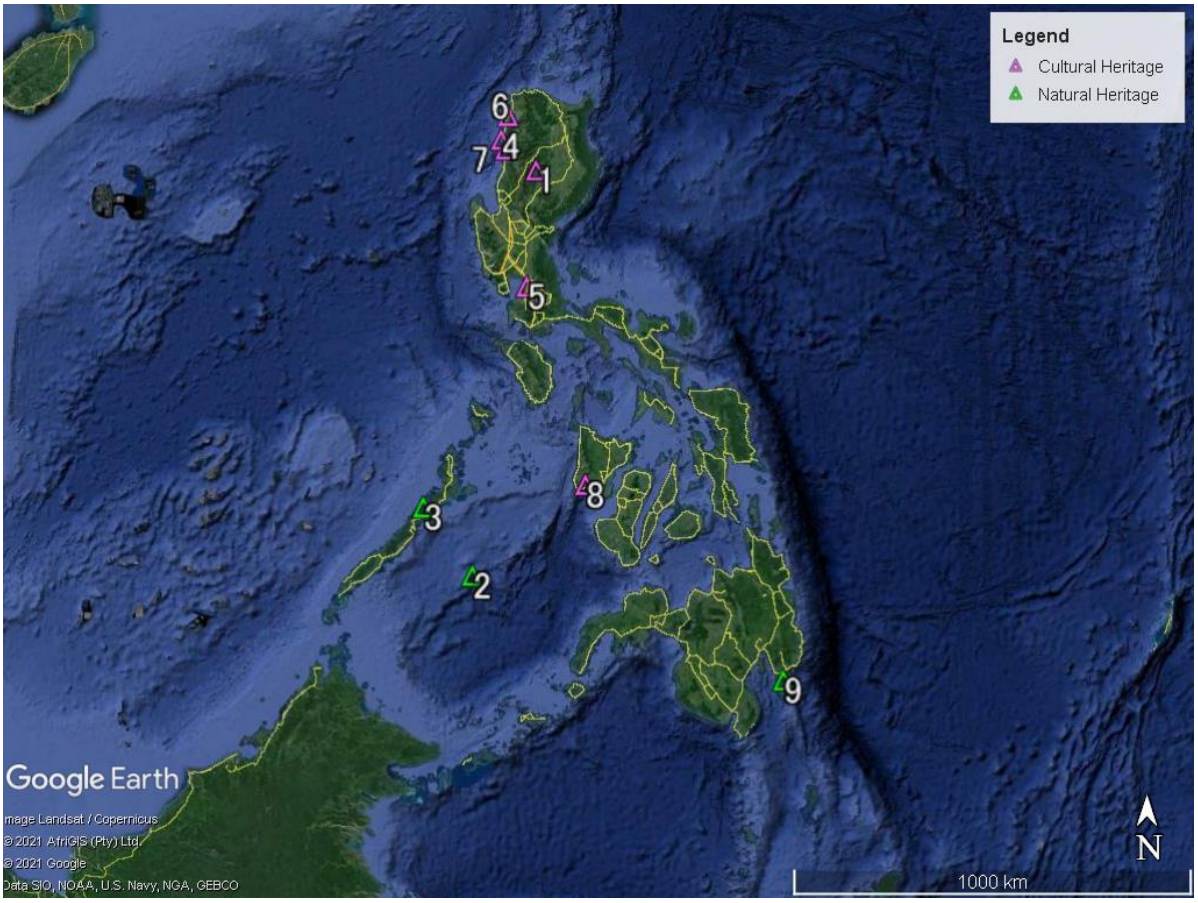
1) UNESCO World Heritage

The Philippines has a total of nine (9) sites registered as UNESCO world heritage sites. In addition, the location of each site is shown in **Table 13.5-16** and **Figure 13.5-13**.

Table 13.5-16 UNESCO World Heritage Sites

Sr.	Name	Location	Type	Year inscribed
1	Rice Terraces of the Philippine Cordillera	Ifugao Province	Cultural	1995
2	Tubbataha Reefs Natural Park	Palawan	Natural	1993, 2009
3	Puerto Princesa Subterranean River National Park	Puerto Princesa, Palawan	Natural	1999
4	Historic City of Vigan	Ilocos Sur	Cultural	1999
5	Church of San Agustin in Manila	Manila	Cultural	1993
6	Paoay Church (Church of San Agustin)	Ilocos Norte	Cultural	1993
7	Church of Nuestra Senora de la Asuncion	Ilocos Sur	Cultural	1993
8	Church of Santo Tomas de Villanueva	Iloilo	Cultural	1993
9	Mount Hamiguitan Range Wildlife Sanctuary	Davao Oriental	Natural	2014

Source: JICA Study Team



Source: JICA Study Team

Figure 13.5-13 Map of UNESCO World Heritage Sites

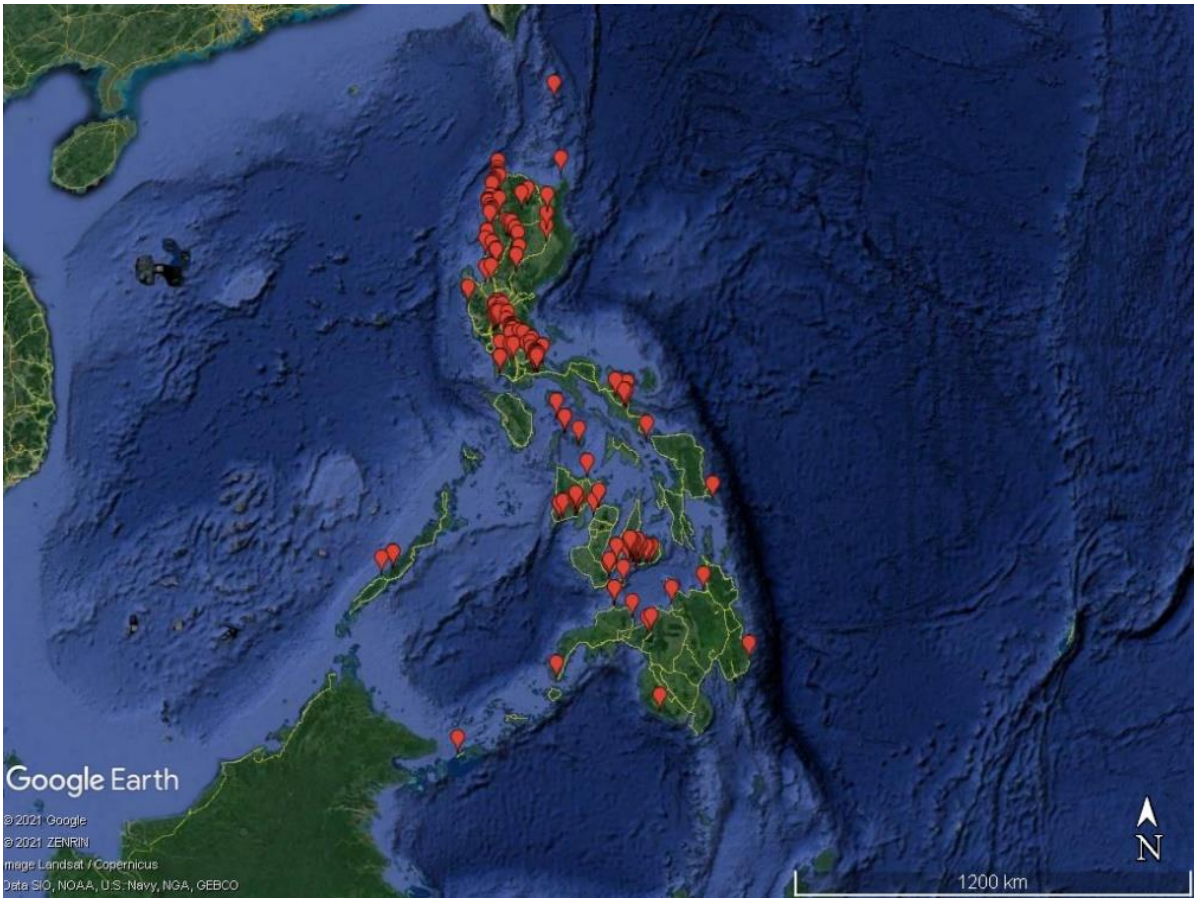
2) National Cultural Property

In addition to the UNESCO world heritage sites, there are cultural properties registered by National Commission for Culture and the Arts under the National Heritage Act of 2009. National Heritage Act of 2009 and its implementation rules and regulations classify the properties into two (2) grades: Grade I and Grade II. Grade I includes five (5) categories: i) national cultural treasures, ii) world heritage sites, iii) national historical shrines, iv) national historical monuments, and v) national historical landmarks. Grade II includes important cultural properties. According to National Registry of Historic Sites and Structure, a total of over 400 sites and structures are registered as Grade I, except World Heritage sites and Grade II.

Table 13.5-17 Number of National Cultural Property by Region

Category / Region	National Cultural Treasures	National historical shrine	National Heritage Monument	National Historical Landmarks	Important Cultural Properties	Total
CAR	7			2	3	12
Region 1	14	4	1	5	10	34
Region 2	4			3	4	11
Region 3	3	4	6	10	18	41
NCR	12	10	2	23	25	72
Region 4-A	11	6	7	19	2	45
Region 4-B	4		1	5	5	15
Region 5	3			4	2	9
Region 6	3	3	31	16	14	67
NIR	1					1
Region 7	11	1	6	19	10	47
Region 8	2	2	1	4		9
Region 9	2	1		1		4
Region 10	5		1	1	16	23
Region 11					1	1
Region 12				2	1	3
Region 13 (CARAGA)	1					1
ARMM (BARMM)	2	1		2	1	6
Total	85	32	56	116	112	401

Source: The Philippine Registry of Cultural Property (PRECUP)



Source: The Philippine Registry of Cultural Property (PRECUP)

Figure 13.5-14 Map of National Cultural Property

(5) Economic Trend

The Gross Domestic Product (GDP) measures the total economic activity of a country. It refers to the monetary value of all finished goods and services produced within a nation's borders in a specific time period. The Philippine GDP trend for the past 10 years is shown in **Figure 2.2-5**.

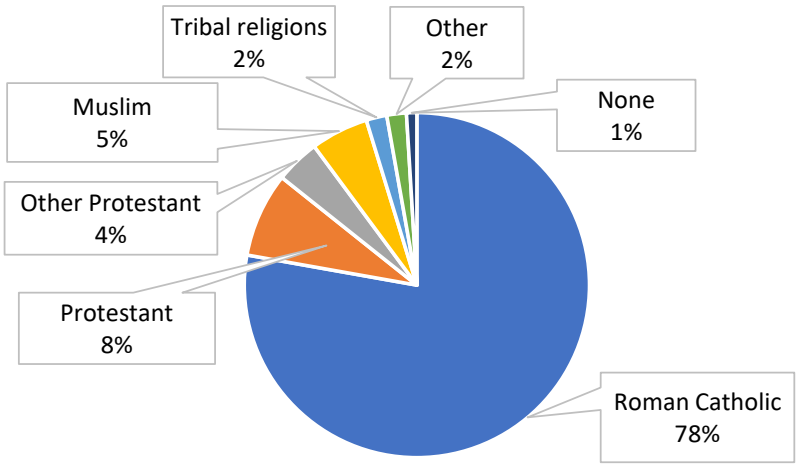
- The Philippines recorded a high and steady economic growth from 2013 to 2018, ranging from 6.1% to 7.1% per year.
- The country's economy grew at a rate of 6.2% in 2018, slower than the 6.7% growth recorded in the previous year.

Detailed information of economic trend is shown in **Section 2.2.2**.

(6) Religion

The Philippine constitution provides for a free exercise of religion and religious worship and prohibits the establishment of a state religion. Over 90% of the population in the country are Christians.

The proportions of religions in the entire Philippines are Roman Catholic 80.6%, Protestant 8.2% (includes Philippine Council of Evangelical Churches 2.7%, National Council of Churches in the Philippines 1.2%, other Protestant denomination 4.3%), other Christian religions 3.4%, Islam (Muslim) 5.6%, Tribal religions 2%, other religions 1.9%, none 1% (2010 est.)

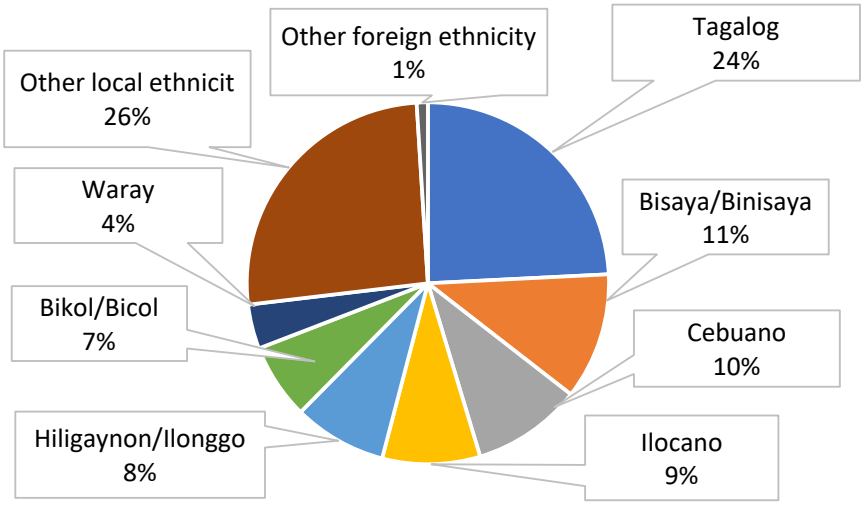


Source: CIA World Factbook Website

Figure 13.5-15 Philippine Religions (2010)

(7) Ethnic Group

The Philippines' main ethnic group is the Tagalog people who live in Central Luzon and adjacent places like Metro Manila and nearby provinces, and account for about 24.4% of the total population. Other ethnic groups are the following: Bisaya/Binisaya 11.4%, Cebuano 9.9%, Ilocano 8.8%, Hiligaynon/Ilonggo 8.4%, Bikol/Bicolano 6.8%, Waray 4%, other local ethnicity 26.1%, other foreign ethnicities 1.0% (2010 est.).

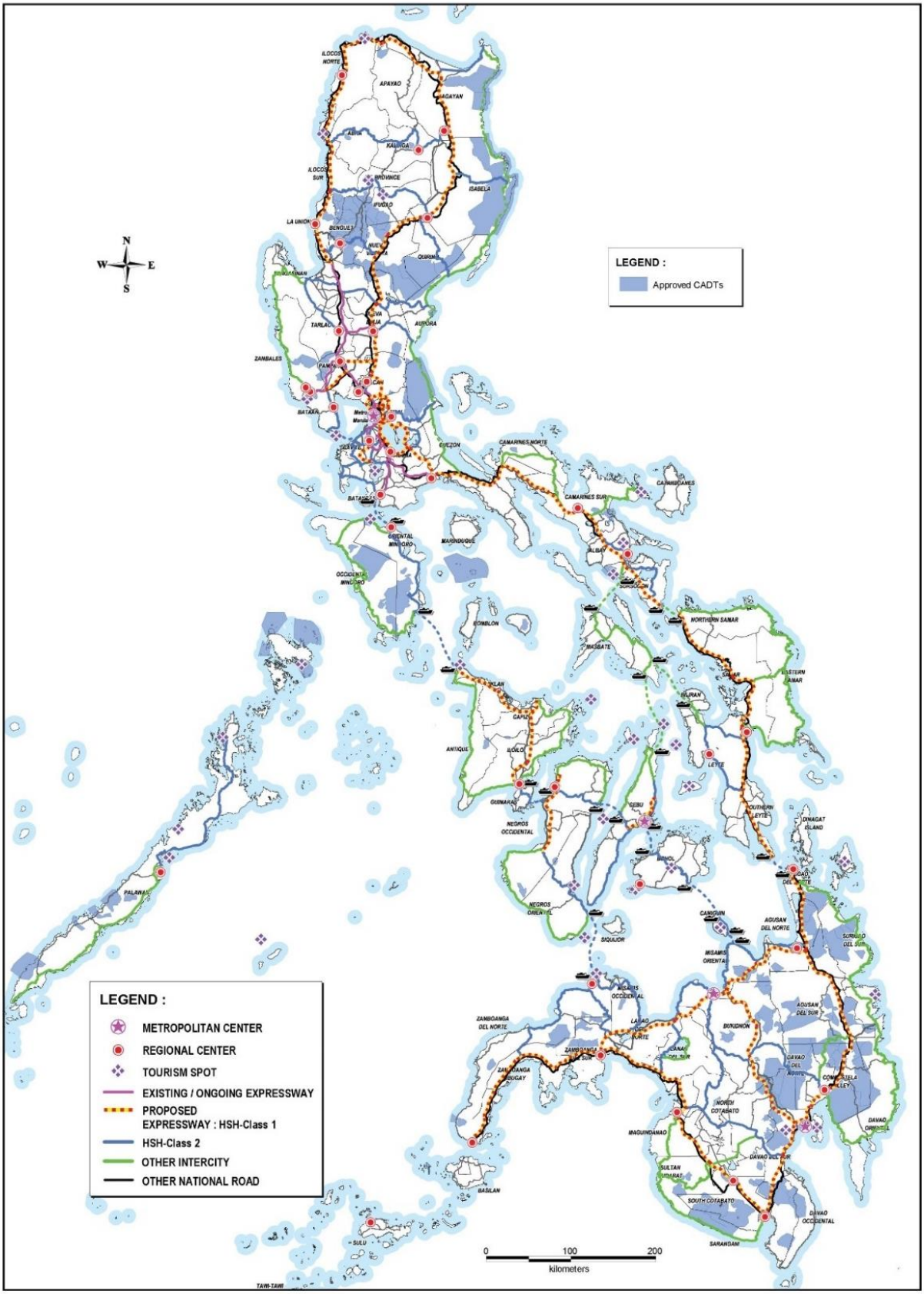


Source: CIA World Factbook Website

Figure 13.5-16 Philippine Ethnic Groups (2010)

(8) Indigenous Peoples

RA No. 8371 or the Indigenous Peoples Right Act (IPRA) enacted in 1997 is the most important legal framework for the protection of the IPs in the Philippines. With the passage of IPRA in 1997, the law recognized the rights of Indigenous peoples over their ancestral domains and provided for a process of titling of lands through the issuance of Certificates of Ancestral Domain Titles (CADT). The distribution map of CADTs is shown in **Figure 13.5-17**. Various Indigenous or Ethnic people has a wide distribution in the different parts of the Philippines. NIPAS-designated PAs to a large part overlap with ancestral domain claims of IPs recognized under the IPRA. A part of the proposed road networks will traverse along existing CADTs.



Source: Based on the original National Commission on Indigenous Peoples (NCIP) data 2012, JST prepared

Figure 13.5-17 CADTs Map

(9) Culture

The culture of the Philippines reflects the complexity of the history of the Philippines through the blending of many diverse traditional Malay heritage mixed with Spanish, American and other Asian cultures. During the Spain Colonization, Spanish and Mexican brought various kinds of their culture and greatly influenced the traditional Philippine folk music, cuisine, festivities and religion. Both the historic town of Vigan, which is the best-preserved example of a planned Spanish colonial town in Asia, and Baroque Churches throughout the country, which style is reinterpretation of European Baroque by Chinese and Philippine craftsmen, were registered as World Heritage Sites.

On the other hand, unique indigenous culture has been identified in various regions. The Philippines designated both the Hudhud Chant of the Ifugao which is a long tale sung during harvesting and the Darangen epic of the Maranao people of Lake Lanao as intangible cultural heritage in the Philippines.

(10) Education

Referring to information by Ministry of foreign Affairs of Japan, education in the Philippines is broadly divided into public schools influenced by the American colony for 50 years, and private schools that follow the educational flow of the Catholic Church during the Spanish colonial era for 300 years. The public primary education system was introduced in 1902.
As of October 2017, there are 5,965 public schools and 4,910 private schools in the Philippines, for a total of 10,875 schools. In addition to regular courses aimed at entering university, local schools have their own characteristics, such as building specialized fields, such as industrial /commercial, physical education, and art. These schools also offer programs that can be granted high school diplomas.

The enrollment rate of school-age children has not been disclosed in the Philippines. However, the Philippine Census Bureau reported that as a result of a media survey conducted in 2013, as many as 1 in every 10 people (about 4 million people) were found to be out-of-school in the Philippines. Among the reasons mentioned that caused such situation, include: early marriage, poverty, and lack of motivation to learn.

13.6 Relevant Laws and Regulations

13.6.4 SEA

There are three (3) House Bills related to SEA drafted in the House of Representatives as of January 2021 (i.e. House Bill No. 145 in 2015, House Bill No. 4800 drafted in 2016, House Bill No. 2279 in 2019). The substance of the three House Bills is significantly the same as shown in the outline below. However, none of these three proposed legislation has been so far approved.

(1) Applicable Projects

House Bill No. 4800 requires to conduct SEA for the proposed policy, plan or program in the categories of agriculture, forestry, fisheries, energy, health, resource extraction, infrastructure, transport, waste management, water management, tourism, coastal zone management, national/regional/provincial/municipal/city development planning or land use. In addition, the following are required to apply for SEA:

- National development plans, policies and programs
- Sectoral plans, policies and program
- Subnational development plans and program
- Policies involving biosafety, genetically modified organism (GMO) and bioprospecting
- Indigenous peoples' development plans

(2) Study Items for SEA

The proponent shall conduct SEA as an integral part of the formulation of policy, plan or program with the purpose of identifying the most practicable alternatives for achieving positive outcomes and minimizing potential adverse effects. For this purpose, the following items shall be at least examined or specified:

- Specifying environmental impacts and cumulative effects to be considered
- Assessment of the policy, program or plan vis-à-vis environmental and sustainable development considerations
- Assessment of disaster risk and capacity to adapt to climate change
- Recommendation or mitigation measures to prevent adverse environmental impacts resulting from the implementation of the policy, plan or program

(3) Approval of SEA

House Bill No. 4800 provides to organize an Inter-agency SEA Council (IASC) with its functions as stated below.

- Ensure the mainstreaming of SEA into policies, plans and programs,
- Formulate implementing rules and regulations on SEA,
- Exercise policy coordination to make sure that the objectives of the Bill are met,
- Recommend legislation, policies, strategies, programs appropriate for SEA and other relevant activities,
- Create and enable environment to promote broader multi-stakeholder participation,
- Formulate and update the guidelines for determining and facilitating the provision of technical assistance for their implementation and monitoring,
- Ensure compliance of all concerned agencies with the act,

- Facilitate capacity building for SEA implementation and monitoring, and
- Oversee the dissemination of information on SEA.

IASC is composed of DENR and other relevant departments, Housing and Land Use Regulatory Board (now DHSUD), NCIP, LGUs, NGOs and business sectors. However, the administrative procedure of SEA is not mentioned in the Bill.

13.6.5 Environmental Impact Statement, Natural Environment and Environmental Standard

(1) Philippine Environmental Impact Statement System (PEISS)

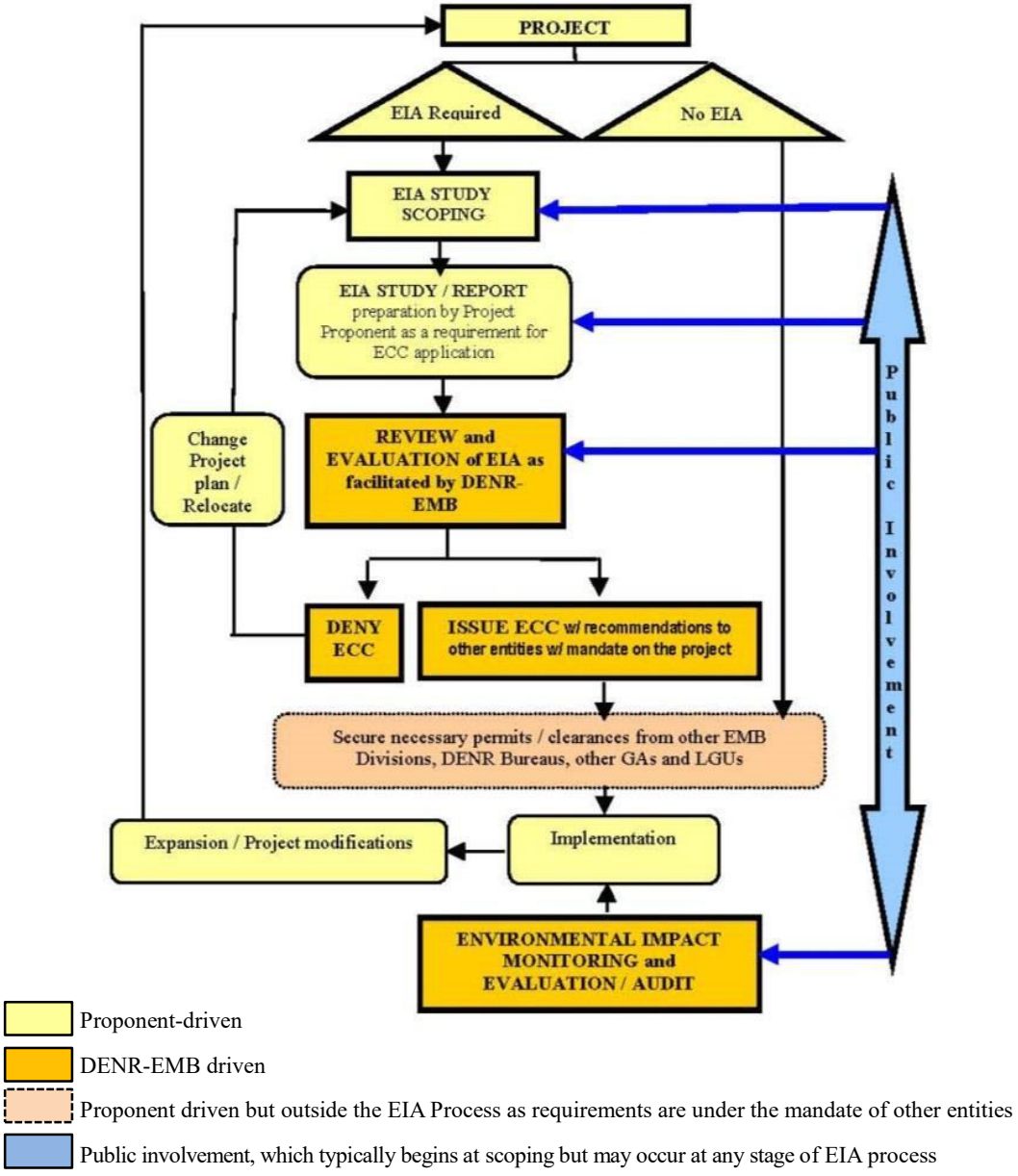
Table 13.6-1 presents the major laws and regulations for Philippine Environmental Impact Statement System (PEISS). The environmental and social impact assessment of any proposed project in the Philippines is mainly anchored on Presidential Decree (PD) 1151 and PD 1586.

Table 13.6-1 Major Laws and Regulations for PEISS

Law/Regulation	Outline
1. PEISS/ EIS	
Presidential Decree No.1151 (1977)	Philippine Environmental Policy. Comprehensive environmental management and mitigations were stipulated, and the concept of environmental impact assessment was applied.
Presidential Decree No.1586 (1978)	PEISS was established and conducting environmental assessment for the environmentally critical projects and projects located in environmentally critical area.
Presidential Proclamation No. 2146 (1981)	Proclaiming Certain Areas and Types of Projects as Environmentally Critical and within the scope of the PEISS established under Presidential Decree No.1586.
Presidential Proclamation No.803 (1996)	Declaring the Construction, Development and Operation of a Golf Course as an ECP Pursuant to Presidential Decree No. 1586.
DENR Administrative Order No. 37 (1996)	Revising DENR Administrative Order No. 21, Series of 1992, to Further Strengthen the Implementation of the EIS System.
Presidential Administrative Order No.42 (2002)	Rationalizing the Implementation of the PEISS and giving authority in addition to the Secretary of the DENR, to the Director and Regional Directors of the Environmental Management Bureau to Grant or Deny the Issuance of ECC.
DENR Administrative Order No. 30 (2003)	Implementing Rules and Regulations (IRR) for the Philippine Environmental Impact Statement (EIS) System.
EMB Memorandum Circular No. 002 (2007)	Revised Procedural Manual for DENR Administrative Order No.2003-30.
DENR Memorandum Circular No.14 (2010)	Standardization of Requirements and Enhancement of Public Participation in the Streamlined Implementation of the Philippine EIS system.
EMB Memorandum Circular No.005 (2014)	Revised Guidelines for Coverage Screening and Standardized Requirements.
DENR Administrative Order No. 15 (2017)	Guidelines on Public Participation under the Philippine Environmental Impact Statement (EIS) System.
EMB Memorandum Circular No. 030 (2020)	Harmonization on the Implementation of EMB MC No. 2019-003

Source: DENR Laws & Politics

The EIA study involves the characterization of the environmental baseline conditions, identification and assessment of impacts, recommendation of mitigation and enhancement measures, and preparation of an environmental management plan (EMP) and environmental monitoring plan (EMoP). As described in the flowchart presented in the procedural manual of PEISS (**Figure 13.6-1**), the project proponent shall prepare and submit the EIS report to the EMB office for review and approval. After review by the EMB office, ECC (Environmental Compliance Certificate), CNC (Certificate of Non-Coverage) or Denial Letter will be issued. In the process of PEISS, public participation is required at the stages of scoping, EIA study, review/ evaluation and monitoring.



Source: Revised Procedural Manual for DENR Administrative Order No. 2003-30

Figure 13.6-1 Flowchart of PEISS

The PEISS covers activities that have significant adverse impact to the environmental quality. Presidential Proclamation No. 2146 defines activities that are either Environmentally Critical Projects (ECPs) or located in Environmentally Critical Areas (ECAs) as within the scope of the PEISS. For new projects: EIA-covered projects are required either an (1) Environmental Impact Statement (EIS), (2) Programmatic EIS (PEIS), (3) Initial Environmental Examination Report

(IEER), or (4) IEE Checklist (IEEC), depending on project type, location, magnitude of potential impacts and project threshold. ECPs are categorized as Category A, while Category B are projects that are not classified as Category A but are likewise deemed to significantly affect the quality of the environment. An Environmental Compliance Certificate (ECC) has to be secured for projects categorized as Category A and Category B prior to implementation. Projects or undertakings which are intended to directly enhance the quality of the environment or directly address existing environmental problems are classified under Category C, while those that do not pose significant environmental impacts are classified as Category D. **Table 13.6-2** and **Table 13.6-3** present the summary list of ECP types and ECA categories, and road and bridge project threshold for coverage screening and categorization, respectively. During master plan stage and pre-feasibility study, the regulations do not require official EIA documents.

Table 13.6-2 Summary List of ECP Types and ECA Categories

A. List of ECPs	
As declared by Proclamation No. 2146 (1981)	
1	Heavy Industries – Non-ferrous Metal Industries, Iron and Steel Mills, Petroleum and Petro-chemical Industries including Oil and Gas, Smelting Plants
2	Resource Extractive Industries – Major Mining and Quarrying Projects, Forestry Projects (logging, major wood processing projects, introduction of fauna (exotic animals) in public and private forests, forest occupancy, extraction of mangrove products, grazing), Fishery Projects (dikes for/ and fishpond development projects)
3	Infrastructure Projects – Major Dams, Major Power Plants (fossil-fueled, nuclear fueled, hydroelectric or geothermal), Major Reclamation Projects, Major Roads and Bridges
As declared by Proclamation No. 803 (1996)	
4	All golf course projects
B. List of ECA Categories - As declared by Proclamation No. 2146 (1981)	
1	All areas declared by law as national parks, watershed reserves, wildlife preserves, sanctuaries
2	Areas set aside as aesthetic potential tourist spots
3	Areas which constitute the habitat of any endangered or threatened species of Philippine wildlife (flora and fauna)
4	Areas of unique historic, archaeological, or scientific interests
5	Areas which are traditionally occupied by cultural communities or tribes
6	Areas frequently visited and/or hard-hit by natural calamities (geologic hazards, floods, typhoons, volcanic activity, etc.)
7	Areas with critical slopes
8	Areas classified as prime agricultural lands
9	Recharged areas of aquifers
10	Water bodies characterized by one or any combination of the following conditions: tapped for domestic purposes; within the controlled and/or protected areas declared by appropriate authorities; which support wildlife and fishery activities
11	Mangrove areas characterized by one or any combination of the following conditions: with primary pristine and dense young growth; adjoining mouth of major river systems; near or adjacent to traditional productive fry or fishing grounds; areas which act as natural buffers against shore erosion, strong winds and storm floods; areas on which people are dependent for their livelihood
12	Coral reefs characterized by one or any combination of the following conditions: With 50% and above live coralline cover; Spawning and nursery grounds for fish; Act as natural breakwater of coastlines

Source: DENR-EMB

Table 13.6-3 Road and Bridge Project Threshold for Coverage Screening and Categorization

Projects/Description	Covered (Required to secure ECC)			Not covered (may secure CNC)	Project size parameters / Remarks
	Category A:ECP	Category B: Non-ECP		Category D	
	EIS	EIS	IEE Checklist	PD *(Part I only)*	
3. INFRASTRUCTURE PROJECTS					
3.4 ROADS & BRIDGES					
3.4.1 Roads, new construction	NATIONAL ROAD: ≥ 20.0 km, (length with no critical slope) OR ≥ 10.0 km (length with critical slope)	PROVINCIAL ROAD and OTHER TYPES OF ROADS: ≥ 20.0 km, (length with no critical slope) OR ≥ 10.0 km (length with critical slope)	ALL TYPES OF ROADS: > 2 km but < 20.0 km, (length with no critical slope) OR > 2 km but < 10.0 km (length with critical slope)	≤2 km	
3..4.2 Roads, widening, rehabilitation and/or improvement	*None*	> 50% increase in capacity (or in terms of length/width) AND ≥ 20.0 km, (length with no critical slope) OR ≥ 10.0 km (length with critical slope)	> 50% increase in capacity (or in terms of length/width) AND > 2 km but < 20.0 km, (length with no critical slope) OR > 2 km but < 10.0 km (length with critical slope)	≤ 50% increase in capacity (or in terms of length/width) but ≤ 2 km increase in length	
3.4.3 Bridges and viaducts (including elevated roads), new construction	≥ 10.0 km	≥ 5 km but < 10.0 km	>50 m but < 5.0 km	≤50 m / Regardless of length for footbridges or for pedestrian only	
3.4.4 Bridges and viaducts (including elevated roads), rehabilitation and/or improvement	*None*	≥ 50% increase in capacity (or in terms of length/width) **OR** ≥ 10 km	>50% increase in capacity (or in terms of length/width) but <total length of 10 km	≤ 50% increase in capacity (or in terms of length/width) but ≤ 2 km increase in length	
3.4.5 Roads – flyover/cloverleaf/interchanges	*None*	*None*	Regardless of length and width	*None*	
3.4.6 Pedestrian passages	*None*	*None*	All underpass projects	All overpass projects	
3.4.7 Tunnels and sub-grade roads and railways	≥ 1.0 km	< 1.0 km	None	*None*	
3.4.8 On-grade railway system, new	Regardless of length and width	*None*	*None*	*None*	

Source: DENR-EMB

(2) Laws and Regulations on Natural Environment

Table 13.6-4 shows the major laws and regulations on natural environment.

Table 13.6-4 Major Laws and Regulations on Natural Environment

Category	Title/Subject
Protected Area, Flora and Fauna, Forest	[Protected Area] ➢ Republic Act (RA) No. 7586 (1992), National Integrated Protected Area System (NIPAS) Act ➢ RA No. 11038 (2018), Expanded National Integrated Protected Areas System (eNIPAS) [Flora and Fauna] ➢ Executive Order (EO) No. 247 (1995), Prescribing Guidelines and Establishing a Regulatory Framework for the Prospecting of Biological and Genetic Resources, Their By-Products and Derivatives, for Scientific and Commercial Purposes, and for other Purposes ➢ DENR Administrative Order (DAO) No. 2004-15, Establishing the List of Terrestrial Threatened Species and Their Categories, and the List of other Wildlife Species pursuant to RA 9147 Otherwise Known as the Wildlife Resources and Conservation Act of 2001 ➢ DAO No. 2007-24, Establishing the National List of Threatened Plants and Their Categories and the List of Other Wildlife Species [Forest] ➢ Presidential Decree (PD) No.953 (1976), Requiring the Planting of Trees in Certain Places and Penalizing the Unauthorized Cutting, Destruction, Damaging and Injury of Certain Trees, Plants, and Vegetation ➢ EO No. 193 (2015), Expanding the Coverage of the National Greening Program (NGP)
Pollution Control	[Air Quality] ➢ RA No. 8749 (1999), Clean Air Act

Category	Title/Subject
	[Water Quality] ➢ PD No. 1067 (1976), Water Code ➢ RA No. 9275 (2004), Clean Water Act ➢ DAO No. 2005-10, IRR of the Clean Water Act [Waste] ➢ PD No. 856 (1975), Sanitation Code ➢ RA No. 6969 (1990), Toxic Substances, Hazardous and Nuclear Waste Control Act ➢ RA No. 9003 (2001), Ecological Solid Waste Management Act ➢ DAO No. 2001-34, IRR of RA No. 9003 ➢ DAO No. 2006-10, Guidelines on the Categorized Final Disposal Facilities ➢ DAO No. 2013-22, IRR of RA No. 6969
Climate Change	➢ RA No. 9729 (2009), Climate Change Act ➢ Climate Change Commission AO No. 2010-01, IRR of RA 9729 ➢ EO No. 174(), Institutionalizing Philippine Greenhouse Gas Inventory Management and Reporting System ➢ EMB Memorandum Circular 2011-005, EIA Technical Guidelines Incorporating Disaster Risk Reduction and Climate Change Adaptation Concerns

Source: JICA Study Team

(3) Environmental Standards

1) Water Quality Criteria

The DENR Administrative Order 2016-08 (DAO 2016-08) or the Water Quality Guidelines and General Effluent Standards of 2016 should be applied to assess the surface water quality according to their respective water body classification as designated by DENR. This guidelines shall also be used to assess the groundwater quality of a specific potential affected project area.

Table 13.6-5 DAO 2016-08 Water Body Classification and Usage of Freshwater

Classification	Beneficial Use*
Class AA	**Public Water Supply Class I**- Intended primarily for waters having watersheds, which are uninhabited and/or otherwise declared as protected areas, and which require only approved disinfection to meet the latest PNSDW.
Class A	**Public Water Supply Class II**- Intended as sources of water supply requiring conventional treatment (coagulation, sedimentation, filtration and disinfection) to meet the latest PNSDW.
Class B	**Recreational Water Class I**- Intended for primary contact recreation (bathing, swimming, etc.)
Class C	**Fishery Water** for the propagation and growth of fish and other aquatic resources. **Recreational Water Class II**- For boating, fishing, or similar activities. **For agriculture, irrigation, and livestock watering.**
Class D	Navigable waters.

*Note: For unclassified water bodies, classification shall be based on the beneficial use as determined by the Environmental Management Bureau (EMB)

Source: DAO 08 Series of 2016

2) Ambient Air Quality Guidelines

The DENR Administrative Order No. 81, Series of 2000 stipulates National Ambient Air Quality Guidelines (NAAQG) and Standards or the Implementing Rules and Regulations (IRR) of RA 8749 as shown in **Table 13.6-6**.

This guidelines is applicable for evaluation of the future monitoring results of air quality around the proposed Central Mindanao Highway alignment.

Table 13.6-6 National Ambient Air Quality Guideline for Criteria Pollutants (DAO No. 81 Series of 2000)

Pollutant	Short Term (a)			Long Term (b)		
	µg/NCM	ppm	Averaging Time	µg/NCM	ppm	Average Time
Suspended Particulate Matter (c)- TSP PM-10	230 (d) 150 (f)		24 hours 24 hours	90 60	90 60	1 year (e) 1 year (e)
Sulfur Dioxide (c)	180	0.07	24 hours	80	0.03	1 year
Nitrogen Dioxide	150	0.08	24 hours	--	--	--
Photochemical Oxidants As Ozone	140 60	0.07 0.03	1 hour 8 hours	-- --	-- --	-- --
Carbon Monoxide	35 mg/NCM 10 mg/NCM	30 9	1 hour 8 hours	-- --	-- --	-- --
Lead (g)	1.5	--	3 months (g)	1.0	--	1 year

Notes:

1. Pursuant to Section 12 of Republic Act 8749, the initial set of National Ambient Air Quality Guideline Values necessary to protect public health and safety and general welfare shall be as follows:
   (a) Maximum limits represented by ninety-eight percentile (98%) values not to exceed more than once a year.
   (b) Arithmetic mean
   (c) SO2 and Suspended Particulate are sampled once every six days when using the manual methods. A minimum number of twelve sampling days per quarter or forty-eight sampling days each year is required for these methods. Daily sampling may be done in the future once continuous analyzers are procured and become available.
   (d) Limits for Total Suspended Particulate Matter with mass median diameter less than 25-50 µm.
   (e) Annual Geometric Mean.
   (f) Provisional limits for suspended Particulate Matter with mass median diameter less than 10 µm until sufficient monitoring data are gather to base a proper guideline.
   (g) Evaluation of this guidelines is carried out for 24-hour averaging time and averaged over three moving calendar months. The monitored average value for any three months shall not exceed the guidelines value.
2. The applicable methods for sampling and measurement of the above pollutants are as follows:
   Sulfur Dioxide – Gas Bubbler and Pararosaniline Method (West and Gaeke Method), or Flame Photometric Detector
   Nitrogen Dioxide – Gas Bubbler Griess-Saltzman, or Chemiluminescence Method
   Ozone – Neutral Buffer Potassium Iodide (NBPI), Chemiluminescence Method
   Suspended Particulate Matter
   TSP - High Volume – Gravimetric, USEPA 40 CFR, Part 50, Appendix B
   PM-10 - High Volume with 10 micron particle-size inlet; Gravimetric USEPA 40 CFR, Part 50, Appendix J
   Sulfur Dioxide - Gas Bubbler and Pararosaniline Method (West and Gaeke Method), or Flame Photometric Detector, USEPA 40CFR, Part 50, Appendix A
   Nitrogen Dioxide -Gas Bubbler Greiss-Saltzman, or Chemiluminescence Method, USEPA 40 cfr, part 50, Appendix F
   Carbon Monoxide - Non-dispersive Infra-red Spectrophotometry (NDIR) USEPA 40 CFR, Par 50, Appendix C
   Lead - High Volume and Atomic Absorption Spectrophotometry USEPA 40 CFR, Part 50, Appendix G
3. An analyzer based on the principles and methods cited above will be considered a reference method only if it has been designated as a reference method in accordance with 40 CFR, Part 53.
4. Other equivalent methods approved by the Department may be adopted.

Source: RA 8749; DAO 2000-81 Series of 2000

3) Ambient Noise Pollution Criteria

PD 984 specifies ambient noise quality standards within any city, region or center of urban living as listed in **Table 13.6-7**.

This criterion is applicable for evaluation of the monitoring results of noise level around the proposed Central Mindanao Highway alignment.

Table 13.6-7 Environmental Quality Standards for Noise in General Areas (PD No. 984)

Category of Area	Daytime	Morning and Evening	Night time
AA	50dB	45dB	40dB
A	55dB	50dB	45dB
B	65dB	60dB	55dB
C	70dB	65dB	60dB
D	75dB	70dB	65dB

Note: Class AA refers to a section or contiguous area that requires quietness, such as areas within 100 meters from school sites, nursery schools, hospitals, and special homes for the aged.
Class A section of contiguous area, which is primarily used for residential purposes
Class B section or contiguous area, which is primarily a commercial area
Class C section primarily reserved as a light industrial area
Class D section which is primarily reserved as a heavy industrial area
The standards are applied to the arithmetic mean of at least seven readings at the point of maximum noise level.
The division of the 24-hour period shall be as follows:
Morning …….. 5:00 A.M. to 9:00 A.M.
Daytime …….. 9:00 A.M. to 6:00 P.M.
Evening …….. 6:00 P.M. to 10:00 P.M.
Night time …….. 10:00 P.M. to 5:00 A.M.

Source: PD 984; National Pollution Control Commission (NPCC) Memorandum Circular No. 002 Series of 1980 Section 78

The Philippines has no standards set for vibration.

4) Solid Waste Management

Ecological Solid Waste Management Act of 2000 (RA 9003) provides the legal framework for the systematic, comprehensive and ecological solid waste management program of the Philippines, which shall ensure protection of public health and the environment. It emphasizes the need to create the necessary institutional mechanisms and incentives, and imposes penalties for acts in violation of any of its provisions.

Solid waste that will be generated during the pre-construction and construction activities in working sites will be managed in accordance with the Solid Waste Management Act of 2000 (RA 9003).

5) Hazardous Waste Management

The DAO NO. 22 series 2013 specifies the revised procedures and standards for the Management of Hazardous Waste (revising DAO 2004-36). **Table 13.6-8** shows the Classification of Hazardous Wastes.

Table 13.6-8 Classification of Hazardous Waste (DAO 2013-22)

Class	Description	Waste number
Waste with Cyanide	All wastes containing cyanide with concentration >70mg/L in liquid waste	A101
Acid Waste	With the pH of ≤ 2.0 Sulfuric acid, Hydrochloric acid, Nitric acid, Phosphoric acid, Hydrofluoric acid, mixture of sulfuric and hydrochloric acid	B201-208, B299
Alkali Waste	With the pH of ≤ 12.5 Caustic soda, Potash, Alkaline cleaners, Ammonium hydroxide, Lime slurries, other alkaline wastes	C301-305, C399
Waste with Inorganic	Includes all its compounds Selenium, Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Fluoride, others wastes with inorganic compounds	D401-408, D499
Reactive Chemicals Waste	Oxidizing agent, Reducing agents, Explosive and unstable chemicals, Highly reactive chemicals	E501-503, E599
Ink/Dyes/Pigments/Resins/Latex /Adhesive/Organic Sludge	Solvent based, Inorganic pigments, Ink formulation, Resinous materials, other mixtures	F601-604, F699
Waste Organic Solvents	Halogenated organic solvents, Non-halogenated organic solvents	G703-704
Organic Waste	Grease wastes	H802
Oil	Used and waste oil	I101-104
Containers	Containers previously containing toxic chemical substances	J201
Stabilized Waste	Solidified wastes, Chemically fixed and polymerized wastes, Encapsulated wastes	K301-303
Organic Chemicals	Waste with specific halogenated and non-halogenated toxic organic chemicals, Ozone depleting substances (ODS) Polychlorinated Biphenyl (PCB) wastes	L401-4040
Miscellaneous Wastes	Pathological or infectious wastes, Asbestos wastes, Pharmaceuticals and drugs, Pesticides, Persistent Organic Pollutants (POPs) wastes, Waste electrical and electronic equipment (WEEE), Special wastes.	M501-507

Source: RA 6969; DAO 2013-22

6) Other Relevant Regulations

In addition, **Table 13.6-9** shows the other environmentally relevant regulations.

Table 13.6-9 Other Environmentally Relevant Regulations

Reference	Description
DPWH Department Order (DO) No. 48 series of 2011	It prescribes guidelines and procedures in mainstreaming gender equality actions in all phases of road infrastructure projects and prescribes the mechanics for monitoring gender equality actions in DPWH
DPWH DO No. 57 series of 2016	It prescribes EIA for DPWH infrastructure projects and tree cutting permit application
DPWH DO No. 130 series of 2016	It prescribes guidelines for implementation of the provisions of RA No. 6685 and PA No. 9710 or the Magna Carta of Women
DPWH DO No. 116 series of 2018	It prescribes tree cutting and earth-balling permit application process and requirements for DPWH infrastructure projects

Source: JICA Study Team

13.6.6 Regulations on Social Environment

(1) Land Acquisition and Resettlement

Table 13.6-10 presents the major laws and regulations for land acquisition and resettlement.

Table 13.6-10 Major Laws and Regulations for Land Acquisition and Resettlement

Reference	Provisions/Description
The Philippines Constitution (1987)	It prohibits to acquire life, free and assets for the public purpose without just compensation. It also stipulates that urban or rural poor dwellers shall not be evicted nor their dwelling demolished except in accordance with law and in a just and human manner.
RA 7160 Local Government Code of 1991	It prohibits to conduct land acquisition unless a valid and defined offer has been previously made to the owner and such offer was not accepted. It allows LGUS to adopt provisions in the ROW acquisition. LGUs may immediately take possession of the property upon the filing of the expropriation proceedings and upon making a deposit with the proper court of at least 15% of the fair market value of the property based on the current tax declaration of the property to be expropriated. The remaining amount to be paid for the expropriated property shall be determined by the proper court, based on the fair market value at the time of the taking of the property.
RA 7279 Urban Development and Housing Act	It stipulates the following: ➢ to improve the conditions of the underprivileged and homeless citizens in urban areas and in resettlement areas by making available to them decent housing at affordable cost, basic services, and employment opportunities. ➢ to provide for an equitable land tenure system that shall guarantee security of tenure to Program beneficiaries but shall respect the rights of small property owners and ensure the payment of just compensation. ➢ to allow eviction or demolition in case: i) persons or entities occupy danger areas and other public places such as sidewalks, roads, parks and playgrounds, ii) when the government infrastructure projects with available funding are about to be implemented, or iii) when there is a court order for eviction and demolition. ➢ to develop socialized housing or resettlement areas with basic services and facilities by the local government unit or NHA in cooperation with the private developers and concerned agencies
RA 10752 An Act Facilitating the Acquisition of Right-of-Way Site or Location for National Government Infrastructure Projects	It stipulates the order of land acquisition for the public purpose. In case acquisition of private land is required for the public purpose, Donation, Negotiated Sale, Expropriation and others are mentioned as the applicable methods of land acquisition. As for Negotiated Sale, assessment of compensation amount based on market value of land, replacement cost of structures and market value of crops and trees by the licensed valuator is stipulated. If the landowner refuses the offer of compensation amount or does not prepare the necessary documents for compensation payment within 30 days, the project proponent will request the court to implement Expropriation. It stipulates that the government through Housing and Urban Development Coordination Council and the National Housing Authority develop the resettlement site for the informal setters in coordination with LGUs and the project proponents.
IRR of RA 10752 (2016)	The IRR was drafted and approved by an Inter-Agency Committee headed by DPWH and was issued as DPWH Memorandum Circular No. 23 series of 2016 and became effective on 07 August 2016.
DPWH DO No.152 (2017)	This DO directs the use of the DPWH ROW Acquisition Manual (DRAM) dated December 8, 2017, superseding DPWH DO No. 124 series of 2017.
DPWH Land Acquisition, Resettlement, Rehabilitation and Indigenous Peoples Policy (LARRIPP) (2007)	This is the DPWH legal framework governing involuntary acquisition of land, structures, crops, and other assets due to implementation of infrastructure projects. It enumerates the entitlements and benefits what the Project Affected Families (PAFs) or Project Affected Persons (PAPs) should rightfully receive. It expounds on safeguards to be followed when the PAPs are Indigenous Peoples (IPs), living inside and outside an officially declared ancestral domain. Further, it delineates the institutional framework for the implementation of the policy and provides mechanisms for monitoring and evaluation.
DPWH	In accordance with the provisions of Section 18 of the IRR of RA 10752, DPWH ROW

Reference	Provisions/Description
DO No. 124 (2017) Right-of-Way Acquisition Manual (DRAM)	Acquisition Manual (DRAM) was prepared with the purpose below. ➢ To provide a working guide of the DPWH on the rules, procedures, and formats to be used by its different offices involved in ROW acquisition ➢ To serve as reference for property owners and PAPs on the rules and processes in ROW acquisition, including their basic rights and obligations ➢ To guide other concerned government entities and Official Development Assistance (ODA) Agencies - on ROW aspects that entail their active participation ➢ To provide reference for concerned Government Financial Institutions (GFIs) and Independent Property Appraisers (IPAs) in undertaking the appraisal of property needed for ROW
DPWH DO No.5 (2003)	Created the Infrastructure Right of Way (IROW) and Resettlement Project Management Office (PMO) and implemented the improved IROW Process. As policy, all projects that will require IROW acquisition shall formulate a Land Acquisition and Resettlement Action Plan (LAPRAP).
DPWH DO No. 327 (2003)	Specifies the guidelines in preparing the LAPRAP for Infrastructure Projects to ensure the equitable provision of just compensation for land, including structures and/or improvements, acquired for IROW.
Executive Order (EO) 1035 (1985)	Provides procedures and guidelines for the expeditious acquisition of private real properties for infrastructure and other government development projects. It outlines the Financial Assistance to displaced tenants, cultural minorities and settlers equivalent to the average annual gross harvest for the last three (3) years and not less than PhP 15,000.00 per hectare. In case agreement is not reached in the negotiation of the sale of the land, the government has the right to immediately institute expropriation proceedings.
EO 113 (1955) and EO 621 (1980)	These Executive Orders state that national roads shall have a ROW of at least 20 meters in rural areas which may be reduced to 15 meters in highly urbanized areas. ROW shall be at least 60 meters in Unpatented Public Land and 120 meters through natural forested areas of aesthetic or scientific value.
PD 635 (1975)	Amended Section 112 of CA 141 increasing the width of the reserved strip of twenty (20) meters to sixty (60) meters.
CA 141 The Public Land Act (1936)	Section 112 prescribes a twenty (20)- meter strip of land reserved by the government for public use with damages being paid for improvements only.

Source: The Republic of the Philippines / DPWH Laws & Politics

(2) Policy for Compensation and Assistance

Based on the results of gap analysis in **Table 13.6-13** and compensation polices generally for projects in the transportation sector funded by international donors, the principle of policy for compensation and assistance is illustrated below.

- Involuntary resettlement and loss of means of livelihood are to be avoided or minimized as much as possible by exploring all viable alternatives.
- People to be relocated will be provided sufficient compensation for loss of their own fixed property and income. In case that land to be used by the Project belongs to the government or national authorities, land compensation is not provided to people using land in the project area.
- Compensation is provided in full replacement cost in timely manner by holding consultation with people in the project area.
- Support for appropriate transition period will be provided for eligible PAPs.
- Additional support for eligible vulnerable PAPs will be provided as necessary.

(3) Other Relevant Laws and Regulations on Social Environment

Table 13.6-11 presents the other laws and regulations on social environment.

Table 13.6-11 Other Relevant Laws and Regulations

Category	Title
Gender and Human Rights	➢ The Philippine Constitution (1987), Article II ➢ RA No. 9710 (2009), The Magna Carta for Women
Historical/Cultural Heritage	➢ RA No. 10066 (2009), The National Cultural Heritage Act
Indigenous People and Ancestral Domain	➢ RA No. 8371 (1997), Indigenous Peoples Rights Act ➢ NCIP AO No. 1 series of 1998, IRR of RA No. 8371 ➢ NCIP AO No. 1 series of 2004, Guidelines on the Formulation of the Ancestral Domain Sustainable Development Protection Plan ➢ NCIP AO No. 1 series of 2006, The Free and Prior Informed Consent Guidelines of 2006 ➢ NCIP AO No. 3 series of 2012, Revised Guidelines on Free and Prior Informed Consent and Related Processes

Source: JICA Study Team

13.6.7 Gap Analysis between JICA Guidelines and Regulations in the Philippines

(1) Gap Analysis between JICA Guidelines and Philippine EIS Regulations

Table 13.6-12 shows the result of gap analysis between JICA Guidelines and EIS regulations in the Philippines.

Table 13.6-12 Gap Analysis between JICA Guidelines and Philippine Regulations

No.	JICA Guidelines	Legislation of the Philippines	Major Gap and Policy Adopted
Principle	Environmental impact must be assessed and examined from the earliest possible planning stage. Alternatives or mitigation measures to avoided or minimize adverse impact must be examined and incorporated into the project plan.	The Philippine Environmental Impact Statement System (PEISS) requires the project proponent to examine possible impact and to conduct scoping in the pre-feasibility study stage. In addition, PEISS requires to conduct alternative study at the feasibility study stage.	No significant gap
Information Disclosure	➢ EIA reports (which may be referred to differently in different system) must be written in the official language or in a language widely used in the country in which the project is to be implemented. When explaining projects to local residents, written materials must be provided in a language and form understandable to them. ➢ EIA reports are required to be made available to the local residents of the country in which the project is to be implemented. The EIA reports are required to be available at all times for perusal by project stakeholders, such as local residents and copying	EIA report is prepared in English which is the common language in the Philippines. In addition, in the EIA report, Project Fact Sheet is prepared by mixing the language which is familiar with the local communities.	No significant gap

No.	JICA Guidelines	Legislation of the Philippines	Major Gap and Policy Adopted
	must be permitted.		
Consultation	➢ For projects with a potentially large environmental impact, sufficient consultations with local stakeholders, such as local residents, must be conducted via disclosure of information at an early stage, at which time alternatives for project plans may be examined. The outcome of such consultations must be incorporated in project plans. ➢ In preparing EIA reports, consultations with stakeholders, such as local residents, must take place after sufficient information has been disclosed. Records of such consultations must be prepared. ➢ Consultations with relevant stakeholders, such as local residents, should take place if necessary throughout the preparation and implementation stages of a project. Holding consultations is highly desirable, especially when the items to be considered in the EIA are being selected, and when the draft report is being prepared.	The revised procedural manual (2008) stipulates to conduct the activities listed below. ✓ Information, education and communication (IEC) activities ✓ Public scoping ✓ Participation of local stakeholders ✓ Holding public hearing ✓ Sharing ECC and EIA reports Prior to holding public hearing or consultation meetings, EIA report shall be available at the EMB office and the local government office in which the project is located.	No significant gap
Impacts to be Assessed	➢ The impacts to be assessed with regard to environmental and social considerations include impacts on human health and safety, as well as on the natural environment, that are transmitted through air, water, soil, waste, accidents, water usage, climate change, ecosystems, fauna and flora, including trans-boundary or global scale impacts. These also include social impacts. In addition to the direct and immediate impacts of projects, their derivative, secondary, and cumulative impacts as well as the impacts of projects that are indivisible from the projects are also to be examined and assessed to a reasonable extent. It is also desirable that the impacts that can occur at any time throughout the project cycle should be considered throughout the life cycle of the project.	Items below are required to be assessed and to be included in EIS report. Land (land use, geology, topography, soil, land organisms), water (hydrology including groundwater, ocean, water quality, freshwater and marine organisms), air (including climate change, air quality, noise), people (relocation, migration, indigenous people, public health, community contribution, basic services and resource distribution, transportation, regional environmental management, affected regional assets),	No significant gap in the evaluation items and contents. However, environmental standards are not established for soil, sediment and vibration.
Monitoring	➢ Project proponents etc. should make efforts to make the results of the monitoring process available to local project stakeholders. ➢ When third parties point out, in concrete terms, that environmental	The project proponent who obtained the ECC shall submit the Compliance Monitoring Report (CMR) semiannually and the Self-Monitoring Report (SMR) quarterly to the	No significant gap

No.	JICA Guidelines	Legislation of the Philippines	Major Gap and Policy Adopted
	and social considerations are not being fully undertaken, forums for discussion and examination of countermeasures are established based on sufficient information disclosure, including stakeholders' participation in relevant projects. Project proponents etc. should make efforts to reach an agreement on procedures to be adopted with a view to resolving problems.	EMB. In addition, as a monitoring by the third party, MMT shall submit Compliance Monitoring and Validation Report (CMVR) to the EMB semiannually. These are the targets of information disclosure.	
Ecosystem and Biota	Projects must not involve significant conversion or significant degradation of critical natural habitats and critical forests.	Implement a project in the protected area is not precisely stipulated in the regulations. However, endorsement from PAMB is required in the process of EIS appraisal to implement a project in the environmentally critical areas.	There is no precise provision to prohibit a project in the environmentally critical areas. Accordingly, JICA Guidelines shall be applied. It is necessary to confirm the location of the protected area and to avoid traversing the project alignment along this protected area as much as possible.
Indigenous People	Any adverse impacts that a project may have on indigenous peoples are to be avoided when feasible by exploring all viable alternatives. When, after such an examination, avoidance is proved unfeasible, effective measures must be taken to minimize impacts and to compensate indigenous peoples for their losses.	For a plan or a project which may cause impact to the area of indigenous people, holding Free, Prior and Informed Consent (FPIC) procedure is required to protect opinion and rights of indigenous people.	There is no precise provision of avoidance or minimization of impact to the indigenous people to be caused by the project although the protection of indigenous peoples' rights is stipulated. Accordingly, the JICA Guidelines shall be applied. Confirming the areas of the ancestral domain is necessary.

Source: JICA Study Team

(2) Gap Analysis between JICA Guidelines and Philippine Land Acquisition Regulations

Table 13.6-13 shows the result of gap analysis between JICA Guidelines and land acquisition regulations in the Philippines. Since this is a master plan study, hence, the Resettlement Action Plan (RAP) for each project listed in the plan is no longer part of the study. "Policies on Resettlement for the Project" shall be the guidelines in the preparation of RAP for each project which shall be undertaken before the implementation of each project.

Table 13.6-13 Gap Analysis between JICA Guidelines and the Philippine Regulations

No	JICA Guidelines and World Bank OP 4.12	Legislations of the Philippines	Major Gap	Policies on Land Acquisition for a Project under the Master Plan
1	Involuntary resettlement and loss of means of livelihood are to be avoided when feasible by exploring all viable alternatives. (JICA GL)	➢ No person shall be deprived of life, liberty, or property, nor shall any person be denied the equal protection of the laws (Constitution of the Republic of the Philippines, Article III, Section 1). ➢ The project shall be evaluated from finance, economy, technology, social and institutional aspects. As for technology and social aspects, environmental impact and land acquisition shall be checked. (ICC*1 Project Evaluation Procedures and Guidelines, Sections 8 to 10, Annex E and F)	The laws do not precisely stipulate to examine alternatives. However, the constitution or ICC guidelines have similar principle.	Each project needs to explore viable alternatives during the Feasibility Study.
2	When population displacement is unavoidable, effective measures to minimize impact and to compensate for losses should be taken. (JICA GL)	➢ Private properties shall not be taken for public purpose without appropriate compensation. (Constitution of the Republic of the Philippines, Article II, Section 9). ➢ Government must hold a series of discussions with the PAPs (RA7279, Section 23)	No significant gap	In the process of preparing RAP, the following evaluations are necessary. ➢ Impacts of the project to the project affected families, ➢ Formulating entitlements and compensation for the losses incurred in terms of land, structures, improvements and crops and trees.
3	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. (JICA GL)	➢ Private property shall not be taken for public use without just compensation. (Constitution of the Republic of the Philippines, Article II, Section 9). ➢ Informal setters shall be provided resettlement site only if they qualify. Resettlement site will be developed with coordination among National Housing Authority, local government unit and the project	There is no significant gap since LARRIPP mentions livelihood/income restoration, although it has some limitations.	Each project needs to consider the followings in the process of RAP preparation. ➢ Allowance for loss of income source or disturbance ➢ Planning income restoration program, such as providing

No	JICA Guidelines and World Bank OP 4.12	Legislations of the Philippines	Major Gap	Policies on Land Acquisition for a Project under the Master Plan
		proponent. (RA7279 Section 16) ➢ For loss of business/income, the project affected persons will be entitled to an income rehabilitation assistance not to exceed PhP 15,000 for severely affected structures, or to be based on the latest copy of the tax record for the period corresponding ,to the stoppage of business activities. (DPWH LARRIPP*2 Chapter 3)		vocational training.
4	Compensation must be based on the full replacement cost, as much as possible. (JICA GL)	To determine the appropriate price offer, the implementing agency may engage the services of a government financial institution with adequate experience in property appraisal, or an independent property appraiser accredited by the Bangko Sentral ng Pilipinas (BSP) or a professional association of appraisers recognized by the BSP to be procured by the implementing agency under the provisions of Republic Act No. 9184 ➢ Land：the current market price ➢ Structure：replacement cost for structure and other assets ➢ Crops and Trees：the current market price (RA10752 Section 5)	No significant gap	Each project shall consider compensation in full replacement cost.
5	Compensation and other kinds of assistance must be provided prior to displacement. (JICA GL)	➢ Land：To be paid 50% of the negotiated price of the affected land, and the balance will be paid when the transfer of land title or annotation of a deed of sale on the title is completed. ➢ Structures and Other Improvement, Crops, Trees: To be paid 70% of the negotiated price of affected assets, and the balance will be paid when the land is cleared. (RA10752 Section 5)	There is difference on timing of compensation payment.	Each project needs to provide compensation and assistance prior to implementation of projects and physical displacement in accordance with JICA Guidelines and referring to regional practice.
6	For projects that entail large-scale involuntary	➢ The implementing agency shall prepare land acquisition	The laws do not stipulate disclosure of RAP but the	Each project needs to prepare either RAP or

No	JICA Guidelines and World Bank OP 4.12	Legislations of the Philippines	Major Gap	Policies on Land Acquisition for a Project under the Master Plan
	resettlement, resettlement action plans must be prepared and made available to the public. (JICA GL)	and resettlement plan for the project funded by the government. (ICC Guidelines and Procedure Annex B) ➢ Resettlement Action Plan will be prepared as per the project stage, and it will be finalized and disclosed at the detailed design stage. (DPWH DO*[3] No. 152 series of 2017)	DPWH internal regulation mentions to disclose RAP at the detailed design stage.	Abbreviated RAP in accordance with the scope of land acquisition impact. In addition, it shall be made to the public in accordance with the JICA Guidelines.
7	In preparing a resettlement action plan, consultations must be held with the affected people and their communities based on sufficient information made available to them in advance. (JICA GL)	➢ The implementing agency with assistance of local government and the office of Media Affairs shall conduct the extensive public information campaign among the local inhabitants that shall be affected by the project to acquaint them with the objectives and benefits to be delivered from the project. (EO 1035 Section 3) ➢ Consultation meetings shall be held at each barangay that will be traversed by the project. (DPWH DO No. 152 series of 2017)	No significant gap	Each project shall hold public consultation meetings by enhancing participation of project affected families in timely manner. In addition, comments raised during the consultation meetings shall be incorporated into the RAP.
8	When consultations are held, explanations must be given in a form, manner, and language that are understandable to the affected people. (JICA GL)	All information on the project must be made public in a language and form easily understandable to the people. (DENR AO No. 37 series of 1996 Section 4)	No significant gap	Each project shall pay attention to the language to be used when public consultation meetings will be held.
9	Appropriate participation of affected people must be promoted in planning, implementation, and monitoring of resettlement action plans. (JICA GL)	➢ The implementing agency with assistance of local government and the office of Media Affairs shall conduct the extensive public information campaign among the local inhabitants that shall be affected by the project to acquaint them with the objectives and benefits to be delivered from the project. (EO 1035 Section 3)	No significant gap	Each project shall enhance participation of project affected families in RAP preparation and monitoring.
10	Appropriate and accessible grievance mechanisms must be established for the affected people and their communities. (JICA GL)	➢ Resolution of issues by Alternative Dispute Resolution (ADR) by the neutral third party is recommended. (RA9285 Section 2)	No significant gap	RAP for each project shall be prepared in consultation with project affected persons, and grievance redress

No	JICA Guidelines and World Bank OP 4.12	Legislations of the Philippines	Major Gap	Policies on Land Acquisition for a Project under the Master Plan
		➢ The grievance shall be filed by the PAP with the Resettlement Implementation Committee*4 (RIC) who will act within 15 days upon receipt thereof, 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 after registry of the complaint, he/she can appeal to the concerned Regional Office, which should act on the complaint/grievance within 15 days from the day of its filing. If the PAP is not satisfied with the decision of the Regional Office, he/she, as a last resort, can submit the complaint to any court of law (DPWH LARRIPP Chapter 6)		mechanism shall be well informed to the affected people and communities at the time of consultation meeting in the process of RAP preparation. Project affected persons shall be involved in the monitoring process as a member of CRIC which will monitor entire RAP activities.
11	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 or others who wish to take advantage of such benefits. (WB OP4.12 Para.6)	The first day of census is regarded as the cut-off date to define eligibility and affected assets. (DPWH DO No. 152 series of 2017)	No significant gap	Census, socio-economic survey and asset inventory shall be conducted to identify the affected people and assets when the road right-of-way will be fixed.
12	Eligibility of benefits includes, the PAPs who have formal legal rights to land (including customary and traditional land rights recognized under the law), the PAPs who don't have	All owners of structures and improvements who do not have legally recognized rights to the land, and who meet all of the following criteria shall be provided compensation for structures and improvements:	Informal setters who do not satisfy the conditions will not be eligible for compensation.	Entitlement for both formal and informal setters shall be examined through the conduct of census and socio-economic survey.

No	JICA Guidelines and World Bank OP 4.12	Legislations of the Philippines	Major Gap	Policies on Land Acquisition for a Project under the Master Plan
	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. (WB OP4.12 Para.15)	➢ Must be a Filipino citizen ➢ Must not own any real property or any other housing facility, whether in an urban or rural area ➢ Must not be a professional squatter or a member of a squatting syndicate, as defined under RA 7279 (RA10752 Section 5) Informal settlers who satisfy the conditions below shall be provided the resettlement site. ➢ Must be a Filipino citizen ➢ Must be an underprivileged and homeless citizen ➢ Must not own any real property whether in the urban or rural areas ➢ Must not be a professional squatter or a member of a squatting syndicate, as defined under RA 7279 (RA7279 Section 16, RA10752 Section 9)		
13	Preference should be given to land-based resettlement strategies for displaced persons whose livelihoods are land-based. (WB OP4.12 Para.11)	Land swapping if feasible, 'land for land', will be provided in terms of a new parcel of land of equivalent market value, at a location acceptable under zoning laws, or a plot of equivalent value, whichever is larger, in a nearby resettlement area with adequate physical and social infrastructure. (DPWH LARRIPP Chapter 3)	There is no precise description on preference of land-based resettlement strategy.	Appropriate compensation methods, including land swapping as one of options if it is feasible and practical, shall be examined by due consultation with PAPs, LGUs and concerned authorities.
14	Provide support for the transition period (between displacement and livelihood restoration). (WB OP4.12 Para.6)	➢ House tenants of severely affected: Equivalent to 1 month rent of a similar structure within the same area ➢ Shop owners of severely affected: Computed income loss during demolition and reconstruction of their shop but not to exceed 1 month period（DPWH DO No. 327 series of 2003）	No significant gap	Each project shall consider the following: ➢ Provide sufficient time of relocation to project affected persons ➢ Provide appropriate compensation and income restoration program for loss of income source ➢ Provide monetary support for shop owners

No	JICA Guidelines and World Bank OP 4.12	Legislations of the Philippines	Major Gap	Policies on Land Acquisition for a Project under the Master Plan
				corresponding to the number of days of business stoppage
15	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. (WB OP4.12 Para.8)	➢ Protect human rights, culture and land of indigenous people. (RA8371 Section 2） ➢ Provide opportunities of vocational training (DO No. 327 series of 2003） ➢ Provide appropriate assistance to socially vulnerable groups (DPWH LARRIPP Chapter 2)	No significant gap	Socially vulnerable households shall be identified through the preparation of RAP. Rehabilitation assistance to them shall be examined based on their needs, which shall be confirmed through the census/socio-economic survey or consultation meetings in the process of RAP preparation.
16	For projects that entail land acquisition or involuntary resettlement of fewer than 200 people, abbreviated resettlement plan is to be prepared. (WB OP4.12 Para.25)	Abbreviated Resettlement Action Plan shall be prepared according to the conditions mentioned below. ➢ Numbers of affected persons are less than 200 ➢ In case the number of affected persons are more than 200, physical displacement is not caused or scale of land acquisition is small. (DPWH LARRIPP)	No significant gap	Refer to No. 6.

**1: ICC (Investment Coordination Committee) Guidelines and Procedures, Revised as of 4 March 2005*
**2: DPWH Land Acquisition, Resettlement, Rehabilitation and Indigenous Peoples Policy (LARRIPP) (2007)*
**3: DPWH Department Order (DO) No.152 (2017)*
**4: Major roles and members of RIC are summarized in Table 13.7-3.*
Source: JICA Study Team

(3) Gap Analysis between JICA Guidelines and IPP Regulations in the Philippines

Table 13.6-14 shows the result of gap analysis between JICA Guidelines and regulations on Indigenous Peoples (IPs) in the Philippines. Since Indigenous Peoples Plan (IPP) for each project is not part in the master plan preparation stage, "Policies on IPP for the Project" shall be used as the guidelines in the conduct of IPP for each project before the implementation phase.

Table 13.6-14 Gap Analysis between JICA Guidelines and Philippine Regulations

No	JICA Guidelines and World Bank OP 4.10	Legislation of Philippines	Major Gap	Policies on IPP for a Project under the Master Plan
Objective	Any adverse impacts that a project may have on indigenous people are to be avoided when feasible by exploring all viable alternatives. When, after such examination, avoidance is unfeasible, effective measures must be taken to minimize impacts and to compensate indigenous peoples for their losses.	➢ The right of Indigenous Cultural Communities/Indigenous Peoples (ICCs/IPs) to introduction or implementation of plans, programs, project activities that will affect them/the ancestral domains shall be protected. (NCIP AO 3 2012, Sec. 2) ➢ In case a project causing negative impact to the ancestral domain area, a project proponent is requested to submit the document including mitigation measures. (NCIP AO 3 2012, Sec. 7)	The laws do not precisely stipulate to examine alternatives.	Examination of the routes to avoid the AD area at the feasible level.
Indigenous Peoples Plan	For some Category A projects that will require necessary measures for indigenous people, an IPP must be submitted. It is desirable that the IPP include the elements laid out in the World Bank Safeguard Policy, OP4.10, Annex B. JICA's funding of projects is provided to a financial intermediary or executing agency; the selection and appraisal of the sub-projects is substantially undertaken by such an institution only after JICA's approval of the funding. In such cases, JICA examines the related financial intermediary to see whether appropriate environmental and social considerations as stated in the guidelines are ensured for projects in this category. JICA also examines institutional capacity in order to confirm environmental and social	➢ Memorandum of Agreement (MOA) is prepared in the process of FPIC. Major items to be included in MOA are shown below: ✓ Benefit-sharing provisions ✓ Development projects ✓ Monitoring of implementation of MOA ✓ Mitigation and resettlement plans for potential risks ✓ Redress mechanisms (NCIP AO 3 2012, Sec. 32) ➢ Indigenous People Action Plan (IPAP) including social assessment and measures is required to be prepared if an infrastructure project has potential adverse effect to Indigenous People. (LARRIP)	Although there is no precise description on the preparation of IPP in the Philippine regulations, MOA is considered similar to IPP and LRA mentioned in the preparation of IPAP. Thus, there is no significant gap.	Preparing IPP in case a project will traverse the AD area or affect indigenous people.

No	JICA Guidelines and World Bank OP 4.10	Legislation of Philippines	Major Gap	Policies on IPP for a Project under the Master Plan
	considerations of the financial intermediary.			
Free, prior, and informed consultation.	When projects may have adverse impacts on indigenous peoples, efforts must be made to obtain the consent of indigenous peoples in a process of free, prior, and informed consultation.	➢ The right of ICCs/IPs to Free and Prior Informed Consent (FPIC) shall be ensured. (NCIP AO 3 2012, Sec. 2) ➢ A project proponent and ICCs/IPs shall conduct 2 times of community assemblies to enhance understanding of a project and to have opinion exchange about any concerns. After the 2nd community assembly, the ICCs/Ips shall provide their opinion to about the project (NCIP AO 3 2012, Sec 22)	No significant gap	Applying FPIC in case a project will traverse the AD area or affect indigenous people.
Disclosure	Prior to its environmental review, JICA shall disclose IPPs for projects that address issues of indigenous people. Measures for the affected indigenous peoples must be prepared as an IPP and must be made public in compliance with the relevant laws and ordinances of the host country.	➢ Full disclosure of records and information relevant to the plan, program, project or activity. (NCIP AO 3 2012, Sec. 21)	Although disclosure of IPP or IAPA is not precisely stipulated, project related document is disclosed. Thus, there is no significant gap.	Disclosing project related information in timely manner.
Grievance procedures	Appropriate and accessible grievance mechanisms must be established for the affected people and their communities.	➢ Any complaint involving the interpretation and implementation of the MOA shall be resolved first in the community using their traditional conflict resolution process. If the complaint is not resolved using the customary system, the complaint shall be filed with the appropriate NCIP Regional Hearing Office (RHO) for disposition. The decision of the RHO may be appealed in accordance with the	No significant gap	Examining the appropriate grievance procedure by confirming the existing problem-solving mechanism.

No	JICA Guidelines and World Bank OP 4.10	Legislation of Philippines	Major Gap	Policies on IPP for a Project under the Master Plan
		provisions of Administrative Circular No. 1, Series of 2003. (NCIP AO 3 2012, Sec. 37)		
Monitoring	After projects begin, project proponents, etc. monitor whether any unforeseeable situations occur and whether the performance and effectiveness of mitigation measures are consistent with the assessment's prediction. They then take appropriate measures based on the results of such monitoring.	➢ NCIP in partnership with LGUs and CSOs conducts monitoring on MOA implementation. (NCIP AO 3 2012, Sec. 32)	No significant gap	Examining the monitoring methods and procedure referring to the similar cases of other projects.

Source: JICA Study Team

13.7 Roles and Responsibilities of Relevant Agencies

13.7.4 Environment

Table 13.7-1 shows the major roles and responsibilities on PEISS and protected area.

Table 13.7-1 Major Roles and Responsibilities of Relevant Agencies

Agencies	Major Roles and Responsibilities
Environmental and Social Safeguards Division (ESSD) in DWPH	➢ Assist the project proponent in the conduct of Initial Environmental Assessment; conduct of Information, Education and Communication (IEC) and Public Scoping for stakeholders participation; and the conduct of Technical Scoping to be convened by DENR- EMB. ➢ Assist the project proponent in the conduct of data gathering. such as water, air and noise sampling and testing. ➢ Assist the project proponent in the conduct of Public Hearing during the substantive review of the EIS Report. ➢ Monitoring of Environmental Compliance of all DPWH infrastructure projects. ➢ Conduct/Assist in environmental monitoring in compliance with the Environmental/Impact Management Plan (E/IMP) and Environmental Compliance Certificate (ECC) conditions of the project.
DENR Central Office (CO)	This is the responsible authority for protection, management, development and use of environment and natural resources. Major roles and responsibilities are presented below: [Central Office] ➢ Prepare and implement policy, guidelines and regulations related to environmental management and pollution control ➢ Prepare, implement and supervise management, protection, development use and supplement natural resources and biodiversity ➢ Promulgate and implement regulations related to survey, develop, collection, disposal and use of natural resources [Regional Office] There are 16 DENR regional offices. DENR RO is responsible for protection, management, development and use of environment and natural resources at regional level.
Environment Management Bureau (EMB) of DENR	[Central Office] ➢ Responsible for environmental management, environmental protection and pollution control at national level ➢ Review and approve the EIS report for the Category A project and issue ECC [Regional Office] ➢ Responsible for environmental management, environmental protection and pollution control at regional level ➢ Review and approve the EIS report for the non-Category A project and issue ECC
Provincial Environment and Natural Resources Office (PENRO)	PENRO is placed at each province for protection, management, development and use of environment and natural resources at provincial level.
Community Environment and Natural Resources Office (CENRO)	CENRO is placed in a province for protection, management, development and use of environment and natural resources at city or village level.

Agencies	Major Roles and Responsibilities
Protected Area Management Board (PAMB)	This is the inter-agency organization required to be established by DAO No. 25 1992. PAMB has the following roles and responsibilities: ➢ Administrate the established protected area. ➢ Approve proposal, work plans, action plans, guidelines, for management of the protected area in accordance with the approved management plan. ➢ Delineate and demarcate protected area boundaries buffer zones, ancestral domains, and recognize the rights and privileges of indigenous communities under the provision of DAO No. 25 1992. ➢ Promulgate rules and regulations to promote development program and projects on biodiversity conservation and sustainable development consistent with the management manual of the protected area. ➢ Ensure implementation of programs as prescribed in the Management Plan in order to provide employment to the people dwelling in and around the protected area. ➢ Control and regulate the construction, operation and maintenance of roads, trains, water works, sewage, fire protection and sanitation system and other utilities within the protected area.

Source: JICA Study Team

13.7.5 Social Environment

(1) Organization in DPWH

Table 13.7-2 shows the major roles and responsibilities of concerned departments in DPWH on land acquisition and resettlement.

Table 13.7-2 Major Roles and Responsibilities of DPWH on Land Acquisition

Agencies	Major Roles and Responsibilities
Unified Project Management Office (UPMO-RMC 1)	➢ Responsible for implementation of a project including supervision, management and coordination with relevant agencies ➢ Prepare, update and validate RAP including budget arrangement for implementing RAP ➢ Establish RIC by preparing MOU with concerned agencies
UPMO (RMC-1)-ROW Task Force	➢ Supervise land acquisition and monitor progress ➢ Review the validation of documents undertaken by TWG ➢ Process of compensation payment
ROW Technical Working Group (TWG)	➢ Check documents for compensation payment ➢ Check compensation calculation
ESSD in DWPH	➢ Assist UPMO to prepare and update RAP including budget plan ➢ Assist UPMO to coordinate with NCIP and DPWH Regional Office in preparing MOA for affected domains ➢ Assist UPMO to monitor compensation payment
DPWH Region Office	➢ Assist UPMO to implement a project ➢ Assist UPMO to secure ROW including activities of land acquisition and resettlement ➢ Assist UPMO to prepare and validate project affected persons and assets ➢ Assist UPMO on compensation payment to affected persons

Source: JICA Study Team

(2) Organization in Local Government

Table 13.7-3 shows the major roles and responsibilities on land acquisition and other social environment at concerned authorities.

Table 13.7-3 Major Roles and Responsibilities of Relevant Agencies

Agencies	Major Roles and Responsibilities
1. Land Acquisition and Resettlement	
Local Government Units (LGUs)	➢ Coordinate with NHA and other concerned agencies to develop resettlement site including basic facility and service and to provide livelihood program
Resettlement Implementation Committee (RIC)	The RIC is composed of City/Municipality, DPWH, affected barangays, representatives of affected families, NGOs and other concerned agencies. It will be organized through a Memorandum of Understanding (MOU) among DPWH, concerned LGUs and Provincial or Regional offices and will have specific functions presented below: ➢ Assist the DPWH staff in (a) validating the list of PAFs; (b) validating the assets of the PAFs that will be affected by the project (using a prepared Compensation Form); and (c) monitoring and implementing land acquisition and relocation; ➢ Assist the DPWH staff engaged in public information campaign, public participation and consultation; ➢ Assist DPWH in the payment of compensation to PAFs; ➢ Receive the complaints and grievances from PAFs and other stakeholders; and act accordingly; ➢ Maintain a record of all public meetings, complaints and actions taken to address complaints and grievances; and ➢ Assistance in the enforcement of laws/ordinances regarding encroachment into the project site or ROW.
National Housing Authority (NHA) Regional Office	➢ Develop resettlement sites including basic facility and service for informal setters in corroboration with LGUs and the project proponents
2. Indigenous People	
National Committee for Indigenous People (NCIP) Regional Office	➢ Protect benefit of indigenous people ➢ Protect and improve livelihood of indigenous people ➢ Implement laws and regulations related to indigenous people ➢ Coordinate with concerned agencies to support indigenous people
3. Social Welfare	
Department of Social Welfare and Development (DSWD) Regional Office	➢ Provide livelihood assistance and training programs ➢ Provide social service and programs for the socially vulnerable groups

Source: JICA Study Team

13.8 Alternative Examinations

13.8.4 "Without Project" Option

There are various factors to be considered in the formulation or development of a master plan of the transportation sector. One important factor would be the socio-economic development, including future population increase since transportation is the fundamental infrastructure to contribute for socio-economic development of a country.

As indicated in Chapter 6, Philippines has several economic sectors which characterize each region. In addition, there are total of 379 operating Special Economic Zone (SEZ) and 141 proclaimed SEZs in the Philippines. Approximately 33% of operating SEZs are located in NCR, and approximately 35% of proclaimed SEZs are located also in NCR. Although large numbers of operational/proclaimed SEZs are located in NCR, Chapter 6 analyzed that other places, such as Cagayan de Oro or Bulacan have started attracting SEZs. This is happening because investors are looking for alternative locations to avoid congestion in NCR.

In addition to the aforementioned economic trend, projection of future population in Metro Cebu, Metro Davao and New Clark City were considered large based on the projection result of the Philippine Statistic Authority (PSA).

Based on the economic trend and future population projection, strengthening of road network is indispensable for improvement of accessibility nationwide. Hence, transportation of commuters and goods among and between regions will be enhanced, and it would result to an effective production, supply and consumer value chains. In addition, strengthening the road network will create an opportunity of another development, such as improvement in the delivery of basic social services in more areas.

Without the masterplan which is the primary basis of development, the current situation may not change and even becomes worse. But, with a well-implemented masterplan, the aforementioned outcomes are expected to take place. Thus, "Without the Project" is not recommended based on the examination as shown in **Table 13.8-1**.

Table 13.8-1 Comparison of With/Without the Project

Aspect	Condition without the Project	Condition with the Project
Technical Aspect	- Current less connectivity among regions is unsolved. - Traffic congestion is unsolved.	- Future demand of traffic capacity in the area will be solved. - Transportation condition will improve.
Economic Aspect	- Distribution of goods and persons between areas may not flow smoothly with the current road network and traffic congestion.	- Improvement of traffic conditions and accessibility at the regions will contribute for economic and social development in the areas.
Environment /Social Consideration	- Impact on natural and social environment due to implementation of the Project will not occur. - There is a possibility of degradation of air quality due to increase of traffic volume and congestion.	- Impact on natural environment, such as cutting of trees due to the implementation of the Project will happen. - Land acquisition and resettlement will take place due to the implementation of the Project. - Improvement of the air quality condition may be expected due to smooth traffic flow. On the other hand, there is a possibility of increase in the number of vehicles. Thus, air quality along the road might get even worse than the current condition.

Source: JICA Study Team

13.8.5 Alternative Examinations

Alternative study was conducted to HSH Class-1 Network in 2040 from Overall HSH Network. The summary of alternative analysis and the detailed alternative study was described in **Section 13.4.11** and **Section 11.5.4**, respectively.

13.9 Preliminary Scoping

13.9.4 Procedure of Preliminary Scoping

Preliminary scoping was conducted for the entire master plan selected through examination of alternatives. The selected master plan projects include several types of High Standard Highways such as embankment, tunnel, flyover or a river bridge. In order to assess the likely significant environmental and social impacts, conceivable environmental and social impacts by the following general highway development activities were identified in consideration of the environmental and social conditions in the Philippines.

Affective activities by general highway development:	
Pre/ During Construction Phase	**Operation**
・ operation of construction machines and equipment ・ transportation of construction materials ・ traffic restriction ・ generation of construction wastes ・ land acquisition and excavation including tunnels	・ appearance / occupancy of highway structures ・ new traffic flow and usage of the new highways ・ increase influx of settlers and business activities

Since this project covers the whole country, the evaluation of this scoping is applied for a general highway project in the Philippines. When the potential impacts on pollution, natural environment, and social environment were expected due to the implementation of HSH project activities, the items are marked as "✓". Expected impacts shall be assessed based on the case that avoidance and mitigation measures are not taken.

[Evaluation of Scoping Stage]
✓ : *Some impacts are expected and/or impacts are not unknown at this moment, need more investigations.*

Blank: No impacts or impacts are negligible, no further study required.

13.9.5 Result of Preliminary Scoping

Preliminary scoping was carried out based on the possible impacts for a highway project, as shown in **Table 13.9-1**. These impacts were evaluated in each of the three stages separately, namely: Pre-Construction Stage [PCS], Construction Stage [CS], and Operation Stage [OS].

Marked items are required to conduct deep investigation and to study in the next stage based on the detailed project location and contents.

Table 13.9-1 Preliminary Scoping Matrix

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 in both land and sea areas including the soil runoff from the works of embankment and cutting, construction vehicles, camp yards may cause water pollution. [OS] Drainage from road structure, service/parking areas and the operation facilities, such as control centers may cause water pollution in water bodies including sea.
3	Waste	✓	✓	[CS] Construction waste, soil and trees to be cut may be generated through construction activities.

No	Item	Selection Status		Reasons for Selection
		PCS/ CS	OS	
				[OS] Waste from service/parking areas and the operation facilities, such as control centers will be generated.
4	Soil Contamination	✓		[CS] There is a possibility of soil contamination by oil leakage from the construction machines. In case the soil at project areas is already contaminated, the construction works may diffuse contaminated soil. [OS] Operation of roads, bridge and tunnel 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 a road, a bridge and a tunnel 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 with soft soil and other specific conditions. In addition, large-scale excavation or tunnel excavation may cause ground subsidence due to leakage from water bearing layers.
7	Offensive Odor	✓		[CS] There is a possibility of occurrence of offensive odor by construction activities. [OS] Operation of roads, bridge and tunnels 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 flown soil caused by earthwork. [OS] Operation of roads, bridge and tunnels may not cause bottom sediment, both directly and indirectly.
9	Protected Area	✓	✓	[CS] In case of projects traversing in or around the protected areas, construction works, such as cutting of trees or changing land use may cause impact to the protected area. [OS] Projects located inside or near the protected areas may cause negative impact due to operation of roads, bridge and tunnels (e.g. disturbance of the flora and fauna habitation due to car exhausts, roadkill due to vehicle traffic).
10	Ecosystem	✓	✓	[CS/OS] The project may cause impact on ecosystem including indicator species along the project site. Additionally, there is a possibility that the change of the surrounding atmosphere and environment, such air quality, noise/vibration and lighting, would influence the surrounding ecosystem.
11	Hydrology	✓	✓	[CS/OS] There is a possibility of changes in the hydrology because the project may cross some rivers.
12	Topography and Geology	✓		[CS] Topography might change caused by land cutting and filling works, land slide and erosion of land surface due to construction works. [OS] Operation of roads, bridge and tunnels 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, bridge, tunnels and other facilities/structures. [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. Livelihood of Informal Settler Families (ISFs) will be affected due to relocation. [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.

No	Item	Selection Status		Reasons for Selection
		PCS/ CS	OS	
16	Local Economy such as Employment and Livelihood	✓		[PCS] Land acquisition and resettlement may cause impact on livelihood. [CS] Employment opportunity can be created due to the construction of the project. [OS] No additional impact is expected during operation stage.
17	Land Use and Usage of Local Resources	✓	✓	[PCS] Land use and local resources, such as forests of the target areas for land acquisition may change. [OS] Projects may contribute rural development along the area with changes of land use.
18	Water Usage	✓	✓	[CS] River water may be affected by earthworks. In addition, existing social infrastructure including irrigation system or wells may be affected by land acquisition and construction. [OS] Operation of roads and bridge may cause impact on water usage both, directly and indirectly.
19	Existing Social Infrastructure and Services	✓	✓	[PCS/CS] Existing social infrastructure including irrigation system or wells may be affected by land acquisition and construction. [OS] New roads, bridge or tunnels may bring positive impact on exiting road networks around the area. On the other hand, 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	✓		[PCS/CS] Disadvantages due to physical diversion of a community caused by construction of a new road or bridge may effect on decision-making or socially- related capital.
21	Misdistribution of Benefit and Damage	✓		[PCS/CS] Construction of a new road or bridge may cause disadvantages originated from physical diversion of a community.
22	Local Conflicts of Interest	✓	✓	[CS] Conflict caused by imbalance between PAPs on land acquisition and those who may obtain job opportunities related to projects. [OS] Conflict caused by imbalance of development opportunity along the road
23	Cultural Heritage	✓	✓	[CS] Cultural heritage in and around the project area may need relocation due to the construction works. [OS]Vibration to be generated from traffic may cause impact to a cultural heritage in case a new road is constructed close to it.
24	Landscape	✓		[CS] There is a possibility of disturbance of landscape by the bridge or tunnels. [OS] Operation of roads, bridge and tunnels may not cause impact on landscape, both directly and indirectly.
25	Gender	✓		[CS] While construction generates positive impact on gender by providing work opportunities for both sexes, there is a possibility that working condition or wage may be different by gender. [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, travel time to schools and hospitals will become faster and safer.

No	Item	Selection Status		Reasons for Selection
		PCS/ CS	OS	
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 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 bridge may not cause impact on labor environment, 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] Significant deforestation is not expected in this project and construction period and areas are limited. [OS] Greenhouse Effect Gasses may increase due to newly generated traffic.

Project Stage; PC: Pre-Construction Stage, CS: Construction Stage, OS: Operation Stage
Impact Rating;
✓ :Some impacts are expected and/or impacts are not unknown at this moment, need more investigations.
Blank : No impacts or impacts are negligible, no further study required (under the general situation)
Source: JICA Study Team

13.9.6 Result of Preliminary Examination on Social Impact

In the process of Scoping, possible social impacts, framework for compensation policy and grievance redress mechanism were also examined. The examination results shall be utilized and developed in Pre-F/S and F/S stages.

(1) Necessity of Land Acquisition

The master plan includes projects for new road construction or upgrading of existing ones to the category of High Standard Highway. Land acquisition will need to be done for a project that will involve either new road construction or road upgrading. Therefore, land acquisition is a must activity for all projects listed in the master plan, regardless of effort to minimize land acquisition with due considerations to specific road design.

(2) Scope of Land Acquisition and Resettlement

As described in **Table 13.9-1** and **Section 13.7.3 (1)** above, land acquisition and resettlement is inevitable for implementing the projects listed in the master plan, although effort to minimize the impact, such as adjusting the alignment, is made. The detailed scope of impact on land acquisition and resettlement is not defined in this master plan since the specific design for each project has not been made yet. Thus, the scope of land acquisition and resettlement shall be examined in detail at the feasibility study phase.

Table 13.9-2 shows the framework of entitlement matrix generally applied for the projects listed in the master plan. It is prepared based on key principles, the outcome of gap analysis between international practices and laws and regulations in the Philippines and existing entitlement matrix formulated under DPWH projects. Each project in the HSH Development Master Plan is requested to develop its own entitlement matrix referring to this framework of entitlement matrix, the conditions of PAPs to be identified through field survey and comments from consultation meetings.

Table 13.9-2 Framework of 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 Title (TCT) or Tax Declaration (TD) showing 30 or more years of continuous possession (Tax Declaration may be legalized to full title)	• 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-generating activity.
		Holders of Certificates of Land Ownership Award (CLOA) Granted under the Comprehensive Agrarian Reform Act	• 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 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-generating 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 will apply as PAPs with OCT.
		PAPs without OCT, TCT or Tax Declaration	• Compensation on land improvement only.
		Holders of Free or Homesteads Patents and CLOA under Public Land's Act	• 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)	• 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).
		Holders of CLOA granted under the Comprehensive Agrarian Reform Act	

Type of Loss	Application	Entitled Persons	Entitlement
		Holders of Free or Homesteads Patents CLOA under CA 141 Public Lands Act	• 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)	• 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	• 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)	• Cash compensation for affected portion of the structure at 100 % replacement cost.
	Severely Affected	Renters and Rent-Free Occupants of Dwelling Structures	• 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)	• 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)	• 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)	• 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)	• Cash compensation for affected portion of the structure at 100% Replacement Cost.
3. Commercial Activity			
(1) Business	Severely Affected	Business Owner	• Rehabilitation assistance in the form of livelihood and skills training.

Type of Loss	Application	Entitled Persons	Entitlement
			• Administrative support to apply for 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	• 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	• Advance notice to the establishments. • Priority in employment during construction and operation stage of projects. • Rehabilitation assistance in the form of skill trainings equivalent to the amount of P15,000.00 per family, if their current means of livelihood is no longer viable in the relocation site, and the project affected families will have to engage in a new income generating activity.
4. Improvements			
(1) Other Non-Dwelling Structures	Severely or Marginally Affected	PAFs with or without TCT or TD	• Cash Compensation for the affected improvements at 100% Replacement Cost.
5. Crops, Trees, Perennials			
	Severely or Marginally Affected	Owners of crops, trees, perennials	• Cash Compensation for crops, trees, and perennials in full replacement cost.[1]
6. Graves			
		Owners of graves	• 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	• 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.

Type of Loss	Application	Entitled Persons	Entitlement
		Homeless, landless, underprivileged, informal occupants of public land, except professional squatters and squatting Syndicates) as defined in RA 7279	• 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	• 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 trees and crops are defined below:
For trees: 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.
DPWH DO No. 152 series of 2017 shows the procedure for appraisal of crops and trees. The appropriate method for appraising trees and crops in replacement cost based on the concept of World Bank OP 4.12 and DPWH DO No. 152 series of 2017 is necessary to be established.

Source: JICA Study Team

If the landowner is not the original patent holder and any previous acquisition of said land is not through a gratuitous title, this shall be subject for Donation and Negotiation. If the landowner is the original patent holder or the acquisition of the land from the original patent holder is through a gratuitous title, this shall be subject under the provision of CA 141 "Public Land Act" or Presidential Decree No. 635.

Under Sec. 112 of CA 141, a 20-meter strip of the property acquired under such law is reserved by government for public use with damages to improvements only. The 20 meters strip had subsequently been increased to 60 meters under PD 635, approved on January 7, 1975, amending Sec. 112 of CA 141. **Table 13.9-3** summarizes the types of land titles.

Table 13.9-3 Types of Land Titles

Land Title	Relevant Regulation	Description
Original Certificate of Title (OCT)	Public Act No. 6657 (namely, Comprehensive Agrarian Reform Law of 1988) RA1075	An OCT is issued as the first title of the ownership on the land.
Transfer Certificate of Title (TCT)	Public Act No. 6657 (namely, Comprehensive Agrarian Reform Law of 1988)	A TCT is issued when the land ownership is transferred from the first owner (OCT) to another person.
Tax Declaration (TD)	Public Act No. 6657 (namely, Comprehensive Agrarian Reform Law of 1988)	A TD is a property record of a traditional assessment document maintained by the provincial, city or municipal assessors. A TD shows the assessed values of the

Land Title	Relevant Regulation	Description
		property as the basis for collecting the real property tax.
Certificate of Land Ownership Award (CLOA)	Commonwealth Act (CA) No. 141 (namely, Public Land Act)	A CLOA is a document to show ownership of the land granted or awarded to the beneficiary by the Department of Agrarian Reform (DAR). It contains the restrictions and conditions provided for in the Comprehensive Agrarian Reform Law (CARL) and other applicable laws.
Holders of Free or Homesteads Patents	Commonwealth Act (CA) No. 141 (namely, Public Land Act)	Public lands suitable for agricultural purposes can be disposed through the following patents: [Free patents] Any natural-born citizen of the Philippines who is not the owner of more than twenty-four hectares and who since July fourth, nineteen hundred and twenty-six or prior thereto, has continuously occupied and cultivated, either by himself or through his predecessors-in-interest, a tract or tracts of agricultural public lands subject to disposition, or who shall have paid the real estate tax thereon while same has not been occupied by any person shall be entitled. [Homestead Patents] Any citizen of the Philippines over the age of eighteen years, or the head of a family, who does not own more than twenty-four hectares of land in the Philippines or has not had the benefit of any gratuitous allotment of more than twenty-four hectares of land since the occupation of the Philippines by the United States, may enter a homestead of not exceeding twenty-four hectares of agricultural land of the public domain. The applicant shall improve and cultivate at least one-fifth of the land applied for the period of not less than one or more than five years from and after the date of the application approval. In addition, the applicant shall reside continuously in the municipality where the land is located or adjacent for at least one year.

Source: JICA Study Team

(3) Grievant Redress Mechanism

1) Principles

A grievance redress mechanism is developed with a purpose of: i) ensuring easy access of PAPs and other parties involved into relocation activities to appeal issues on relocation issues, ii)

ensuring all complains related to relocation are appropriately dealt with, and iii) taking adequate measures to solve the raised issues.

Grievance redress mechanism is established during the relocation phase and after the relocation phase. The eligible period of grievance redress mechanism is until two years after physical displacement is done.

2) Procedure of Grievance Redress Mechanism

According to the LARRIPP, grievances related to any aspect of the project or sub-project will be handled through negotiations and are aimed at achieving consensus following the procedures outlined below:

- The grievance shall be filed by the PAFs with the Resettlement Implementation Committee (RIC) who will act within 15 days upon receipt thereof, 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 PAF does not receive a response from the RIC within 15 days of registry complaint, he/she can appeal to the concerned UPMO ROW Task Force, which should act on the complaint/grievance within 15 days from the day of its filing;
- If the PAP is not satisfied with the decision of the UPMO ROW Task Force, he/she as a last resort can submit the complaint to any court of law.

Referring to the steps defined in LARRIPP, each project listed in the master plan is required to develop its own grievance redress mechanism considering the local customs in the project area. Major roles and members of RIC area summarized in **Table 13.7-3**.

13.9.7 Preparation for Pre-Feasibility Study

(1) Purpose of Pre-Feasibility Study

Prior to the conduct of the Feasibility Study (F/S) for a selected project, the preliminary Feasibility Study (Pre-F/S) for the candidate F/S projects was planned to be conducted with the purpose of evaluating approximate project viability and identifying problems and issues beforehand. The Pre-F/S was planned to be conducted based on examination of existing data (e.g. satellite image, topographic maps) and site reconnaissance without conducting geological survey or topographic survey. In the Pre-F/S, the route for each project would be roughly identified and alternatives of bridge types would be examined for the subsequent F/S preparation.

(2) TOR on Environmental and Social Considerations for Pre-F/S

As the results of scooping, items evaluated as negative impact (i.e. "✓" in the column of Impact Check) in **Table 13.9-1** will need further examination. **Table 13.9-4** shows the TOR for Pre-F/S preparation. Basically, survey for environmental and social considerations is carried out based on collected secondary data and key informant interview. Possible impact caused by project implementation will be evaluated qualitatively based on existing secondary data, interview of

concerned parties and examining project design. The field survey for flora, fauna and biodiversity shall be conducted during the dry season and rainy season, respectively in F/S stage.

Table 13.9-4 Survey Item and Method

Impact Items	Survey Items	Survey Methods
Pollution Control		
Air quality	➢ Collecting the latest environmental standards ➢ Confirming the air quality condition at the selected project sites ➢ Examining possible impact at the construction and operation phases	➢ Collecting the latest environmental standards ➢ Collecting the monitoring data of air quality in and around the selected projects ➢ Confirming the project design ➢ Qualitative evaluation based on collected data
Water quality	➢ Collecting the latest environmental standards ➢ Confirming the water quality condition at the selected project sites ➢ Examining possible impact at the construction and operation phases	➢ Collecting the latest environmental standards ➢ Collecting the monitoring data of water quality in and around the selected projects ➢ Confirming the project design ➢ Qualitative evaluation based on collected data
Waste	➢ Examining mitigation measures for wastes generated by construction activities	➢ Confirming the project design and general construction activities ➢ Qualitative evaluation based on collected data
Soil Contamination	➢ Examining mitigation measures for soil contamination caused by construction activities	➢ Confirming the project design and general construction activities ➢ Qualitative evaluation based on project design
Soil waste	➢ Examining the method of soil disposal	➢ Confirming the regulation at concerned LGUs ➢ Qualitative evaluation based on collected data
Noise and vibration	➢ Collecting the latest environmental standards ➢ Confirming the noise and vibration condition at the selected project sites ➢ Examining possible impact at the construction and operation phases	➢ Collecting the latest environmental standards ➢ Collecting the monitoring data of noise and vibration in and around the selected projects ➢ Confirming the project design ➢ Qualitative evaluation based on collected data
Ground subsidence	➢ Examining possible impact at the construction and operation phases	➢ Collecting relevant existing information in and around project areas ➢ Confirming the general construction activities ➢ Qualitative evaluation based on collected data
Offensive odor	➢ Examining possible impact at the construction and operation phases	➢ Confirming the general construction activities ➢ Qualitative evaluation based on collected data
Bottom sediments	➢ Examining possible impact at the construction and operation phases	➢ Confirming the general construction activities ➢ Qualitative evaluation based on collected data
Natural Environment		
Protected area	➢ Collecting information of exiting protected area	➢ Collecting the latest map of protected areas

Impact Items	Survey Items	Survey Methods
	➢ Examination possible impact at the construction and operation phases	➢ Interview of concerned agencies ➢ Qualitative evaluation based on collected data and interview results
Flora, fauna and biodiversity	➢ Examining possible impact at the construction and operation phases	➢ Collecting existing information on considerable species such as listed species on IUCN Red list ➢ Interview of concerned agencies ➢ Qualitative evaluation based on collected data and interview results
Hydrological situation	➢ Examining possible impact at the construction and operation phases	➢ Collecting existing information
Topography and geographical features	➢ Examining possible impact at the construction and operation phases	➢ Collecting existing information ➢ Confirming the general construction activities ➢ Qualitative evaluation based on collected data
Social Environment		
Land Acquisition and Resettlement	➢ Examining possible impact due to implementation of the project	➢ Check the satellite image ➢ Qualitative evaluation based on analysis of satellite image
Poverty	➢ Examining possible impact due to implementation of the project	➢ Collecting existing information ➢ Interview of concerned agencies ➢ Qualitative evaluation based on collected data and interview results
Indigenous and ethnic people	➢ Examining possible impact due to implementation of the project	➢ Collecting existing information ➢ Interview of concerned agencies ➢ Qualitative evaluation based on collected data and interview results
Local economy such as employment and livelihood	➢ Examining possible impact due to implementation of the project	➢ Collecting existing information ➢ Qualitative evaluation based on collected data
Land use and utilization of local resources	➢ Examining possible impact due to implementation of the project	➢ Collecting existing information ➢ Qualitative evaluation based on collected data
Water Usage	➢ Examining possible impact due to implementation of the project	➢ Collecting existing information ➢ Confirming the general construction activities ➢ Qualitative evaluation based on collected data
Social institutions such as local decision-making institutions	➢ Examining possible impact due to implementation of the project	➢ Collecting existing information ➢ Qualitative evaluation based on collected data
Existing Social Infrastructure and Services	➢ Examining possible impact due to implementation of the project	➢ Collecting existing information ➢ Qualitative evaluation based on collected data
Misdistribution of benefit and damage	➢ Examining possible impact due to implementation of the project	➢ Collecting existing information ➢ Qualitative evaluation based on collected data
Local Conflicts of Interest	➢ Examining possible impact due to implementation of the project	➢ Collecting existing information ➢ Qualitative evaluation based on collected data
Cultural Heritage	➢ Confirming location of cultural heritage ➢ Examining possible impact due to implementation of the project	➢ Collecting existing information ➢ Interview of concerned agencies ➢ Qualitative evaluation based on collected data and interview results
Landscape	➢ Examining possible impact due to implementation of the project	➢ Collecting existing information ➢ Confirming the project design ➢ Qualitative evaluation based on collected data

Impact Items	Survey Items	Survey Methods
Gender	➢ Examining possible impact due to implementation of the project	➢ Collecting existing information ➢ Qualitative evaluation based on collected data
Children's Right	➢ Examining possible impact due to implementation of the project	➢ Collecting existing information ➢ Qualitative evaluation based on collected data
Infectious Diseases such as HIV/AIDS	➢ Examining possible impact due to implementation of the project	➢ Collecting existing information ➢ Qualitative evaluation based on collected data
Labor environment including safety	➢ Examining possible impact due to implementation of the project	➢ Collecting existing information ➢ Qualitative evaluation based on collected data
Others		
Accident	➢ Examining possible impact due to implementation of the project	➢ Collecting existing information ➢ Qualitative evaluation based on collected data
Transboundary impact and climate change	➢ Examining possible impact due to implementation of the project	➢ Collecting existing information ➢ Confirming the general construction activities ➢ Qualitative evaluation based on collected data

Source: JICA Study Team

(3) Recommendation on Environmental and Social Considerations for F/S of HSH project

The field survey for flora, fauna and biodiversity shall be conducted during the two (2) seasons (i.e. dry season and rainy season) in F/S preparation stage.

Along road section, which is recognized as critically affected area, F/S shall include qualitative assessment including impacts on ecosystem, regional livelihood, culture, and ethnic minorities in addition to quantitative aspect of studies, this is to attain an integrated environmental and social assessment.

The F/S shall include necessary studies for areas along existing roads which is bypassed by new alignments to determine impacts and target areas. Once such impacts are recognized, people along the existing roads are recommended to participate in stakeholders meetings and necessary socioeconomic survey shall be conducted. In addition, livelihood restoration program should be considered against reduction of income due to the impact on livelihood, if such impacts are expected through studies considering assessment items of poverty and local economy of employment and means of livelihood.

The additional /detailed recommendations for F/S against pre-FS are explained in each final section of **Chapters 15, 16, 17 and 18**.

13.10 Stakeholder Meetings

13.10.4 Purpose and Outline of Stakeholders Meetings

In this SEA, the stakeholders meetings have been held three times to hear various opinions among stakeholders in accordance with the progress of formulating the HSH Development Master Plan.

(1) 1st Stakeholders Meeting (July 2019)

This meeting aimed to (a) present to the key stakeholders the Project Outline, the coverage of Strategic Environmental Assessment, pre-scoping of the HSH Development Master Plan, and the present road and traffic problems; (b) gather regional information and be able to identify

the present problems and issues concerning environmental and social considerations in the respective areas; and (c) come up with policies, guidelines, recommendations and measures to address the identified problems/issues.

(2) 2nd Stakeholders Meeting (February 2020)

This meeting aimed to present to wider range of stakeholders each project Pre-F/S which includes: the initial outline of HSH network strategy, alternative network, development scenario, and comprehensive analysis.

(3) 3rd Stakeholder Meeting (February 2021)

This meeting aimed to present to the wide range of stakeholders the outline of HSH network strategy, alternative network, development scenario, contents of Pre-F/S for the four projects, and comprehensive analysis applying the concept of SEA.

13.10.5 1st Stakeholder Meeting

(1) Program of 1st SHM

The JICA Study Team conducted a series of stakeholders' meetings from July 23 - 31, 2019. The program for the meetings is as follows:

- Presentation by DPWH and JICA Study Team
  - Explanation of Project Outline
  - Image of HSH Output
  - What is SEA? and Pre-Scoping of HSH Masterplan
  - Present Road/Traffic Problems (Traffic Congestion, Road Closure, Weak access to Urban Center, etc.)
  - Forward to next SHM
- Question and Answer on the Presentation by DPWH and JICA Study Team (Open Forum)
- Group Discussion by Region
- Presentation from Each Group

(2) Outline of Area-Wide Attendance

The central/regional government agencies, LGUs, private sectors for operation and maintenance of existing express highways, NGOs including regional Chamber of Commerce and Industry, and individual companies/foundation to support NGOs' activities (environmental preservation, social support, poverty support, rural development, etc.) were invited as key stakeholders for road development and environmental and social considerations. The attendance list is in **Table 13.10-1**.

Table 13.10-1 Outline of Area-wise Attendance List of 1st SHM

Area		Visayas	Mindanao	South of Luzon	North of Luzon
1	Date	23 July 2019	25 July 2019	30 July 2019	31 July 2019
2	Venue	Best Western Lex Plus Hotel, Cebu City	Apo View Hotel, Davao City	DPWH Multi-Purpose Hall, DPWH	DPWH Multi-Purpose Hall, DPWH
3	Attendance	34 persons Female :13 Male : 21	60 persons Female :20 Male : 40	81 persons Female :28 Male : 53	61 persons Female :17 Male : 44
4	Region	Region 6	Region 9	NCR	Region 1

Area		Visayas	Mindanao	South of Luzon	North of Luzon
		Region 7 Region 8	Region 10 Region 11 Region 12 Region 13 BARMM	Region 4A Region 4B Region 5	Region 2 Region 3 CAR
5	Agencies	DPWH NEDA DENR LGUs (9) NGO (1)	DPWH NEDA DENR MinDA LGUs (14)	DPWH NEDA DENR PPP Center MMDA DOTr TRB DILG LGUs (16) NGO (1)	DPWH NEDA DENR PEZA PPP Center LGUs (14) Private Sectors (2) NGOs (1)

Note: ( ) presents the number of agencies
Source: JICA Study Team

(3) Opinions and Suggestions from Stakeholders

Table 13.10-2 shows the summary of opinions raised in the open forum at each stakeholder meeting. Each minutes of the meeting is attached in **Appendix 13**.

Table 13.10-2 Major Questions and Answers at the Open Forum of 1st SHM

Questions	Answers from DPWH/JST
1. Visayas	
Q1: What is the timeline of the study/project? (Question from NEDA Region 7 officer)	A1: Development strategy for HSH network is planned to be formulated by September, and short-term and long-term projects will be shortlisted and presented in January.
Q2: It is a good opportunity to link Metro Cebu and other islands properly and efficiently. (Comment from NEDA Region 7 officer)	A2: There are master plans for Metro Cebu, Metro Manila and Metro Davao, which will be integrated into the HSH Development Master Plan.
Q3: Does HSH include primary, secondary and tertiary road? (Question from the private sector)	A3: We consider that the HSH Development Master Plan includes express road, and bypass. Smooth traffic and high-speed traffic roads are considered in the HSH Development Master Plan.
Q4: It is suggested to present the status of HSH Phase 1 even only at Metro Cebu. So that, we know the status and good reference. (LGUs, Northern Samar)	A4: It can be discussed at the group discussion session.
Q5: Panay is Region 6 most populated area. Thus, we hope the area is included in the study. (LGUs, Iloilo)	A5: Since this is a nationwide study, Panay including Negros, Samar and Leyte will be considered.
2. Mindanao	
No questions were raised from participants.	
3. North Luzon	
Q1: Inclusion of the design of tunnels is requested since the region has many mountains. (Comment from Provincial Engineer, La Union)	A1: Your suggestion is considered in the HSH Development Master Plan.

Questions	Answers from DPWH/JST
Q2: Inclusion NCIP into the Technical Working Group (TWG) is recommended since the role of NCIP is very critical especially on the ancestral domain areas. (Comment from PLGU Nueva Vizcaya)	A2: NCIP will be included in the TWG.
Q3: There is always traffic congestion along Balagtas-Plaridel-Bustos to North since some vehicles, such as trucks always park along the roadway. (Comment from Regional Governor, PCCI-Region 3)	A3: This issue will be resolved at the LGUs level since LGUs have to control illegal parking along the national roads within their jurisdiction. DPWH will not intervene in the LGUs policy on parking.
Q4: Is development of Bulacan coastal road and its interior road included? (Comment from Regional Governor, PCCI-Region 3)	A4: DPWH is planning to develop the said roads.
Q5: There is the on-going project, Bulacan Airport. Is it possible to connect Bulacan Airport and Clark Airport? (Comment from Regional Governor, PCCI-Region 3)	A5: It is possible to secure the road network between both airports.
4. South Luzon	
Q1: Is the result of this study be released to the public? (Question from DOTr officer)	A1: The result of this study will be released to the public for their reference on proposed projects in the Philippines.
Q2: Inviting the environmental specialist to the next meeting is recommended. The area has many protected areas, which may be affected if the project is approved. (Comment from DENR officer)	A2: Your suggestion is noted. The environmental specialist will be invited in the next meeting.

Source: JICA Study Team

After the open forum, group discussion was conducted by organizing group by regional cluster. A total of four groups were organized in North and South Luzon and three groups were organized for Visayas and Mindanao. Each group discussed the topics provided by JICA Study Team. The result of discussion (i.e. issue/problem and opinion/advice) was presented by the leader of each group. The contents of discussion results presented by each group leader were classified into four topics as shown in **Table 13.10-3**. Detailed contents of the group discussions are included in **Appendix 13**.

Table 13.10-3 Issues/Problems and Opinions/Advices for Formulation of HSH

Issue /Problem	Opinion /Advice
I. Government / Structure	
Involvement of LGUs in planning and implementation stages	・Provide updates/status of Phase I projects of HSH ・LGUs need to update CLUPs; integrate HSH road network plan ・Implement policies/regulations on the sustainability use of roads
Contradictory Policies of LGU and National Government	・Harmonize policies of LGUs and national government ・Institutional arrangements: delineation of functions among different government agencies ・Streamline processing and issuance of permits (One-stop shop, etc.) ・Central Government and local governments shall cooperate

Issue /Problem	Opinion /Advice
	regarding the processing of permits for government projects ・Integrate different government agency plans; policies on development, recommendations
Limited inclusiveness of study to consider national, regional, and sub-regional plans	・Gather the different plans for review and inclusion
Political Intervention	・Strong political intervention needed to cascade necessary permits
II. General on HSH Study	
Study of Alignment	・Alignment for efficiently linking of economic zones ・Provide for Transit Oriented Development (TOD) ・Consider lateral connectivity of growth/population area ・Develop Bypass Roads/Circumferential Roads to decongest urban traffic ・Address narrow primary roads, bridges, and absence of lateral connectivity
Access to transportation base (Railway station, Airport, Port)	・Coordinate with DOTr, PNR, PPA, and LGUs
Function and structure	・Consider pedestrian lanes and bicycle lanes ・Provide special lanes, priority lanes for high occupancy vehicles ・Provide adequate service roads to prevent slow transport of goods ・Road quality should be improved and maintained ・Restricted access, limitations ・Sloping terrains with road projects should consider slope protection programs ・Consider tunneling in sloping areas ・Provide restrooms
・Securing of Funds	・Identify projects and financing for PPP and other funding agencies
Traffic congestion ・Business/commercial establishments (malls) – issues on traffic due to proximity along main/service roads; problems on setback/easement in the main road ・There were issues on the schedule of rehabilitation of national roads. Apparently, there are roads that require severe rehabilitation every year creating congestion along the roads.	・Construct bypass roads and/or flyovers ・Separate the local traffic from the main thoroughfare. Undertake specific design for intersections of local and national roads ・Extend the existing highway ・Continue road widening program for national roads ・Develop alternative transport modes (railway development) ・The business sector recommends the use of railway system ・Undertake interface/integration/interoperability of all toll expressway systems (toll collections) and with other transport projects ・Traffic management plan should be included/integrated during the feasibility study rather than during project implementation
Greenhouse Gas	・Increase of GHG emission from the motor vehicles
III. Social Environment	
ROW acquisition process ・Late payment of acquired properties prior to implementation and delayed parcellary plan ・Cumbersome appraisal of properties	・Prepare a Right-of-Way Action Plan in accordance with RA 10572 ・Streamline process of ROWA based on RA 10752 and DPWH ROW Acquisition Manual ・Organize community IEC (Information, Education and

Issue /Problem	Opinion /Advice
	Communication) to convince the affected individuals ・Consider cost of RROW and community resettlement in the total project cost ・Adopt frequent bottom-top approach ・LGU has to provide resettlement sites
Illegal use of ROW	・Ensure compliance with DILG MC2011-68, 2007-07 and DPWH DO73, series of 2014
Gender	・Include a discussion on the Gender Aspect in accordance with Department Order no. 48 “Guidelines for Mainstreaming Gender Equality Actions in Road Infrastructure Projects” series of 2011 prescribing the guidelines and procedures in mainstreaming gender equality actions in all phases of road infrastructure projects
Change of land use	・Fast-track the approval of NaLUA (National Land Use Act) Bill ・Consider grade separation on High Standard Highway ・Ensure effective land use considerations in updating of CLUPs
Encroachment of public and private utilities	・Consider inclusion of project cost of relocation of existing utilities and facilities (widened roads) – as LGU counterpart ・Ensure proper coordination with all utility providers (transmission lines, telecommunication lines, water lines, etc.) ・Prepare traffic management plan
Socio economic impact of new alignment along existing growth centers	・Consider in the study the pros and cons of a new alignment
NCIP- IPs concern	・Provide for early acquisition of FPIC(Free Prior Informed Consent: FPIC) ・Coordinate closely with National Commission on Indigenous Peoples (NCIP)
Social acceptability of road projects within ancestral domains	・Comply with Indigenous Peoples’ Rights Act：IPRA ・Secure FPIC
Cultural and heritage sites	・Conduct alternate route study for alignments passing through heritage sites ・Properly observe cultural heritage sites
IV. Natural Environment	
・Protected Areas ・Preservation of Environmentally Critical Areas ・Mangroves, trees, natural landscapes, etc. should be considered during the implementation of the project; to find ways to address the cutting of trees to have the least adverse effects	・Coordinate with DENR-EMB (Environmental Management Bureau) and DENR-BMB (Biodiversity Management Bureau) ・Comply with DENR DAO 2017-15
Cutting of trees	・Conduct IEC ・Undertake pre-identification of areas for tree planting as replacement of trees to be cut ・Promptly address delay in the release of ECCs or CNCs and of Tree Cutting Permit ・Coordinate with DENR-EMB and DENR-FMB (Forest Management Bureau)

Issue /Problem	Opinion /Advice
Mangrove trees and Coconut trees	・Coordinate with the DENR-FMB and Philippine Coconut Authority (PCA)
Limited and no consideration to bio-diversity corridors	・Consider tunneling, viaduct, or bio-bridges ・Consider an in-depth study of the affected bio-diversity
National Historical Issues	・Coordinate with the National Commission on Culture and Arts and its attached agencies
Environmental impact	・Undertake urban greening to address low air quality in city centers ・Develop tunnels to lessen environmental impact and shorten travel time
V. Natural Disaster	
Landslide problems, Land subsidence	・Consider alternate route ・Provide resilient roads to address geohazard problems ・Develop disaster-resistant road network due to mountainous topography ・Coordinate with DENR-MGB (Mines and Geosciences Bureau)
Erosion (soils and rocks)	・Adopt slope stabilization, debris catcher, rock shed
Flood, Earthquake, Storm	・Consider geohazard assessment (earthquake, flooding, storm surge, etc.) ・Include adequate drainage in the design
VI. Safety and Public Security	
Public Security	・Adopt whole-of-government approach to fight insurgency ・Operationalize EO 70 Ending Local Communist Armed Conflict)
Safety	・Ensure proper coordination among MMDA, LGUs and project proponent on road traffic and road safety in project planning and implementation ・Prepare Road and Bridge safety programs
VII. Public Participation	
Public Participation	・Ensure participation of all concerned stakeholders ・Strictly implement DAO 2017-1 (Participatory Process in the Preparation of Environmental Impact Statement) ・Conduct intensive consultation to the affected communities/Indigenous Peoples (IPs) ・Implement measures to gain acceptance of project (e.g., from fishermen and farmers)
VIII. Survey	
Baseline Survey	・Include baseline data on monsoon rains, intertidal, earthquakes and other geohazards in the study traversing the IPs ・As much as possible, do not depend on secondary data ・Refrain from considering projects without Feasibility Studies

Note: Summarized comments above are responses from each group to "Question 1. After listening to the presentation and seeing the scope of the study, what are the issues/things you want to advice/share to the Study Team to ensure success of this study?" and "Question 2. In your region, identify (and indicate location) most serious issues/problems which hamper social and economic development."

Source: JICA Study Team prepared this table based on the result of group discussion in the 1st SHM.

(4) Proposed HSH Routes by Group Discussion

During the group discussion session, each group discussed road network or improvement to be incorporated into the HSH road network with the objectives listed below.

- To widen roads to six lanes, open new roads, build elevated High Standard Highways, construct roads traversing mountainous areas, and make roads resilient to disasters, will solve the traffic congestions and shorten travel time.
- To connect each region to major cities/provinces and/or economic zones that will help in economic development.
- To connect coastal areas which will provide connectivity among provinces in the Region and will improve trading of commodities in these areas.
- To develop HSH which will help mitigate transport problems and provide connectivity of islands to regional centers.
- To develop HSH which will provide access links to railways, airport, and ports.

Discussion was held to examine the suitable locations of High Standard Highways to push forward development in the region. Each group discussed the road network (i.e. new construction, upgrade and improvement) in general, regardless of HSH-1 or HSH-2.

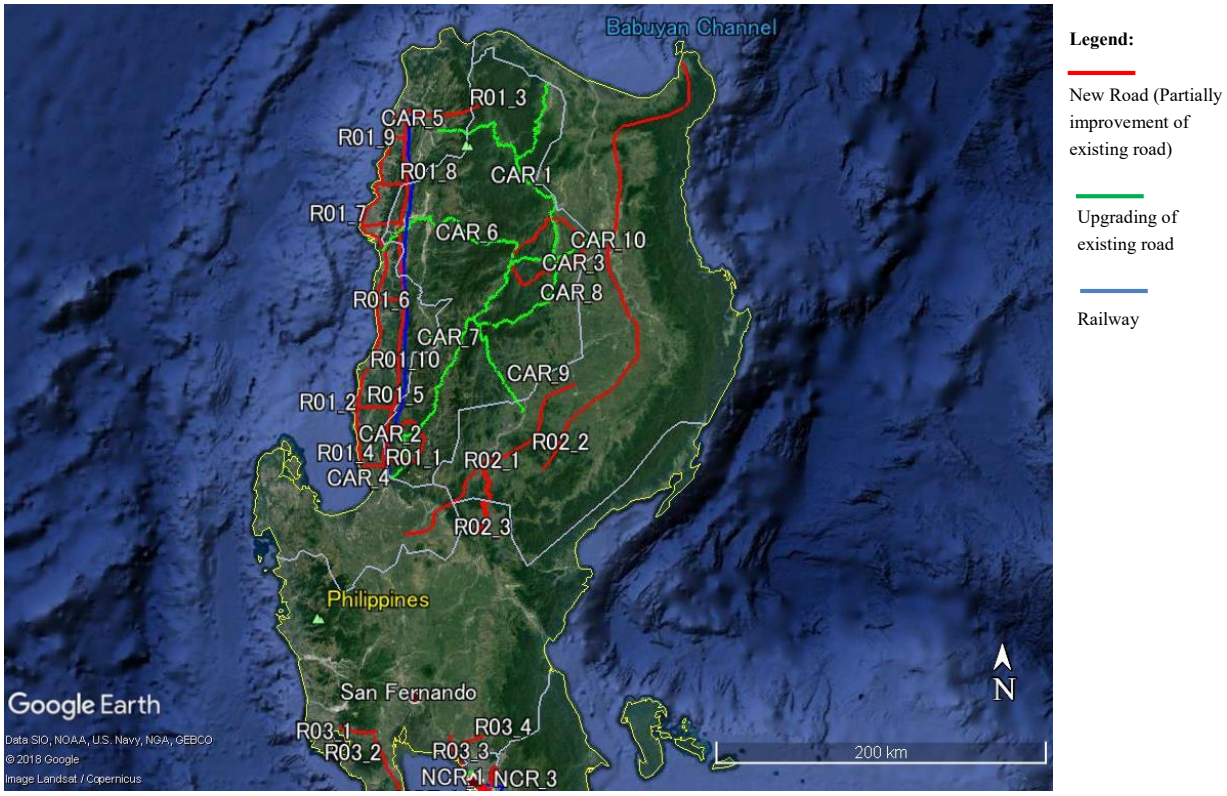
Table 13.10-4 shows the list of roads and type of services (i.e. new construction, upgrade and improvement) proposed by each group to be considered in the HSH road network and Figures showing the road locations. The overall HSH network discussed in **Chapter 12** is referring to the proposed roads considering the definition of HSH and the necessity of highways to address the future traffic demand. Comments raised during the stakeholders meetings were taken into consideration for establishing the evaluation items and evaluation alternatives.

Table 13.10-4 List of Routes Proposed by Group Discussion for the HSH Road Network

S/N	REGION	NO.	NAME	Remark	S/N	REGION	NO.	NAME
1	CAR	1	Regional Trunkline Road Development	Improvement	57	R06	1	Mambusao-Libacao Road Widening
2		2	BLISTT Outer Ring Circumferential Road	New	58		2	Lambunao-Valderrama Road
3		3	EKGC Circumferential Road	New+Improvement	59		3	Valderrama-Bugasong-Tapaz Road
4		4	Kennon Road HSH Upgrading	Upgrading	60		4	Iloilo-Kalibo Elevated Expressway
5		5	Kabugao-Calanasan-Solsona Lateral Road	Upgrading	61		5	Iloilo Coastline Road Widening
6		6	Abra-Kalinga Lateral Road	Upgrading	62		6	Santa Barbara-Passi-Cuartero Road Widening
7		7	Cervantes-Tadian-Sabangan Lateral Road	Upgrading	63		7	Santa Barbara-Lambunao-Cuartero Road Wideni
8		8	Bontoc-Barlig-Tabuk Lateral Road	Upgrading	64		8	Pototan-Janiuay Road Widening
9		9	Bontoc-Banaue-Bagabag Lateral Road	Upgrading	65		9	Victorias-Barotac Viejo Link Bridge
10		10	Tabuk-Roma Norte Lateral Road	Upgrading	66		10	Bacolod-San Carlos Road Widening
11	R01	1	Rosario-Laoag Expressway	New	67		11	Pontevedra-San Carlos Road Widening
12		2	Coastal Road	New+Improvement	68		12	Binalbagan-Guihulngan Road Widening
13		3	Laoag-Apayao Bypass Road	New (Bypass)	69		13	Pulupandan Terminal Port
14		4	East-West Lateral Road-1	New	70		14	San Carlos Terminal Port
15		5	East-West Lateral Road-2	New	71		15	Bacolod Ferry Terminal
16		6	East-West Lateral Road-3	New	72		16	Toledo City Ferry Terminal
17		7	East-West Lateral Road-4	New	73	R07	1	East Coast Cebu Expressway
18		8	East-West Lateral Road-5	New	74		2	West Coast Cebu Expressway
19		9	East-West Lateral Road-6	New	75		3	Cebu Circumferential Road
20		10	Railroad Development	New (Railway)	76		4	Naga-Toledo Road
21	R02	1	TPLEX-Santa Fe-Santiago Expressway	New	77		5	Mactan Tunnel
22		2	Cagayan Valley Expressway	New	78		6	Cebu-Bohol Link Bridge
23		3	Dalton Pass East Alternate Route	New	79		7	Metro Cebu Expressway
24	NCR	1	Marikina-Vista Real Bridge	New (Bridge)	80		8	Dumaguete-Bacolod Expressway
25		2	J.P. Rizal-St. Mary Bridge	New (Bridge)	81	R08	1	Lapinig-Tacloban Road
26		3	J.P. Rizal-Lopez Jaena Bridge	New (Bridge)	82		2	Abuyog-Silago-San Ricardo Expressway
27		4	Antipolo/Taytay-EDSA Ortigas Railway Project	New (Railway)	83		3	Allen-Liloan Expressway
28		5	Estrella-Pantaleon Bridge	New (Bridge)	84		4	2nd San Juanico Bridge and Access Road
29		6	Boni-Barangka Drive Road Widening	Widening	85		5	Leyte-Surigao Link Bridge
30		7	E. Pantaleon Road Widening	Widening	86	R09	1	Pagadian-Bonifacio Road Widening
31		8	Alabang-Zapote Road Widening	Widening	87	R10	1	Pagadian-Bonifacio Road Widening
32		9	Blumentritt-Antipolo Bridge	New (Bridge)	88		2	Tukuran-Malabang Road Widening
33		10	C3 Road Caloocan Widening	Widening	89		3	Naawan-Tubod Expressway
34		11	Port Expressway (Roxas Boulevard)	Parallel to existing road	90		4	Opol-Naawan Expressway
35		12	Pasig-Marikina Expressway	New	91		5	Villanueva-Opol Expressway
36	R03	1	San Marcelino-Dinalupihan Bypass Road	New (Bypass)	92		6	Villanueva-Butuan Expressway
37		2	Dinalupihan-Mariveles Expressway	New	93		7	Bukidnon-Misamis Oriental Expressway
38		3	Bulacan Airport Expressway	New	94		8	Tagoloan Road
39		4	San Jose Del Monte-Balagtas NLEX Diversion Road	New (Bypass)	95		9	Kapai Road
40	R04A	1	Calamba-Los Banos Bypass Road	New (Bypass)	96		10	Kauswagan-Marantao Road
41		2	Padre Pio Flyover	New (Flyover)	97	R11	1	Mati-Manay Bypass Road
42		3	Cavite Choke Point-1	Choke Point	98	R12	1	Datu Paglas-Columbio-Matanao Road
43		4	Cavite Choke Point-2	Choke Point	99		2	Columbio-Lutayan-Koronadal City Road
44		5	Cavite Choke Point-3	Choke Point	100		3	Banga-Tupi-Malungon Road
45	R04B	1	Dumaran-Araceli Island Bridge	New (Bridge)	101		4	Surallah-T'boli-GSC Bypass Road
46		2	Coron-Culion Island Bridge	New	102		5	Kidapawan City Circumferential Road
47		3	Palawan Circumferential Road Improvement	New	103		6	NHW Jct. Malungon-Boundary Sta. Maria Road
48		4	Canipaan-Buliluyan Road	New	104		7	Tacurong East Bypass Road
49		5	PPSR & PPNR Improvement	Improvement	105		8	Manuangan-Sultan Kudarat-DOS Road
50		6	Victoria-Sablayan Road	New	106	R13	1	Surigao Del Norte Nautical Highway
51		7	Abra de Ilog-Puerto Galera Road	New	107		2	Butuan-Carmen Road Widening
52		8	Dr. Damina Reyes Road	New	108		3	North and South Lateral Road
53		9	Romblon Circumferential Road Improvement	Improvement	109		4	Surigao-Trento Road Widening
54		10	Mindoro-Batangas Bridge	New (Bridge)	110		5	Hayanggabon Bridge
55		11	Calapan North Road and SRNH Improvement	Improvement	111		6	Cabadbaran-Madrid Tunnel Road
56	R05	1	Pili-Caramoan-Catanduanes Expressway	New	112		7	Agusan del Norte Logistical Highway

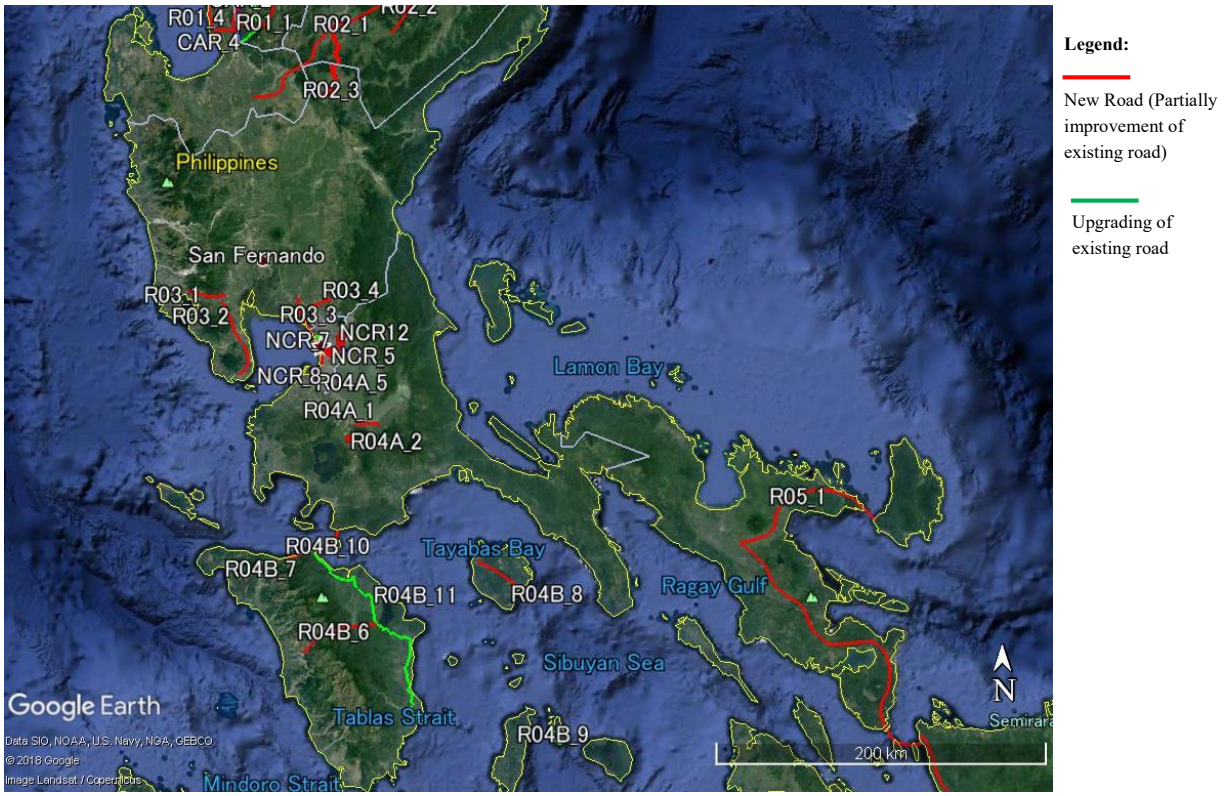
Note: The list includes both of HSH-1 and HSH-2.

Source: JICA Study Team,



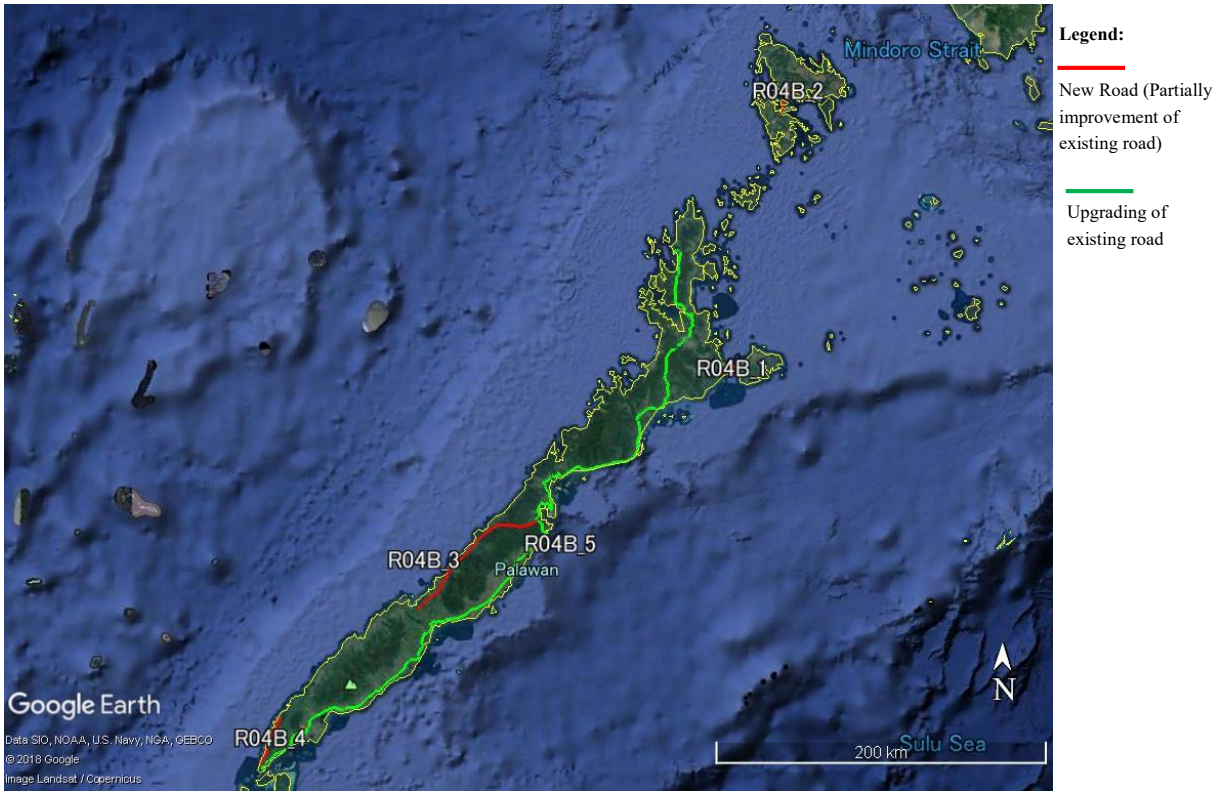
Note: Numbers in the map are corresponding to the serial numbers in **Table 13.10-4**.
Source: JICA Study Team

Figure 13.10-1 Location of Routes Proposed during Group Discussion (North Luzon)



Note: Numbers in the map are corresponding to the serial numbers in **Table 13.10-4**.
Source: JICA Study Team

Figure 13.10-2 Location of Routes Proposed during Group Discussion (South Luzon)

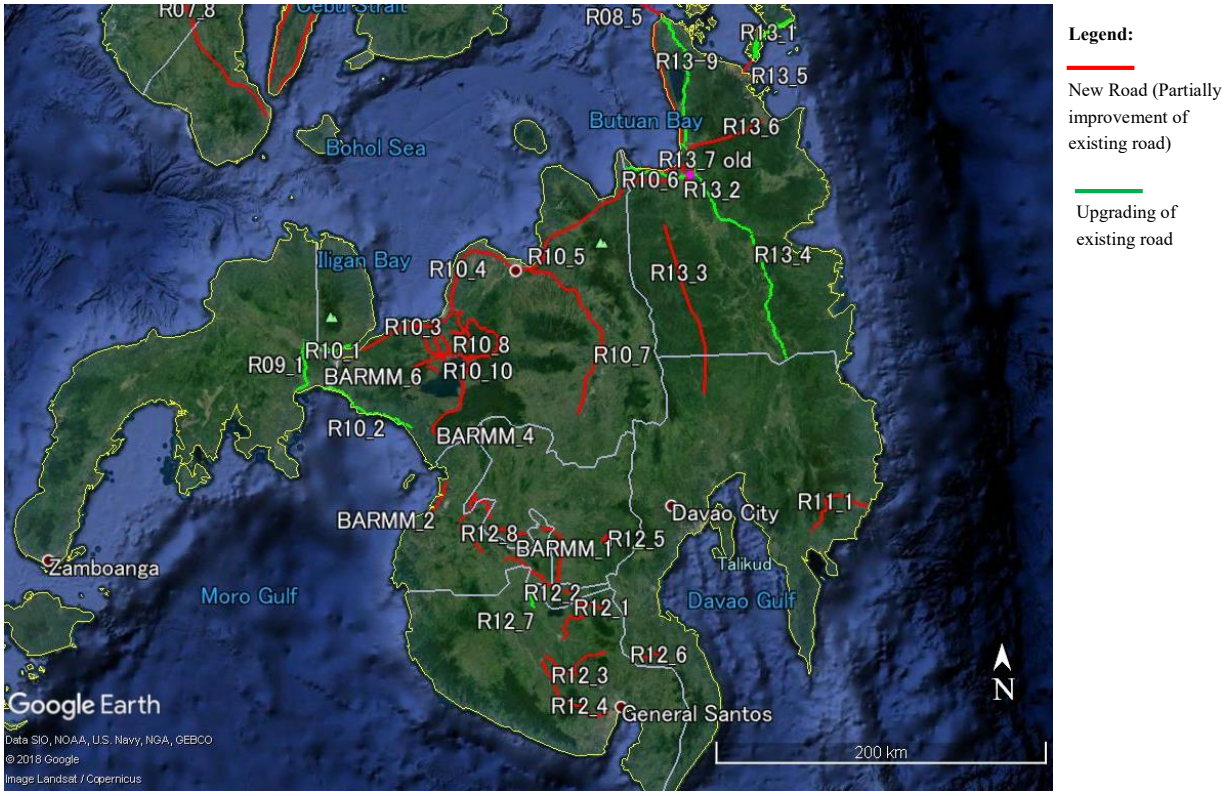


Note: Numbers in the map are corresponding to the serial numbers in **Table 13.10-4**.
Source: JICA Study Team

Figure 13.10-3 Location of Routes Proposed during Group Discussion (Palawan)

Note: Numbers in the map are corresponding to the serial numbers in **Table 13.10-4**.
Source: JICA Study Team

Figure 13.10-4 Location of Routes Proposed during Group Discussion (Visayas)



Note: Numbers in the map are corresponding to the serial numbers in **Table 13.10-4**.
Source: JICA Study Team

Figure 13.10-5 Location of Routes Proposed during Group Discussion (Mindanao)

13.10.6 2nd Stakeholders Meeting

(1) Program of 2nd SHM

The JICA Study Team conducted a series of stakeholders' meetings from February 11 - 20, 2020. The program for the meetings is as follows:

- Presentation by DPWH and JICA Study Team (Open Forum)
  - Result of the 1st SHM
  - Proposed HSH Development Network
  - Forward to Next Pre-F/S
- Group Discussion by Region
- Presentation from Each Group

(2) Outline of Area-wide Attendance

The attendance list is in **Table 13.10-5**. The agencies invited to the 2nd SHMs were the same as in 1st SHM.

Table 13.10-5 Outline of Area-wide Attendance List of 2nd SHM

Area		South of Luzon	North of Luzon	Visayas	Mindanao
1	Date	11 February 2020	13 February 2020	18 February 2020	20 February 2020
2	Venue	Bayleaf Hotel, Manila City	Savannah Hotel, Clark City	Best Western Hotel, Cebu City	Pinnacle Hotel and Suites, Davao City
3	Attendance	75 persons Female :31 Male : 44	75 persons Female :9 Male : 66	50 persons Female :13 Male : 37	68 persons Female :26 Male : 42
4	Region	NCR Region 4A Region 4B Region 5	Region 1 Region 2 Region 3 CAR	Region 6 Region 7 Region 8	Region 9 Region 10 Region 11 Region 12 Region 13 BARMM
5	Agencies	DPWH NEDA DENR DOTr MMDA NCIP PPPC LGUs (18) Private Sectors (2) NGO (1)	DPWH NEDA DENR DA LGUs (14) Private Sectors (3)	DPWH NEDA DENR DILG LGUs (11) NGOs (2)	DPWH NEDA DENR DILG NICP MinDA LGUs (12) NGOs (2)

Note: ( ) presents the number of agencies
Source: JICA Study Team

(3) Opinions and Suggestions from Stakeholders

Table 13.10-6 shows the summary of opinions raised in the open forum at each stakeholder meeting. Each minutes of the meeting is attached to **Appendix 13**. Questions/comments considered to be related to Master Plan were extracted and summarized in the table below and questions/comments related to Pre-F/S were described at respective chapter from **Chapters 15** to **18**.

Table 13.10-6 Major Questions and Answers on M/P at the Open Forum of 2nd SHM

Questions	Answers from DPWH/JST
1. Visayas	
Q1: Visayas region is very prone to typhoons which oftentimes destroy our power and communication cables and difficult to restore since most roads become unpassable. Thus, we suggest installing the power and communication cables underground. (Question from NEDA Region 6 officer)	A1: The suggestion is a matter that should be considered as DPWH's future road development policy or in the D/D stage. The possibility will be examined.
Q2: Consolacion, Cebu is the area of traffic congestion. It is suggested to include the area in the HSH. (Comment from Council of Region 7 officer)	A2: The issue will be examined by the team.
Q3: The project Panay-Guimaras-Negros bridge was already approved by the NEDA Board, which would be funded by the government of China. Is it possible that JICA takes over the project for fast-track implementation? (Question from NEDA Region 6 officer)	A3: It might be possible that JICA would support the said project. However, we believe that the government of China would implement the said project since the government of China already declared its implementation.

Questions	Answers from DPWH/JST
Q4: It is suggested to implement all projects instead of only one (1) project. (Comment from NEDA Region 7 officer)	A4: The road development budget limitation should be considered. Possibility will be examined by DPWH.
Q5: It is suggested to examine the parallel road, bypass or diversion road instead of road improvement. There are many settlements in the area as we presented in the 1st SHM. (Comment from DPWH Region 7 officer)	A5: Your suggestion is noted and will verify if could be included in the study. An objective of HSH development is to correspond to this suggestion such as bypass or diversion road.
Q6: Road widening is difficult since many structures are located at the interlink from Cebu to Negros. Thus, improvement of the corridor is considered much better. (Comment from DPWH Region 7 officer)	A6: Your suggestion is noted and will verify if could be included in the study. In response to this opinion, the Cebu circumferential road construction will be proposed and not the road widening of existing roads.
Q7: Improvement of connectivity at Matnog, Sorsogon to Northern Samar is important. There is no improvement without securing connectivity in the said area. In addition, improvement of bridge connectivity from Layte to Bohol, Bohol to Cebu and Cebu to Negros is important for the said areas. (Comment from NEDA Region 8 officer)	A7: Investment is an important factor to be considered. The HSH Development Master Plan focuses on upgrading existing national highways and construction of new highways. Bridge construction may be included in the next master plan.
2. Mindanao	
Q1: Please clarify the two (2) proposed projects in Central Mindano since their names were confusing. (Comment from Development Authority officer)	A1: We will consider to change or rename the confusing project names.
Q2: Which agency is the lead agency to identify issues and concerns? It is suggested to detail the timeline and responsibilities of LGUs to solve the issues and to prepare for resettlement. (Comment from Agusan Del Sur officer)	A2: The lead agencies are DPWH. DENR and LGUs and other concerned agencies. Study to prepare for resettlement is necessary, but it is not within the master plan preparation period.
Q3: It is requested to include a road project passing Cotabato Province especially in Region 12. (Comment from Cataboto Province officer)	A3: Please identify the specific alignment for our consideration.
Q4: It is suggested to have a separate workshop for the private sector to get the input from them regarding their views and opinions about the proposed project. (Cagayan de Oro Chamber)	Q4: A separate consultation meeting is planned. Private sector representatives will be informed once the schedule is finalized.
Q5: It is suggested to consider Central Mindanao High Standard Highway traversing the airport in San Carlos, Bukidnon. This airport is one of gateway airports in Mindanao between Region 10 and 11. (Comment from NEDA Region 10 officer)	A5: We note your suggestion. Please suggest the alignment since we do not have information about your recommendation.
3. South Luzon	
Q1: Camsur Express 4 and PR 4 are ongoing and have already been endorsed. It should not be in the long term but should be in the short term. It is part of the pipeline projects of the administration. (Comment from NEDA Region 4 officer)	A1: Your comment is noted. Proposals will be revisited in the review of the implementation schedule.

Questions	Answers from DPWH/JST
Q2: The connectivity for C4 and R10 is not part of the short-term proposal. Please take note that ROW is already acquired for almost 30 years already and yet the project is not prioritized until now. (Comment from LGUs Caloocan)	A2: Your comment is noted and alreadyconveyed to DPWH Central Office.
Q3: Please consider the following road as part of HSH. - North-South Commuter Highway - Extension of R10 (Comment from LGUs Caloocan)	A3: Your suggestion is noted. Proposals will be revisited in the study of HSH class2 network.
Q4: Please include disaster mitigations and vulnerability component since the area is a flood prone area.	A4: Your suggestion is noted. JST and DPWH have analyzed the flood susceptibility, road closure section due to typhoon damage, tracks of a major typhoon. Basically, the HSH class1 network is planned considering avoiding hazard areas. The detailed risk of a natural disaster should be considered in the design stage.
Q5: Safety is a prioritized factor to be considered. Many types of vehicles are using roads, and it will bring traffic and accidents. (Comment from a private sector, Former USec)	A5: The safety policy is very important. It will be mentioned to DPWH if they have considered foreign assistance to undertake planning for effective traffic safety measures.
4. North Luzon	
Q1: Please explain the scenario for 2040. Were population growth and economic development included in the formulation of master plan until 2040? (Question from NEDA Region 1 officer)	A1: Population growth, economic development and traffic volume were included among the scenarios to be examined in the master plan.
Q2: DPWH and JICA completed the master plan (Phase 1) in 2010. How much has been the 1st master plan achieved after 10 years? (Question from NLEX staff)	A2: Almost all of the projects in the 1st master plan were completed.
Q3: The 1st master plan does not have a monitoring and evaluation component. It is suggested to include the component to assess progress and implementation. (Comment from NEDA Region 1 officer)	A3: Your suggestion is noted. DPWH will consider the setting up of the monitoring system.
Q4: Is it possible to prioritize implantation of HSH in Nueva Vizcaya. There is a bottleneck in Region 2. If traffic congestion occurred, all areas are affected. It will also affect economic activities. (Comment from NEDA Region 2 officer)	A4: The limited resources of the government are the reason why we classify the projects into short term, medium term and long term. To fast-track development in the area will also fast-track the road connectivity.
Q5: It is suggested to include timberland as one of criteria in the environmental and social aspect. (Comment from DENR Region 1 officer)	A5: Timberland is considered in the evaluation of possible environmental impact.

Source: JICA Study Team

After the open, group discussion was conducted by organizing groups by region. A total of four groups were organized, and each group discussed the topics provided by JICA Study Team. The result of discussion (i.e. issue/problem and opinion/advice) was presented by the leader of each group. The contents of presentation by each group leader were classified into four topics as presented in **Table 13.10-7**. Detailed contents of the group discussions are made part of **Appendix 13**.

Table 13.10-7 Issues/Problems and Opinions/Advices for Formulation of HSH-2

Topics	Opinion/Advice
HSH network design	・Harmonization of all proposed and existing /future road network related master plan (Regional Development Plans, Road Network Plan etc.) is important. ・Road network should be considered in the connectivity of airports, seaports, and on-going road projects. ・Close communication within national and local is necessary. ・HSH will help solve insurgency issues and improve tourism. ・The stakeholder appeals that their expectations regarding schedule, prioritization and criteria of road projects is considered in the masterplan, as much as possible. ・Good coordination with utility companies (telecom, power/electric and water) is required to relocate them smoothly.
Resettlement and affected IPs	・Issues on ROW were again raised since most of the delay in project implementation is caused by ROW acquisition. ・Free and Prior Informed Consent (FPIC) process is effective to obtain agreement with affected IPs in the formation of the project.
Protected Area and Ecosystem	・Compliances to Environmental Permits and Tree cutting Permits are required. ・There is a possibility of opposition on tree cutting from some NGOs. ・Green infrastructure/component should be considered.
Others	・For landslide prone areas and slope area, protection controls /measures should be considered. ・Monitoring and Evaluation System of Master Plan is required. ・It is recommended to consider international standard designs for High Standard Highways and standardize policy on expressway regulations.

Note: Summarized comments above are responses from each group to "Question 1. After Listening to the presentation and seeing the proposed network development plan, what are other suggestions you want to share to the study team?" and "Question 2. Based on the presented identified network development plan, what are possible environmental and social issues in your region".

Source: JICA Study Team prepared this table based on the result of group discussion in the 2nd SHM.

13.10.7 3rd Stakeholder Meeting

(1) Program of 3rd SHM

The JICA Study Team conducted a series of stakeholders' meetings from February 22-26, 2021. The program for the meetings is as follows:

- Presentation by DPWH and JICA Study Team
  - Project background
  - Formulation of Master Plan
  - Result of the 1st and 2nd SHM
  - Study of Pre-F/S projects
  - Environmental and social assessment on Pre-F/S project
- Open Forum

(2) Public Notice and Distribution of Invitation Letters

The 3rd SHM was held through on-line Zoom meeting style considering the situation under COVID-19 pandemic. For those who were not able to access the internet, the venues on the sites where people could participate in the Zoom meeting were arranged. In order to enhance participation of wide range of stakeholders into the 3rd SHM, public notice in the ways of i) posting the notice at the public places, ii) nationwide radio announcement in English, Filipino and Bisaya, iii) announcement at the website of DPWH and Facebook of LGUs and iv) distribution of invitation letters to concerned LGUs. In addition, participation of local stakeholders, expected project affected persons and other relevant groups in the areas of each Pre-F/S project, as well as socially vulnerable groups were encouraged through pre-notice of the SHMs

i) Bulletin Board

The notice was posted on each LGUs' bulletin boards.

ii) Radio Announcement

To gain more audience and for the purpose of information dissemination, the invitation for the online stakeholders' meeting was radio broadcasted on the national level via Radio Veritas. It was announced three (3) to five (5) times a day before the scheduled SHM.

iii) Website Announcement

Program were also posted on the DPWH website and Facebook Page.

iv) Invitation Letters

The invitation letters were distributed to the affected LGUs, barangay chairpersons, barangay secretaries and the NGOs. A direct call and courtesy call were done simultaneously to invite the LGUs, barangay chairpersons, barangay secretaries and the NGOs. The invitation letters were first distributed via email before the schedule of the SHM and conducted a series of follow ups to confirm the attendance of the participants.

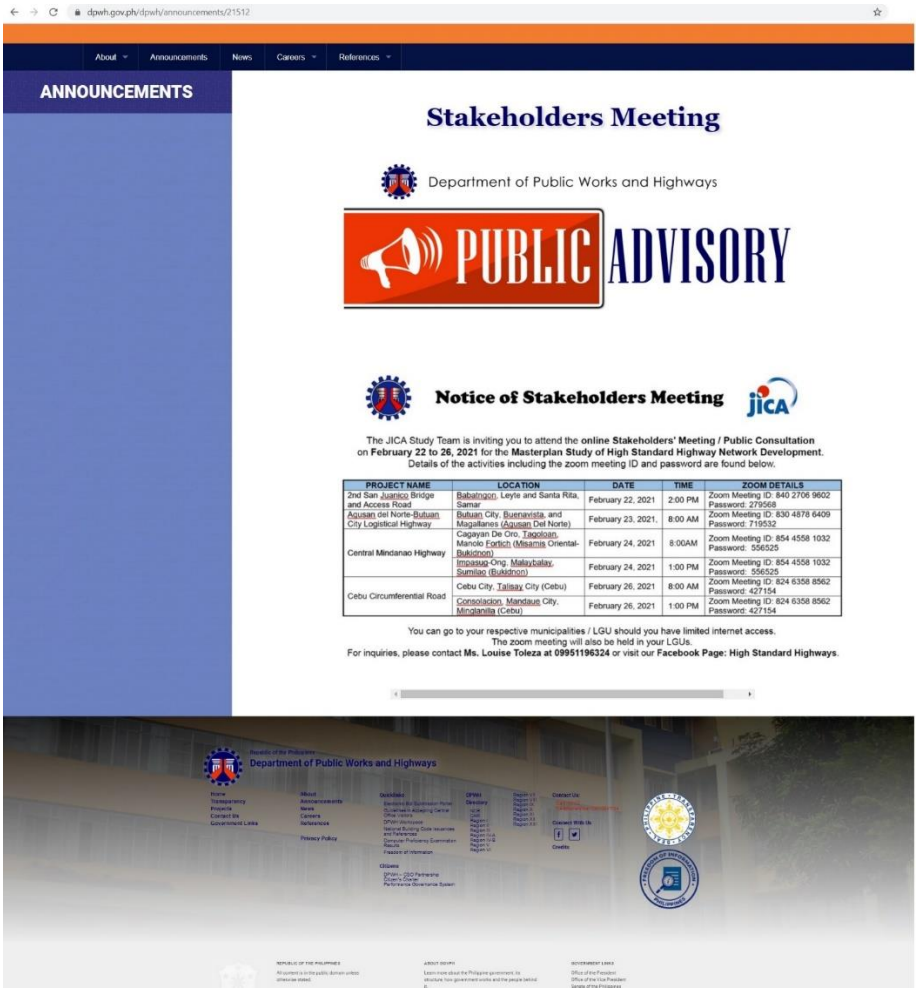


Figure 13.10-6 DWPH Website

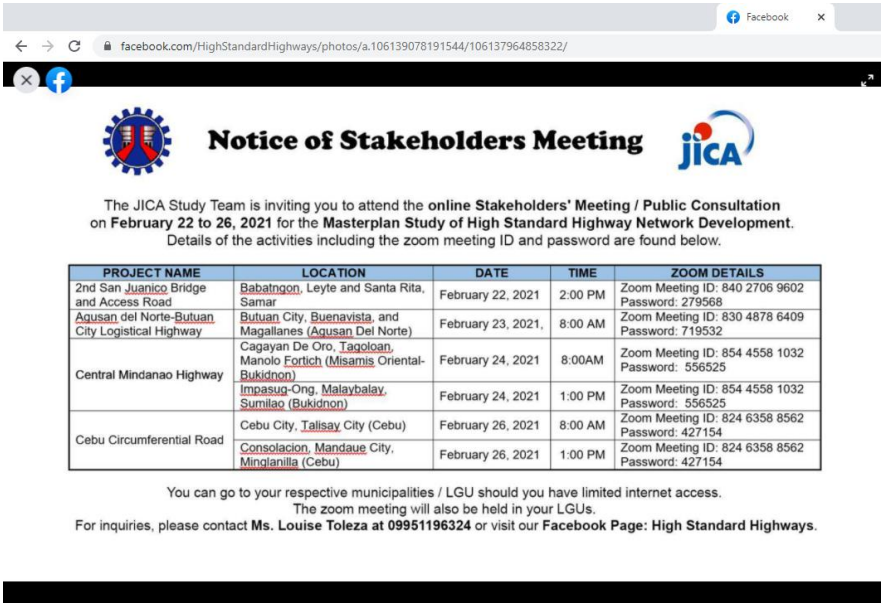


Figure 13.10-7 High Standard Highways's Facebook Page

(3) Attendance of SHM

The central/regional governments, LGUs and local stakeholders including NGOs such as environmental preservation, social support, poverty support, rural development, were invited as key stakeholders for road development and environmental and social considerations. The attendance list is in **Table 13.10-8**. The following various stakeholders joined the meeting.

-Affected barangay people (residents, barangay chairpersons) including vulnerable people (elder, women and children),

- Affected LGU's Mayor and/or Vice Mayor,

-Central/Regional Government officers and Local Government officers, and

-NGOs, Professor of university

In addition to zoom meeting, series of Facebook Livestream of each stakeholder meeting were disclosed for the person, who could not join the meeting on live at site. They could view the video clip of all SHMs in their convenience time after the date of SHMs. The number of access to Facebook is shown in the bottom of **Table 13.10-8.**

Table 13.10-8 Outline of 3rd SHM

Items \ Pre-F/S Project			1	2	3	4	5	6
			2nd San Juanico Bridge	**Agusan del Norte - Butuan City Logistical Highway**	**Central Mindanao Highway**		**Cebu Circumferential Road**	
1	**Date and Time of SHM**		22 Feb 2021 PM 01:00 - PM 5:00	23 Feb 2021 AM 08:00 - PM 12:00	24 Feb 2021 AM 08:00 - PM 12:00	24 Feb 2021 PM 01:00 - PM 5:00	26 Feb 2021 PM 01:00 - PM 5:00	26 Feb 202 PM 01:00 - PM 5:00
2	**LGUs**		Babatgon Santa Rita	Buenavista Butuan Magallanes	Tagoloan Manolo Fortich	Impasug-ong Malaybalay	Cebu Talisay	Consolacion Mandaue Minglanilla
3	**Venue on site**		LGU's Conference Room	LGU's Conference Room, Mayor's office, Barangay halls	LGU's Conference Room, Mayor's office, Barangay halls	LGU's Conference Room, Mayor's office, Barangay halls	LGU's Conference Room, Mayor's office, Barangay halls	LGU's Conference Room, Mayor's office, Barangay halls
4	**Total Attendances**		**163**	**62**	**84**	**89**	**191**	**85**
4-1	**Gender rate**	**Male**	96	33	46	51	79	34
		Female	67	29	38	38	112	51
		%	41.4	46.8	45.2	42.7	58.6	60.0
4-2	**Local Stakeholder (Affected Person and institution, NGOs)**		75	44	69	31	169	67
5	**Facebook Engagement Up : As of 3 Marh 2021 Down: As of 11 March 2021**		210 views 247 views	320 views 580 views	128 views 263 views	238 views 525 view	182 views 478 views	83 views 223 views

Source: JICA Study Team

(4) Opinions and Suggestions from Stakeholders

Table 13.10-9 shows the summary of opinions raised in the open forum. Each minutes of the meeting is attached to **Appendix 13**. Each SHM included the contents of Master Plan and Pre-F/S projects. Thus, participants asked questions/commented regardless of Master Plan or Pre-F/S projects during the question and answer portion. Questions/comments considered to be related to Master Plan were extracted and summarized in the table below and questions/comments related to Pre-F/S were described at respective chapter from **Chapters 15** to **18**.

Some reactions of the residents were positive for their local economy and accessibility, and they are looking forward on each Pre-F/S Project. The major/common concerns of participants were the harmonization with LGUs plan, the alignment of proposed road network project, the design of the bridge, the implementation schedule of the project, the consideration of flood and landslide prone area, the affected trees and the compensation for affected people and properties due to the project. DPWH and the JICA study team principally replied that their comments and concerns are to be reflected into the following 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 detailed survey for resettlement would be conducted in the following F/S preparation.

Table 13.10-9 Major / Common Opinions and Answers at the Open Forum of 3rd SHM

No.	Comment, Questions and Suggestion	Answers
Project Design and Coordination with Local Plans		
1	Question When will the project start? (Brgy. Chairperson of Barangay Quiot/Male) (Brgy. Councilor of Barangay Busay/Male)	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 before the activity starts. (DPWH-ESSD)
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	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)	The suggestion is very important in the road network. (JICA Study Team)
4	Suggestion 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. (Mayor of Butuan City)	The elevation of the road is very important and should be considered in the Feasibility Study stage. And that they will address such concerns on the next stage. (JICA Study Team)

No.	Comment, Questions and Suggestion	Answers
5	We would like to ask if the navigational clearance for the boat-building industry was considered during the planning stage of this project. (Representative of Butuan barangay official /Male)	The navigational clearance was considered in the planning stage to set up the bridge design. (JICA Study Team)
6	Question I would like to ask if the road widening of existing highways instead of constructing 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)	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)
Environmental and Social Considerations		
7	Question What is the plan of the DPWH regarding the affected trees? (Representative of Municipal Environment and Natural Resources Office (MENRO), Tagoloan)	After the alignment is finalized the DPWH will conduct a tree cutting inventory together with MENRO and DENR. For every 1 tree to be cut, there will be a replacement of 50-100 seedlings. Aside from the Trees, we also need to consider the Key Biodiversity Area that will be affected in the sensitive areas. (JICA Study Team)
8	Question 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? (Mayor's Office of Butuan City/ Male)	The archeological artifacts have been mapped out and identified. The River Kingdom is very far from the proposed project site. Hence, the possibility of affecting any artifacts is very low. Although there would be excavation activities along the proposed alignment but it is only for the embankment. And those 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. (Mayor of Butuan City) 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". (JICA Study Team)
9	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 therefore necessary. (Brgy. Chairperson 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)
10	Question Would it be possible to provide us with a drainage plan because Brgy. Poblacion Pardo is a flood prone area? (Brgy. Chairperson of Barangay Quiot/Male)	We cannot give you a drainage plan as early as now but definitely it will be considered. (JICA Study Team)
11	Comment The proposed alignment is prone to accidents including landslide.	During this stage, all concerns, especially the risk of natural disaster will be considered. The team will carefully design the road considering natural disasters, especially landslide. More detailed and important inputs are needed. The other

No.	Comment, Questions and Suggestion	Answers
	(Local people from Barangay 10, City of Malaybalay)	stakeholders meeting will be held during the Feasibility Study Stage and will focus on this matter. In addition, HSH is designed to consider the occurrence of natural disasters in its planning and road designs. If the existing national highway will be destroyed due to natural disaster, the proposed HSH will be a detour in Central Mindanao. (JICA Study Team)
12	Questions We would like to ask if there is a relocation site or financial assistance for the affected families. (Local people, Brgy. Chairpersons, and LGUs)	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. (DPWH-ESSD)
13	Question 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? (Local people, Brgy. Chairpersons, and LGUs)	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. (DPWH and JICA Study Team)
Questions from DPWH /JICA Study Team to participants		
14	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)	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) 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)
15	Question (To all participants) 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. Chairperson of Barangay Quiot/Male)
16	Question What is positive impact or benefit of this project in your LGU? (JICA Study Team).	The project is a good development project which helps in transporting our agricultural products (pineapple and corn) and it will provide more access especially to our hidden tourist spots. It will also provide faster response to crimes and will improve peace and order especially in case of emergency because there is an inaccessible areas in Manolo Fortich, Bukidnon. (Brgy. Chairperson in Manolo Fortich/Male)

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

Source: JICA Study Team

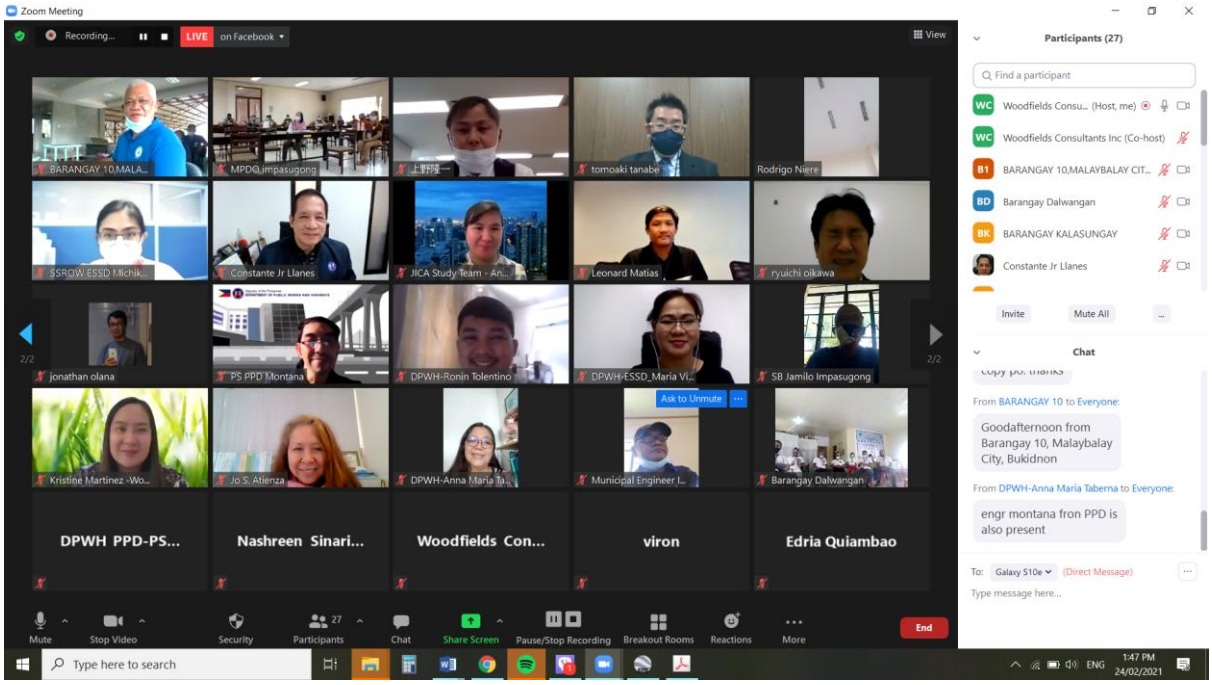


Figure 13.10-8 On-Line Zoom Meeting

Figure 13.10-9 Presentation

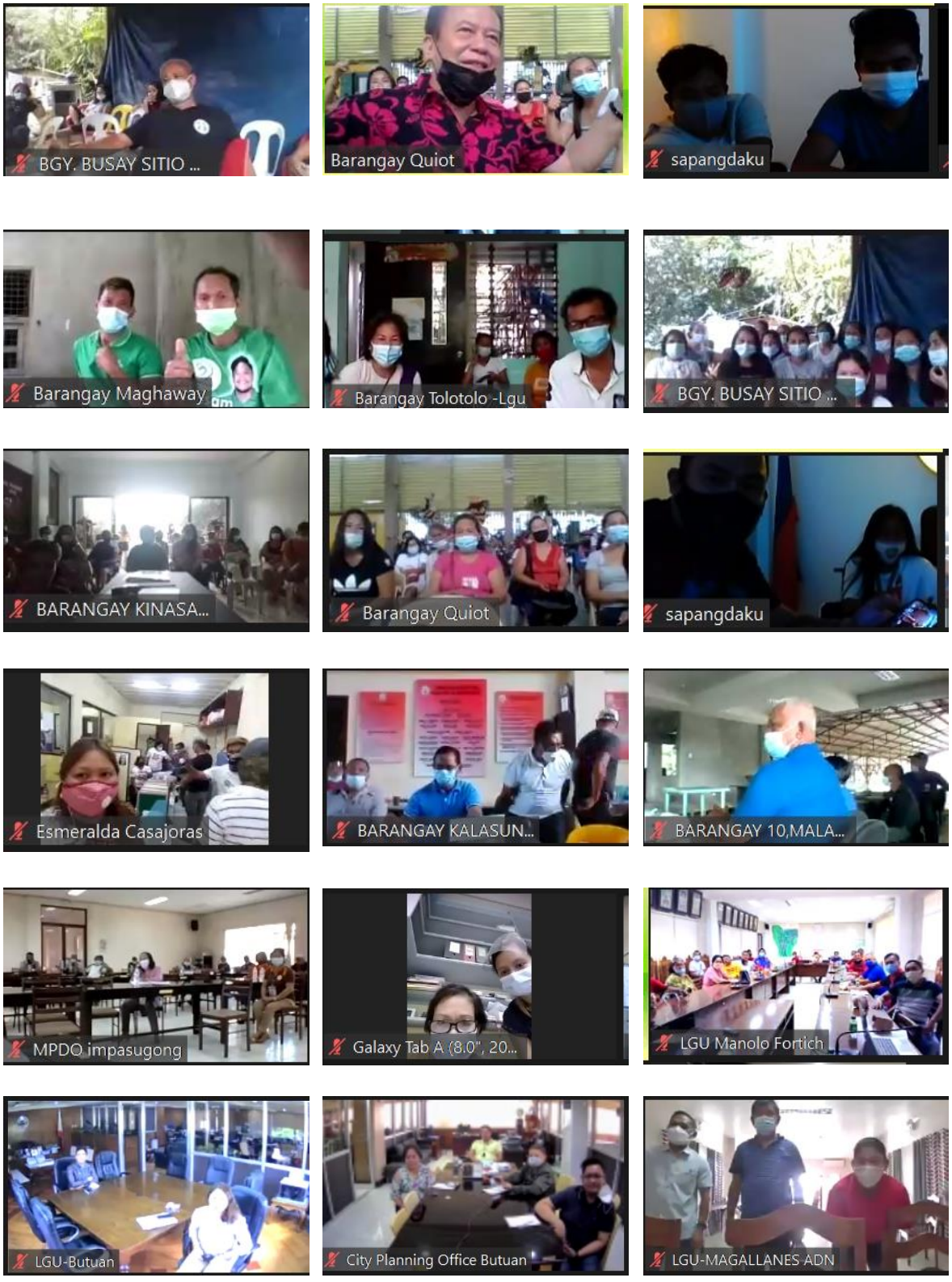


Figure 13.10-10 Participant from Local Sites

13.10.8 Evaluation / Assessment

The suggestions and opinions from stakeholders were considered into the process of evaluation/assessment of the criteria.

Major comments and requests raised at the 1st SHM were; i) location of right-of-way, ii) possible impact to land acquisition/relocation, iii) sensitive control points (e.g. avoid indigenous people's land, improve the food condition), iv) improvement of existing traffic jams, v) harmonization of land use plan, vi) considerations of user's demand on road alignment and vii) economic effectiveness at the areas by implementing a project. The comments and requests at the 1st SHM were classified into four groups: a) natural and environment, b) social, economic and cultural concerns, c) disaster, and d) governmental/technical matters. The issues related to these four groups were taken into considerations to establish the criteria and rating. The result of criteria evaluation was explained in **Chapter 12** of this report.

The result of evaluation /assessment in the formulation of master plan was explained to stakeholders at the 2nd SHM. Opinions obtained from each stakeholder meeting were incorporated into formulation of master plan, and brush- up the selected projects with less environmental impacts but optimizing positive impacts.

The comments and requests raised during the 3rd SHM were examined and remarked as recommendations at respective Pre-F/S chapter in this report. Comments and requests raised from the 1st to 3rd SHMs are still necessary and shall be given due attention and consideration during the feasibility study phase preparation.

13.11 Selection of Projects for Pre-Feasibility Study

Candidate projects for Pre-F/S were selected among the projects which necessitates the application of an advanced technology, such as long span bridge, long tunnel, earthquake proof, soft ground treatment and rapid construction in the urban area, etc.

Therefore, Pre-F/S was selected with different criteria with Masterplan, which is described in **Chapter 14**.

Chapters 15 to **18** present the selected Pre-FS that were conducted utilizing secondary data. The main objective of these Pre-F/S is to identify the applicable advanced technologies and issues which shall be studied comprehensively in the subsequent feasibility study preparation.