CHAPTER 7
PROJECT COST ESTIMATE

7.1 CIVIL WORK COST

7.1.1 Unit Prices of Construction Items

Unit prices of construction of construction items are shown in **Table 7.1.1-1.**

TABLE 7.1.1-1 (1) UNIT PRICES OF CONSTRUCTION ITEMS

Unit: Php

PAY ITEM NO.	DESCRIPTION	QUANTITY	UNIT	Unit Cost	Remarks
1.0	**GENERAL REQUIREMENTS**				
A	**FACILITIES FOR THE ENGINEER**	1.00	l.s.	70,000,000.00	
B	**OTHER GENERAL REQUIREMENTS**				
SPL B.2.1	Construction Health and Safety	1.00	l.s.	2,000,000.00	
SPL B.2.2	Mobilization / Demobilization (1.0% of Civil Works)	1.00	l.s.	126,000,306.96	
SPL B.3.1	Environmental Monitoring Action Plan	1.00	l.s.	4,000,000.00	
SPL 2000	Traffic Management During Construction	1.00	l.s.	20,000,000.00	
SPL 3000	Day Work	1.00	PS.	10,000,000.00	
	SUB-TOTAL (PART B)				
	SUB-TOTAL GENERAL REQUIREMENTS				
2.0	**MAIN HIGHWAY**				
C	**EARTHWORKS**				
100(1)	Clearing and Grubbing	109.00	ha	90,846.53	
102(1)	Unsuitable Excavation	2,718.00	cu.m.	219.50	
103(1)	Structure Excavation, Common Material	67,811.00	cu.m.	586.73	
103(3)	Fundation Back fill	12,749.00	cu.m.	565.00	
104(1)a	Roadway Excavation	925,455.00	cu.m.	493.93	
104(1)b	Embankment from Roadway Excavation	925,455.00	cu.m.	186.41	
105(1)	Subgrade Preparation	401,202.00	sq.m	37.18	
	SUB-TOTAL (PART C)				
D	**SUBBASE AND BASE COURSE**				
200	Aggregate Subbase Course	200,601.00	cu.m.	879.97	
202	Crushed Aggregate Base Course	82,097.00	cu.m.	1,177.00	
206	Cement Treated Base Course	40,766.00	cu.m.	2,333.70	
	SUB-TOTAL (PART D)				
E	**SURFACE COURSES**				
301(1)	Bituminous Prime Coat, MC-701 (1.0 L/m2)	945.00	tonne	67,331.52	
302(2)	Bituminous Tack Coat, Emulsified Asphalt, SS-1 (0.45 L/m2)	214.00	tonne	67,062.72	
310 (1)	Bituminous Concrete Binder Course, Hot Laid (t=60mm)	324,629.00	sq.m	1,087.98	
310 (2)	Bituminous Concrete Surface Course, Hot Laid (t=60mm)	458,890.00	sq.m	1,109.17	
311	Portland Cement Concrete Pavement t=300 mm	141,954.00	sq.m	2,887.66	
	SUB-TOTAL (PART E)				
F	**BRIDGE STRUCTURE CONSTRUCTION**				
400(17)a	Concrete Piles cast in Drilled Holes (1200mm) excluding Re-Bar	5,069.00	l.m.	19,980.16	
400(17)b	Concrete Piles cast in Drilled Holes (1800mm) excluding Re-Bar	10,189.00	l.m.	34,729.20	
400(17)c	Concrete Piles cast in Drilled Holes (2000mm) excluding Re-Bar	563.00	l.m.	41,917.69	
400(17)d	Concrete Piles cast in Drilled Holes (2200mm) excluding Re-Bar	435.00	l.m.	45,948.78	
400(17)e	Concrete Piles cast in Drilled Holes (2800mm) excluding Re-Bar	192.00	l.m.	61,945.00	
401(1)	Railing, (Concrete Bridge Railing)	14,513.00	l.m.	5,006.92	
404 (1)	Reinforcing Steel, Grade 60 (Bridge)	39,885,007.00	kg	63.90	

TABLE 7.1.1-1 (2) UNIT PRICES OF CONSTRUCTION ITEMS

Unit: Php

PAY ITEM NO.	DESCRIPTION	QUANTITY	UNIT	Unit Cost	Remarks
405(1)	Lean Concrete, 17Mpa	1,915.00	cu.m.	4,073.75	
405(1)a	Structural Concrete Class AA 28Mpa for Pile Cap	44,761.50	cu.m.	5,623.00	
405(1)b	Structural Concrete Class AA 28Mpa for Column	19,183.50	cu.m.	11,663.24	
405(1)c	Structural Concrete Class P 38Mpa for Coping	34,652.00	cu.m.	16,687.08	
405(1)d	Structural Concrete Class AA 28Mpa for Diaphragm	2,301.00	cu.m.	18,354.30	
405(1)e	Structural Concrete Class AA 28Mpa for Deck Slab	57,910.55	cu.m.	7,643.31	
405(1)f	Structural Concrete Class AA 28Mpa for Abutment, Wingwall, Approach	8,975.00	cu.m.	9,627.72	
405(1)g	Structural Concrete Class AA 28Mpa for Approach Slab	3,192.00	cu.m.	7,643.32	
405(1)i	Structural Concrete Class AA 21Mpa for Parapet, Curb, Median	9,433.45	cu.m.	8,425.88	
405(1)j	Structural Concrete Class AA 28Mpa for Box Culvert	2,076.80	cu.m.	8,480.81	
405(1)k	Non Shrink Grout 41Mpa including wiremesh for Girder Riser	50.00	cu.m.	80,462.16	
406(1)a	PSC Member (AASHTO Girder Type V) L = 15m-25m	173.00	each	910,352.00	
406(1)c	PSC Member (AASHTO Girder Type V) L = 30m	124.00	each	1,121,873.50	
406(1)d	PSC Member (AASHTO Girder Type V) L = 33 m	381.00	each	1,126,773.50	
406(1)e	PSC Member (AASHTO Girder Type V) L = 35 m	1,654.00	each	1,162,519.33	
406(3)	Prestressing Steel	1,669,593.00	kg	152.90	
408	Structural Steel	238,256.00	kg	181.86	
412(1)a	Elastomeric Bearing Pad (450 x 300 x 25mm)	6,102.00	pcs	2,794.06	
412(1)b	Elastomeric Bearing Pad (550 x 400 x 60mm)	1,456.00	pcs	5,588.13	
SPL 414(d)	Ruber Filler (400 x 150 x 50mm)	5,148.00	each	865.83	
SPL 414(e)	Hard Rubber Filler & Restrainer Bolts Dia 30mm	4,869.00	sets	1,573.81	
SPL 416(1)a	Pile Dynamic Analysis	10.00	each	719,017.58	
SPL 416(1)b	Pile Integrity Test	100.00	each	43,667.04	
SPL 417(1)b	Cast Iron Deck Drain	1,452.00	each	19,679.57	
SPL 417(2)a	Collector Pipe (150mm dia PVC)	11,610.40	l.m.	791.70	
SPL 417(2)b	Collector Pipe (200mm dia PVC)	3,532.00	l.m.	1,153.20	
SPL 418(a)	Expansion Joint, Type A (M80 Multiplex)	2,801.00	l.m.	29,418.63	
SPL 414	Metal Decking (8 mm thk)	134,262.00	sq.m.	2,428.25	
	SUB-TOTAL (PART F)				
G	**DRAINAGE AND SLOPE PROTECTION STRUCTURES**				
500(1)a	RCPC, 610 mm dia.	10,960.00	l.m.	3,082.45	
500(1)c	RCPC, 1220 mm dia.	2,000.00	l.m.	7,005.56	
502(1)	Manholes	100.00	each	28,779.72	
504(5)a	Grouted Riprap Class A (Slope Protection)	1,739.00	cu.m	3,946.61	
504(5)b	Grouted Riprap Class A (Side Ditch)	8,768.80	cu.m	3,794.21	
600a	Rolled Gutter (Median) 600mm x 200mm	10,961.00	l.m.	1,048.33	
600(1) b	Asphalt Curb Type B3	21,922.00	l.m.	360.74	
603(3)a	Single Metal Beam Guardrail (w/Post)	2,000.00	l.m.	3,796.71	
603(3)b	Double Metal Beam Guardrail (w/Post)	18,960.00	l.m.	6,597.25	
604(2)	Fancing (Chain Link)	36,434.00	l.m.	1,400.83	
610	Sodding	219,202.00	sq.m.	726.35	
611(1)	Tree Planting	14,000.00	each	493.00	
SPL 515	Mechanically Stabilized Earth (MSE) Wall	23,820.00	sq.m.	11,468.35	
	SUB-TOTAL (PART G)				
H	**MISCELLANEOUS STRUCTURES**				
605(1)a	Warning Signs	45.00	each	14,173.35	
605(2)	Regulatory Signs	91.00	each	14,034.06	
605(3)a	Informatory Signs (3.50m x 2.00m)	25.00	each	285,563.50	
605(3)b	Informatory Signs (4.50m x 2.50m)	10.00	each	388,903.66	
612(1)	Reflectorized Thermoplastic Pavement Markings	21,637.00	sq.m.	1,087.90	
612(2)	Reflectorized Studs 100x400x20	2,000.00	each	752.32	
613	Seeding with Coconet	350,000.00	sq.m.	166.01	
SPL	Noise Barrier	5,000.00	lm	48,031.19	
SPL	Installation of Fiber Optic	18,217.00	lm	6,881.28	
SPL 1110	Toll Road Linghting	150.00	each	158,671.93	
SPL200	Relocation of High-tension Electric Cable and Tower	1.00	PS	50,000,000.00	
SPL201	Traffic Signal	14.00	each	1,500,000.00	
	SUB-TOTAL (PART H)				
	SUB-TOTAL MAIN HIGHWAY				

TABLE 7.1.1-1 (3) UNIT PRICES OF CONSTRUCTION ITEMS

Unit: Php

PAY ITEM NO.	DESCRIPTION	QUANTITY	UNIT	Unit Cost	Remarks
4.0	**TOLL PLAZA AND SERVICE AREA**				
SPL 801	Truck Weigning Station	2.00	set	3,564,478.23	
SPL 1041(3)a	Toll Island,	44.00	each	138,225.73	
SPL 1041(4)	Crash Attenuators,	44.00	set	45,779.29	
SPL 1000	Toll Booth (Type 1)	38.00	each	387,204.43	
SPL 1010	Toll Booth (Maxi Type 2)	6.00	each	841,889.37	
SPL 1020	Toll Plaza	3,811.28	sq.m.	21,755.00	
SPL 1030	Toll Collection System	1.00	l.s.	40,000,000.00	
SPL 1040	Traffic Control System	1.00	l.s.	250,000,000.00	
SPL 1050	Toll Plaza Lighting System	60.00	each	307,858.73	
SPL 1130	Toll Operation Building	1.00	l.s.	100,000,000.00	
SPL 1140	Toll House	6.00	Unit	4,500,000.00	
	SUB-TOTAL TOLL PLAZA				
	TOTAL				

7.1.2 Estimated Civil Work Cost

Total civil work cost was estimated at **Php 12,832 Million** as shown in **Table 7.1.2-1.**

The currency components (foreign, local and tax) were determined for each construction item by referencing previous study’s data.

TABLE 7.1.2-1 (1) ESTIMATED CIVIL WORK COST

Unit: Php in 2012 Prices

PAY ITEM NO.	DESCRIPTION	QUANTITY	UNIT	Unit Cost	Civil Work Cost	COST COMPONENT			Remarks
						Foreign Currency (FC)	Local Currency (LC)	TAXES	
1.0	**GENERAL REQUIREMENTS**								
A	**FACILITIES FOR THE ENGINEER**	1.00	l.s.	70,000,000.00	**70,000,000.00**	**28,125,000.00**	**33,333,333.33**	**8,541,666.67**	
B	**OTHER GENERAL REQUIREMENTS**								
SPL B.2.1	Construction Health and Safety	1.00	l.s.	2,000,000.00	2,000,000.00	714,285.71	1,038,961.04	246,753.25	
SPL B.2.2	Mobilization / Demobilization (1.0% of Civil Works)	1.00	l.s.	126,000,306.96	126,000,306.96	45,000,109.63	65,454,704.91	15,545,492.42	
SPL B.3.1	Environmental Monitoring Action Plan	1.00	l.s.	4,000,000.00	4,000,000.00	1,428,571.43	2,077,922.08	493,506.49	
SPL 2000	Traffic Management During Construction	1.00	l.s.	20,000,000.00	20,000,000.00	7,142,857.14	10,389,610.39	2,467,532.47	
SPL 3000	Day Work	1.00	PS.	10,000,000.00	10,000,000.00	3,571,428.57	5,194,805.19	1,233,766.23	
	SUB-TOTAL (PART B)				**162,000,306.96**	**57,857,252.48**	**84,156,003.61**	**19,987,050.86**	
	SUB-TOTAL GENERAL REQUIREMENTS				**232,000,306.96**	**85,982,252.48**	**117,489,336.95**	**28,528,717.52**	
2.0	**MAIN HIGHWAY**								
C	**EARTHWORKS**								
100(1)	Clearing and Grubbing	109.00	ha	90,846.53	9,902,271.77	3,536,525.63	5,144,037.28	1,221,708.85	
102(1)	Unsuitable Excavation	2,718.00	cu.m.	219.50	596,601.00	213,071.79	309,922.60	73,606.62	
103(1)	Structure Excavation, Common Material	67,811.00	cu.m.	586.73	39,786,748.03	14,209,552.87	20,668,440.54	4,908,754.63	
103(3)	Fundation Back fill	12,749.00	cu.m.	565.00	7,203,185.00	2,572,566.07	3,741,914.29	888,704.64	
104(1)a	Roadway Excavation	925,455.00	cu.m.	493.93	457,109,988.15	163,253,567.20	237,459,734.10	56,396,686.85	
104(1)b	Embankment from Roadway Excavation	925,455.00	cu.m.	186.41	172,514,066.55	61,612,166.63	89,617,696.91	21,284,203.02	
105(1)	Subgrade Preparation	401,202.00	sq.m	37.18	14,916,690.36	5,327,389.41	7,748,930.06	1,840,370.89	
	SUB-TOTAL (PART C)				**702,029,550.86**	**250,724,839.59**	**364,690,675.77**	**86,614,035.50**	
D	**SUBBASE AND BASE COURSE**								
200	Aggregate Subbase Course	200,601.00	cu.m.	879.97	176,522,861.97	63,043,879.28	91,700,188.04	21,778,794.66	
202	Crushed Aggregate Base Course	82,097.00	cu.m.	1,177.00	96,628,169.00	34,510,060.36	50,196,451.43	11,921,657.21	
206	Cement Treated Base Course	40,766.00	cu.m.	2,333.70	95,135,614.20	33,977,005.07	49,421,098.29	11,737,510.84	
	SUB-TOTAL (PART D)				**368,286,645.17**	**131,530,944.70**	**191,317,737.75**	**45,437,962.72**	

TABLE 7.1.2-1 (2) ESTIMATED CIVIL WORK COST

Unit: Php in 2012 Prices

PAY ITEM NO.	DESCRIPTION	QUANTITY	UNIT	Unit Cost	Civil Work Cost	COST COMPONENT			Remarks
						Foreign Currency (FC)	Local Currency (LC)	TAXES	
E	**SURFACE COURSES**								
301(1)	Bituminous Prime Coat, MC-701 (1.0 L/m2)	945.00	tonne	67,331.52	63,628,286.40	22,724,388.00	33,053,655.27	7,850,243.13	
302(2)	Bituminous Tack Coat, Emulsified Asphalt, SS-1 (0.45 L/m2)	214.00	tonne	67,062.72	14,351,422.08	5,125,507.89	7,455,284.20	1,770,630.00	
310 (1)	Bituminous Concrete Binder Course, Hot Laid (t=60mm)	324,629.00	sq.m	1,087.98	353,189,859.42	126,139,235.51	183,475,251.65	43,575,372.27	
310 (2)	Bituminous Concrete Surface Course, Hot Laid (t=60mm)	458,890.00	sq.m	1,109.17	508,987,939.08	181,781,406.81	264,409,319.00	62,797,213.26	
311	Portland Cement Concrete Pavement t=300 mm	141,954.00	sq.m	2,887.66	409,914,887.64	146,398,174.16	212,942,798.77	50,573,914.71	
	SUB-TOTAL (PART E)				**1,350,072,394.62**	**482,168,712.36**	**701,336,308.89**	**166,567,373.36**	
F	**BRIDGE STRUCTURE CONSTRUCTION**								
400(17)a	Concrete Piles cast in Drilled Holes (1200mm) excluding Re-Bar	5,069.00	l.m.	19,980.16	101,279,431.04	36,171,225.37	52,612,691.45	12,495,514.22	
400(17)b	Concrete Piles cast in Drilled Holes (1800mm) excluding Re-Bar	10,189.00	l.m.	34,729.20	353,855,818.80	126,377,078.14	183,821,204.57	43,657,536.09	
400(17)c	Concrete Piles cast in Drilled Holes (2000mm) excluding Re-Bar	563.00	l.m.	41,917.69	23,599,659.47	8,428,449.81	12,259,563.36	2,911,646.30	
400(17)c	Concrete Piles cast in Drilled Holes (2200mm) excluding Re-Bar	435.00	l.m.	45,948.78	19,987,719.30	7,138,471.18	10,383,230.81	2,466,017.32	
400(17)e	Concrete Piles cast in Drilled Holes (2800mm) excluding Re-Bar	192.00	l.m.	61,945.00	11,893,440.00	4,247,657.14	6,178,410.39	1,467,372.47	
401(1)	Railing, (Concrete Bridge Railing)	14,513.00	l.m.	5,006.92	72,665,429.96	25,951,939.27	37,748,275.30	8,965,215.38	
404 (1)	Reinforcing Steel, Grade 60 (Bridge)	39,885,007.00	kg	63.90	2,548,651,947.30	910,232,838.32	1,323,975,037.56	314,444,071.42	
405(1)	Lean Concrete, 17Mpa	1,915.00	cu.m.	4,073.75	7,801,231.25	2,786,154.02	4,052,587.66	962,489.57	
405(1)a	Structural Concrete Class AA 28Mpa for Pile Cap	44,761.50	cu.m.	5,623.00	251,693,914.50	89,890,683.75	130,750,085.45	31,053,145.30	
405(1)b	Structural Concrete Class AA 28Mpa for Column	19,183.50	cu.m.	11,663.24	223,741,764.54	79,907,773.05	116,229,488.07	27,604,503.42	
405(1)c	Structural Concrete Class P 38Mpa for Coping	34,652.00	cu.m.	16,687.08	578,240,696.16	206,514,534.34	300,384,777.23	71,341,384.59	
405(1)d	Structural Concrete Class AA 28Mpa for Diaphragm	2,301.00	cu.m.	18,354.30	42,233,244.30	15,083,301.54	21,939,347.69	5,210,595.08	
405(1)e	Structural Concrete Class AA 28Mpa for Deck Slab	57,910.55	cu.m.	7,643.31	442,628,285.92	158,081,530.69	229,936,771.91	54,609,983.33	
405(1)f	Structural Concrete Class AA 28Mpa for Abutment, Wingwall	8,975.00	cu.m.	9,627.72	86,408,787.00	30,860,281.07	44,887,681.56	10,660,824.37	
405(1)g	Structural Concrete Class AA 28Mpa for Approach Slab	3,192.00	cu.m.	7,643.32	24,397,477.44	8,713,384.80	12,674,014.25	3,010,078.39	
405(1)i	Structural Concrete Class AA 21Mpa for Parapet, Curb, Median	9,433.45	cu.m.	8,425.88	79,485,117.69	28,387,542.03	41,290,970.23	9,806,605.43	
405(1)j	Structural Concrete Class AA 28Mpa for Box Culvert	2,076.80	cu.m.	8,480.81	17,612,956.01	6,290,341.43	9,149,587.54	2,173,027.04	
405(1)k	Non Shrink Grout 41Mpa including wiremesh for Girder Riser	50.00	cu.m.	80,462.16	4,023,108.00	1,436,824.29	2,089,926.23	496,357.48	
406(1)a	PSC Member (AASHTO Girder Type V) L = 15m-25m	173.00	each	910,352.00	157,490,896.00	56,246,748.57	81,813,452.47	19,430,694.96	
406(1)c	PSC Member (AASHTO Girder Type V) L = 30m	124.00	each	1,121,873.50	139,112,314.00	49,682,969.29	72,266,137.14	17,163,207.57	
406(1)d	PSC Member (AASHTO Girder Type V) L = 33 m	381.00	each	1,126,773.50	429,300,703.50	153,321,679.82	223,013,352.47	52,965,671.21	
406(1)e	PSC Member (AASHTO Girder Type V) L = 35 m	1,654.00	each	1,162,519.33	1,922,806,971.82	686,716,775.65	998,860,764.58	237,229,431.59	
406(3)	Prestressing Steel	1,669,593.00	kg	152.90	255,280,769.70	91,171,703.46	132,613,386.86	31,495,679.38	
408	Structural Steel	238,256.00	kg	181.86	43,329,236.16	15,474,727.20	22,508,694.11	5,345,814.85	

TABLE 7.1.2-1 (3) ESTIMATED CIVIL WORK COST

Unit: Php in 2012 Prices

PAY ITEM NO.	DESCRIPTION	QUANTITY	UNIT	Unit Cost	Civil Work Cost	COST COMPONENT			Remarks
						Foreign Currency (FC)	Local Currency (LC)	TAXES	
412(1)a	Elastomeric Bearing Pad (450 x 300 x 25mm)	6,102.00	pcs	2,794.06	17,049,378.53	6,089,063.76	8,856,820.01	2,103,494.75	
412(1)b	Elastomeric Bearing Pad (550 x 400 x 60mm)	1,456.00	pcs	5,588.13	8,136,314.37	2,905,826.56	4,226,656.81	1,003,830.99	
SPL 414(d)	Ruber Filler (400 x 150 x 50mm)	5,148.00	each	865.83	4,457,292.84	1,591,890.30	2,315,476.80	549,925.74	
SPL 414(e)	Hard Rubber Filler & Restrainer Bolts Dia 30mm	4,869.00	sets	1,573.81	7,662,880.89	2,736,743.18	3,980,717.35	945,420.37	
SPL 416(1)a	Pile Dynamic Analysis	10.00	each	719,017.58	7,190,175.80	2,567,919.93	3,735,156.26	887,099.61	
SPL 416(1)b	Pile Integrity Test	100.00	each	43,667.04	4,366,704.00	1,559,537.14	2,268,417.66	538,749.19	
SPL 417(1)b	Cast Iron Deck Drain	1,452.00	each	19,679.57	28,574,735.64	10,205,262.73	14,844,018.51	3,525,454.40	
SPL 417(2)a	Collector Pipe (150mm dia PVC)	11,610.40	l.m.	791.70	9,191,953.68	3,282,840.60	4,775,040.87	1,134,072.21	
SPL 417(2)b	Collector Pipe (200mm dia PVC)	3,532.00	l.m.	1,153.20	4,073,102.40	1,454,679.43	2,115,897.35	502,525.62	
SPL 418(a)	Expansion Joint, Type A (M80 Multiplex)	2,801.00	l.m.	29,418.63	82,401,582.63	29,429,136.65	42,806,016.95	10,166,429.03	
SPL 414	Metal Decking (8 mm thk)	134,262.00	sq.m.	2,428.25	326,021,701.50	116,436,321.96	169,361,922.86	40,223,456.68	
	SUB-TOTAL (PART F)				**8,336,646,742.13**	**2,977,373,836.48**	**4,330,725,580.33**	**1,028,547,325.33**	
G	**DRAINAGE AND SLOPE PROTECTION STRUCTURES**								
500(1)a	RCPC, 610 mm dia.	10,960.00	l.m.	3,082.45	33,783,610.35	12,065,575.13	17,549,927.46	4,168,107.77	
500(1)c	RCPC, 1220 mm dia.	2,000.00	l.m.	7,005.56	14,011,119.50	5,003,971.25	7,278,503.64	1,728,644.61	
502(1)	Manholes	100.00	each	28,779.72	2,877,972.00	1,027,847.14	1,495,050.39	355,074.47	
504(5)a	Grouted Riprap Class A (Slope Protection)	1,739.00	cu.m	3,946.61	6,863,154.79	2,451,126.71	3,565,275.22	846,752.86	
504(5)b	Grouted Riprap Class A (Side Ditch)	8,768.80	cu.m	3,794.21	33,270,668.65	11,882,381.66	17,283,464.23	4,104,822.76	
600a	Rolled Gutter (Median) 600mm x 200mm	10,961.00	l.m.	1,048.33	11,490,745.13	4,103,837.55	5,969,218.25	1,417,689.33	
600(1) b	Asphalt Curb Type B3	21,922.00	l.m.	360.74	7,908,142.28	2,824,336.53	4,108,125.86	975,679.89	
603(3)a	Single Metal Beam Guardrail (w/Post)	2,000.00	l.m.	3,796.71	7,593,420.00	2,711,935.71	3,944,633.77	936,850.52	
603(3)b	Double Metal Beam Guardrail (w/Post)	18,960.00	l.m.	6,597.25	125,083,860.00	44,672,807.14	64,978,628.57	15,432,424.29	
604(2)	Fancing (Chain Link)	36,434.00	l.m.	1,400.83	51,037,840.22	18,227,800.08	26,513,163.75	6,296,876.39	
610	Sodding	219,202.00	sq.m.	726.35	159,217,372.70	56,863,347.39	82,710,323.48	19,643,701.83	
611(1)	Tree Planting	14,000.00	each	493.00	6,902,000.00	2,465,000.00	3,585,454.55	851,545.45	
SPL 515	Mechanically Stabilized Earth (MSE) Wall	23,820.00	sq.m.	11,468.35	273,176,097.00	97,562,891.79	141,909,660.78	33,703,544.44	
	SUB-TOTAL (PART G)				**733,216,002.62**	**261,862,858.08**	**380,891,429.93**	**90,461,714.61**	
H	**MISCELLANEOUS STRUCTURES**								
605(1)a	Warning Signs	45.00	each	14,173.35	637,800.75	227,785.98	331,325.06	78,689.70	
605(2)	Regulatory Signs	91.00	each	14,034.06	1,277,099.46	456,106.95	663,428.29	157,564.22	
605(3)a	Informatory Signs (3.50m x 2.00m)	25.00	each	285,563.50	7,139,087.50	2,549,674.11	3,708,616.88	880,796.51	
605(3)b	Informatory Signs (4.50m x 2.50m)	10.00	each	388,903.66	3,889,036.60	1,388,941.64	2,020,278.75	479,816.20	
612(1)	Reflectorized Thermoplastic Pavement Markings	21,637.00	sq.m.	1,087.90	23,538,892.30	8,406,747.25	12,227,996.00	2,904,149.05	
612(2)	Reflectorized Studs 100x400x20	2,000.00	each	752.32	1,504,640.00	537,371.43	781,631.17	185,637.40	

TABLE 7.1.2-1 (4) ESTIMATED CIVIL WORK COST

Unit: Php in 2012 Prices

PAY ITEM NO.	DESCRIPTION	QUANTITY	UNIT	Unit Cost	Civil Work Cost	COST COMPONENT			Remarks
						Foreign Currency (FC)	Local Currency (LC)	TAXES	
613	Seeding with Coconet	350,000.00	sq.m.	166.01	58,103,500.00	20,751,250.00	30,183,636.36	7,168,613.64	
SPL	Noise Barrier	5,000.00	lm	48,031.19	240,155,950.00	85,769,982.14	124,756,337.66	29,629,630.19	
SPL	Installation of Fiber Optic	18,217.00	lm	6,881.28	125,356,362.34	44,770,129.41	65,120,188.23	15,466,044.70	
SPL 1110	Toll Road Linghting	150.00	each	158,671.93	23,800,789.50	8,500,281.96	12,364,046.49	2,936,461.04	
SPL200	Relocation of High-tension Electric Cable and Tower	1.00	PS	50,000,000.00	50,000,000.00	17,857,142.86	25,974,025.97	6,168,831.17	
SPL201	Traffic Signal	14.00	each	1,500,000.00	21,000,000.00	7,500,000.00	10,909,090.91	2,590,909.09	
	SUB-TOTAL (PART H)				**556,403,158.45**	**198,715,413.73**	**289,040,601.79**	**68,647,142.93**	
	SUB-TOTAL MAIN HIGHWAY				**12,046,654,493.85**	**4,302,376,604.95**	**6,258,002,334.47**	**1,486,275,554.44**	
3.0	**TOLL PLAZA AND SERVICE AREA**								
SPL 801	Truck Weigning Station	2.00	set	3,564,478.23	7,128,956.46	2,546,055.88	3,703,354.01	879,546.58	
SPL 1041(3)a	Toll Island,	44.00	each	138,225.73	6,081,931.95	2,172,118.56	3,159,445.17	750,368.23	
SPL 1041(4)	Crash Attenuators,	44.00	set	45,779.29	2,014,288.55	719,388.77	1,046,383.66	248,516.12	
SPL 1000	Toll Booth (Type 1)	38.00	each	387,204.43	14,713,768.34	5,254,917.26	7,643,516.02	1,815,335.05	
SPL 1010	Toll Booth (Maxi Type 2)	6.00	each	841,889.37	5,051,336.22	1,804,048.65	2,624,070.76	623,216.81	
SPL 1020	Toll Plaza	3,811.28	sq.m.	21,755.00	82,914,396.40	29,612,284.43	43,072,413.71	10,229,698.26	
SPL 1030	Toll Collection System	1.00	l.s.	40,000,000.00	40,000,000.00	14,285,714.29	20,779,220.78	4,935,064.94	
SPL 1040	Traffic Control System	1.00	l.s.	250,000,000.00	250,000,000.00	89,285,714.29	129,870,129.87	30,844,155.84	
SPL 1050	Toll Plaza Lighting System	60.00	each	307,858.73	18,471,523.80	6,596,972.79	9,595,596.78	2,278,954.24	
SPL 1130	Toll Operation Building	1.00	l.s.	100,000,000.00	100,000,000.00	35,714,285.71	51,948,051.95	12,337,662.34	
SPL 1140	Toll House	6.00	Unit	4,500,000.00	27,000,000.00	9,642,857.14	14,025,974.03	3,331,168.83	
	SUB-TOTAL TOLL PLAZA				**553,376,201.73**	**197,634,357.76**	**287,468,156.74**	**68,273,687.23**	
	TOTAL				**12,832,031,002.53**	**4,585,993,215.19**	**6,662,959,828.16**	**1,583,077,959.19**	

7.2 ENGINEERING SERVICE COST

Engineering service costs were estimated and summarized in **Table 7.2-1.**

TABLE 7.2-1 SUMMARY OF ENGINEERING SERVICE COST

Description	**Estimated Cost (Million Php)**	**Remarks**
a) Detailed Engineering Design Cost	210.81	Refer to **Table 7.2-2** and **Table 7.2-3**
b) Tender Assistance for Selection of Contractor	78.61	Refer to **Table 7.2-4** and **Table 7.2-5**
c) Construction Supervision Cost	474.54	Refer to **Table 7.2-6** and **Table 7.2-7**

TABLE 7.2-2 ENGINEERING COST FOR LAGUNA SECTION OF CALAX – DETAILED ENGINEERING DESIGN

Description	Unit	Unit Price	Quantity	Total
A. Professional Staff				
A-1 Remuneration				
1) Professional Staff (A)	M/M	JPY 2,500,000	78.00	JPY 195,000,000
2) Professional Staff (B)	M/M	JPY 300,000	207.00	JPY 62,100,000
Sub-Total (A-1)				JPY 257,100,000
A-2 Reimbursable Cost				
1) International Travel Expenses	RT	JPY 180,000	8.00	JPY 1,440,000
2) Subsistence Allowance	M/M	JPY 240,000	78.00	JPY 18,720,000
3) International Communication	Month	JPY 50,000	12.00	JPY 600,000
4) Vehicle Rental (5×12months)	Veh.-Mo.	JPY 140,000	60.00	JPY 8,400,000
5) Office Supply/Equipment	Month	JPY 250,000	12.00	JPY 3,000,000
6) Printing Cost	Month	JPY 350,000	12.00	JPY 4,200,000
7) Topographic Survey	L.S.	JPY 10,000,000	-	JPY 10,000,000
8) Soils/Geo-technical Investigation	L.S.	JPY 6,000,000	-	JPY 6,000,000
9) Parcellary Survey	L.S.	JPY 8,000,000	-	JPY 8,000,000
Sub-Total (A-2)				JPY 60,360,000
Sub-Total (A)				JPY 317,460,000
	(Equivalent to)			**Php 170,677,419**
B. Supporting Staff				
B-1 Remuneration				
1) Technical Support Staff	M/M	Php 50,000	198.00	Php 9,900,000
2) Administrative Staff	M/M	Php 50,000	69.00	Php 3,450,000
Sub-Total (B-1)				Php 13,350,000
B-2 Reimbursable Cost				
1) Office Rental (500m^2 × 400pesos/m^2)	Month	Php 200,000	12.00	Php 2,400,000
2) Office Operation/Maintenance	Month	Php 100,000	12.00	Php 1,200,000
3) Local Communication	Month	Php 50,000	12.00	Php 600,000
Sub-Total (B-2)				Php 4,200,000
Sub-Total (B)				**Php 17,550,000**
Total (A) + (B)				**Php 188,227,419**
VAT (12%)				**Php 22,587,290**
Grand Total				**Php 210,814,709**

Exchange Rate:
1 Php = 1.86 Yen

	JPY	Php	
Foreign	317,460,000	170,677,419	(77.4%)
Local	32,643,000	17,550,000	(11.9%)
Tax	42,012,359	22,587,290	(10.7%)
Total	392,115,359	210,814,709	(100.0%)

TABLE 7.2-3 ASSIGNMENT SCHEDULE FOR LAGUNA SECTION OF CALAX – DETAILED ENGINEERING DESIGN

Position	1	2	3	4	5	6	7	8	9	10	11	12	Man-Month	
													Foreign	Local
[Professional A]														
Project Manager	1	1	1	1	1	1	1	1	1	1	1	1	12.00	
Sr. Highway Engineer	1	1	1	1	1	1	1	1	1	1	1	1	12.00	
2 - Sr. Structural Engineer	2	2	2	2	2	2	2	2	2	2	2	2	24.00	
Sr. Interchange Engineer		1	1	1	1	1	1	1	1				8.00	
Toll Facility Engineer						1	1	1	1	1	1		6.00	
Toll System Engineer						1	1	1	1				4.00	
Sr. Document Specialist							1	1	1	1	1	1	6.00	
Sr. Cost Estimator							1	1	1	1	1	1	6.00	
Sub-total													**78.00**	
[Professional B]														
Deputy Team Leader	1	1	1	1	1	1	1	1	1	1	1	1		12.00
2 - Highway Engineer	2	2	2	2	2	2	2	2	2	2	2	2		24.00
3 - Structural Engineer	3	3	3	3	3	3	3	3	3	3	3	3		36.00
2 - Drainage Engineer				2	2	2	2	2						10.00
1 - Pavement Engineer			1	1	1	1	1							5.00
2 - Soils/Material Engineer		2	2	2	2	2								10.00
2 - Cost Estimator								2	2	2	2	2		10.00
2 - Document Specialist								2	2	2	2	2		10.00
Sr. Geodetic Engineer	1	1	1	1	1	1	1	1	1	1	1	1		12.00
Toll Facility Engineer						1	1	1	1	1	1			6.00
Toll System Engineer						1	1	1	1					4.00
Environmental Specialist			1	1	1	1	1	1	1	1				8.00
3 - RAP Specialist			3	3	3	3	3	3	3	3	3	3		30.00
3 - Independent Assesor			3	3	3	3	3	3	3	3	3	3		30.00
Sub-total														**207.00**
[Technical Support Staff]														
2 - Geodetic Engineer	2	2	2	2	2	2	2	2	2	2				20.00
6 - Civil Engineer			6	6	6	6	6	6	6	6	6			54.00
2 - Chief CAD Operator	2	2	2	2	2	2	2	2	2	2	2	2		24.00
10 - CAD Operator			10	10	10	10	10	10	10	10	10	10		100.00
Sub-total														**198.00**
[Administrative Staff]														
Admin. Officer	1	1	1	1	1	1	1	1	1	1	1	1		12.00
Secretary	1	1	1	1	1	1	1	1	1	1	1	1		12.00
3 - Encoder		3	3	3	3	3	3	3	3	3	3	3		33.00
Photocopy Man	1	1	1	1	1	1	1	1	1	1	1	1		12.00
Sub-total														**69.00**

TABLE 7.2-4 ENGINEERING COST FOR LAGUNA SECTION OF CALAX – TENDER ASSISTANCE FOR SELECTION OF CONTRACTOR (15 MONTHS)

Description		Unit	Unit Price		Quantity	Total	
A.	Professional Staff						
A-1	Remuneration						
1)	Professional Staff (A)	M/M	JPY	2,500,000	31.00	JPY	77,500,000
2)	Professional Staff (B)	M/M	JPY	300,000	62.00	JPY	18,600,000
	Sub-Total (A-1)					JPY	96,100,000
A-2	Reimbursable Cost						
1)	International Travel Expenses	RT	JPY	180,000	5.00	JPY	900,000
2)	Subsistence Allowance	M/M	JPY	240,000	31.00	JPY	7,440,000
3)	International Communication	Month	JPY	50,000	15.00	JPY	750,000
4)	Vehicle Rental (2 veh. X 15)	Veh.-Mo.	JPY	140,000	30.00	JPY	4,200,000
5)	Office Supply/Equipment	Month	JPY	150,000	15.00	JPY	2,250,000
6)	Printing Cost	L.S.	JPY	200,000	15.00	JPY	3,000,000
	Sub-Total (A-2)					JPY	18,540,000
Sub-Total (A)						JPY	114,640,000
		(Equivalent to)				**Php**	**61,634,409**
B.	Supporting Staff						
B-1	Remuneration						
1)	Technical Support Staff	M/M	Php	50,000	60.00	Php	3,000,000
2)	Administrative Staff	M/M	Php	50,000	60.00	Php	3,000,000
	Sub-Total (B-1)					Php	6,000,000
B-2	Reimbursable Cost						
1)	Office Rental (150m^2 × 400pesos/m^2)	Month	Php	60,000	15.00	Php	900,000
2)	Office Operation/Maintenance	Month	Php	60,000	15.00	Php	900,000
3)	Local Communication	Month	Php	50,000	15.00	Php	750,000
	Sub-Total (B-2)					Php	2,550,000
Sub-Total (B)						**Php**	**8,550,000**
Total (A) + (B)						**Php**	**70,184,409**
VAT (12%)						**Php**	**8,422,129**
Grand Total						**Php**	**78,606,538**

Exchange Rate:
1 Php = 1.86 Yen

	JPY	Php	
Foreign	114,640,000	61,634,409	(74.3%)
Local	15,903,000	8,550,000	(15.0%)
Tax	15,665,160	8,422,129	(10.7%)
Total	146,208,160	78,606,538	(100.0%)

TABLE 7.2-5 ASSIGNMENT SCHEDULE FOR LAGUNA SECTION OF CALAX – TENDER ASSISTANCE FOR SELECTION OF CONTRACTOR (15 MONTHS)

Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Man-Month	
																Foreign	Local
[Professional A]																	
Project Manager	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15.00	
Sr. Cost Estimator	1	1	1	1				1	1							6.00	
Sr. Document Specialist	1	1	1	1				1	1	1	1	1	1			10.00	
Sub-total																**31.00**	
[Professional B]																	
Deputy Project Manager	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		15.00
2 - Cost Estimator	2	2	2	2				2	2								12.00
2 - Document Specialist	2	2	2	2				2	2	2	2	2	2				20.00
RAP Monitoring Specialist	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		15.00
Sub-total																	**62.00**
[Technical Support Staff]																	
2 - Civil Engineer	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		30.00
2 - CAD Operator	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		30.00
Sub-total																	**60.00**
[Administrative Staff]																	
Admin. Officer /Secretary	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		15.00
2 - Encoder	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		30.00
Photocopy Man	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		15.00
Sub-total																	**60.00**

TABLE 7.2-6 ENGINEERING COST FOR LAGUNA SECTION OF CALAX – CONSTRUCTION SUPERVISION STAGE

Description		Unit	Unit Price	Quantity	Total
A.	**Professional Staff**				
A-1	Remuneration				
1)	Professional Staff (A)	M/M	JPY 2,500,000	151.00	JPY 377,500,000
2)	Professional Staff (B)	M/M	JPY 300,000	488.00	JPY 146,400,000
	Sub-Total (A-1)				**JPY 523,900,000**
A-2	Reimbursable Cost				
1)	International Travel Expenses	RT	JPY 180,000	11.00	JPY 1,980,000
2)	Subsistence Allowance	M/M	JPY 240,000	151.00	JPY 36,240,000
3)	International Communication	Month	JPY 50,000	29.00	JPY 1,450,000
4)	Vehicle Rental (6×29months)	Veh.-Mo.	JPY 130,000	174.00	JPY 22,620,000
5)	Office Supply/Equipment	Month	JPY 200,000	29.00	JPY 5,800,000
6)	Printing Cost	L.S.	JPY 200,000	29.00	JPY 5,800,000
	Sub-Total (A-2)				**JPY 73,890,000**
Sub-Total (A)					**JPY 597,790,000**
		(Equivalent to)			**Php 321,392,473**
B.	**Supporting Staff**				
B-1	Remuneration				
1)	Technical Support Staff	M/M	Php 50,000	1000.00	Php 50,000,000
2)	Administrative Staff	M/M	Php 50,000	269.00	Php 13,450,000
	Sub-Total (B-1)				**Php 63,450,000**
B-2	Reimbursable Cost				
1)	Office Rental (500m^2 × 500pesos/m^2)	Month	Php 250,000	29.00	Php 7,250,000
2)	Office Operation/Maintenance	Month	Php 50,000	29.00	Php 1,450,000
3)	Local Communication	Month	Php 30,000	29.00	Php 870,000
4)	Field Allowance	Month	Php 60,000	488.00	Php 29,280,000
	Sub-Total (B-2)				**Php 38,850,000**
Sub-Total (B)					**Php 102,300,000**
Total (A) + (B)					**Php 423,692,473**
VAT (12%)					Php 50,843,097
Grand Total					**Php 474,535,570**

Exchange Rate:
1 Php = 1.86 Yen

	JPY	Php	
Foreign	597,790,000	321,392,473	(64.1%)
Local	190,278,000	102,300,000	(25.2%)
Tax	94,568,160	50,843,097	(10.7%)
Total	882,636,160	474,535,570	(100.0%)

TABLE 7.2-7 ASSIGNMENT SCHEDULE FOR LAGUNA SECTION OF CALAX – CONSTRUCTION SUPERVISION STAGE

Position	Review			C/S																										Man-Month	
	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	Foreign	Local
[Professional A]																															
Project Manager	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	29.00	
Sr. Highway Engineer	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	29.00	
2 - Sr. Structural Engineer	2	2	2	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	48.00	
Sr. Material Engineer	1	1	1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	27.00	
Sr. Interchange Engineer	1	1	1		1	1	1	1	1	1						1	1	1	1	1	1			1	1	1				18.00	
Sub-total																														**151.00**	
[Professional B]																															
Deputy Project Manager	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		29.00
2 - Resident Engineer	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		58.00
2 - Highway Engineer	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		58.00
4 - Structural Engineer	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		116.00
2 - Drainage Engineer	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		58.00
2 - Material Engineer	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		58.00
2 - Quality Engineer	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		55.00
2 - Envt'l Monitoring Specialist		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		56.00
Sub-total																															**488.00**
[Technical Support Staff]																															
6 - Surveyor				6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6		156.00
8 - Material Inspector				8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8		208.00
8 - Structural Inspector				8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8		208.00
4 - Drainage Engineer				4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		104.00
6 - Civil Engineer				6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6		156.00
6 - CAD Operator	4	4	4	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6		168.00
Sub-total																															**1000.00**
[Administrative Staff]																															
2 - Administrative Officer	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		55.00
2 - Secretary	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		55.00
6 - Encoder	1	1	1	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6		159.00
Sub-total																															**269.00**

7.3 RIGHT-OF-WAY (ROW) ACQUISITION COST

Right-of-way acquisition and RAP cost was estimated at **Php 3,582.48 Million** as shown in **Table 7.3-1.**

TABLE 7.3-1 ROW ACQUISITION COST AND RAP COST

Unit: Million Php in 2012 Prices

		Land Use	Note
A) Road Right-of-Way Acquisition			
1) Land Acquisition			
	Million Php		
Silang 10,260 m x 60 m = 615,600 m2 x 650 Php/m2 =	400.140	Agri. Land	Expressway
Silang 1,050 m x 30 m = 31,500 m2 x 650 Php/m2 =	20.475	Agri. Land	IC Link Road
Sta. Rosa 850 m x 60 m = 51,000 m2 x 5,000 Php/m2 =	255.000	Road	Expressway
Sta. Rosa 800 m x 45 m = 36,000 m2 x 5,000 Php/m2 =	180.000	Road	Connection Road
Sta. Rosa 830 m X 60 m = 49,800 m2 x 5,000 Php/m2 =	249.000	Road	Connection Road
Biñan 5,400 m x 60 m = 324,000 m2 x 5,000 Php/m2 =	1,620.000	Road	Expressway (Laguna Blvd.)
Biñan 1,610 m x 50 m = 80,500 m2 x 10,000 Php/m2 =	805.000	Under Development	Expressway (Greenfield)
Sub-total (1) 1,188,400 m2	**3,529.615**		***Agri. Land = 64.71 ha.*** ***Road = 46.08 ha.*** ***Under Development = 8.05 ha***
2) Structures and Improvement	46.586		
* Houses	17.423		36 houses
* Other Structures	14.352		34 Structure (commercial store, pig pens, etc.)
* Trees and perennials	14.811		9,393 trees
3) Cash Compensation for Disturbance Allowance (crops)	4.374		64.71 ha.
4) Income Loss	0.060		4 Eatery and Sari-sari Store
5) Rental Subsidy	0.015		5 Renters (Php 3,000)
6) Unemployed Women	1.350		180 (50 + 130) households x 0.5 x 15,000 Pesos
7) Allowance for Vulnerable Person	0.810		180 (50 + 130) households x 0.3 x 15,000 Pesos
Sub-total (2) ~ (7)	**53.195**		
Sub-total (A)	**3,582.810**		
B) RAP Implementation			
1) Cost for External Monitoring	**1.600**		
2) Cost for MRIC/CRIC	**2.250**		
3) Cost for Grievance Committee	**0.750**		
4) Cost for Social Development Program (SDP)	**1.000**		
5) Cost for Public Meetings	**0.600**		
Sub-total (B)	**6.200**		
Total: (A) + (B)	**3,589.010**		
Contingency (5%)	**179.451**		
Grand Total	**3,768.461**		

7.4 ADMINISTRATIVE COST

Administrative cost of DPWH was assumed to be 1.5% of Civil Work Cost and estimated to be Php 192.48 Million at 2012 prices.

7.5 SUMMARY OF PROJECT COST BEFORE O&M STAGE

Summary of project cost excluding price escalations and O & M stage is shown in **Table 7.5-1** by cost component and **Table 7.5-2** by cost sharing.

TABLE 7.5-1 CAVITE-LAGUNA EXPRESSWAY: LAGUNA SECTION
SUMMARY OF PROJECT COST: BEFORE O&M STAGE BY COST COMPONENT

Unit : Million Php in January 2012 Prices

Item		Cost (Million Php)	Cost Component (Million Php)		
			Foreign	Local	Tax
Civil Work (Base Cost)	**Civil Work**	**12,278.65**	4,388.35	6,375.49	1,514.81
	Toll Facility Installation	**553.38**	197.64	287.47	68.27
	Sub-total	**12,832.03**	**4,585.99**	**6,662.96**	**1,583.08**
Engineering Services Cost (Base Cost)	**Detailed Engineering Design**	**210.82**	170.68	17.55	22.59
	Tender Assistance for Contractor Selection	**78.61**	61.64	8.55	8.42
	Construction Supervision	**474.54**	321.39	102.30	50.85
	Sub-total	**763.97**	**553.71**	**128.40**	**81.86**
ROW Acquisition Cost (Base Cost)		**3,589.01**	**-**	**3,204.47**	**384.54**
Physical Contingency (5%)	**Civil Work**	**613.93**	219.42	318.77	75.74
	Toll Facility Installation	**27.67**	9.88	14.38	3.41
	Engineering Services	**38.20**	27.69	6.42	4.09
	ROW Acquisition	**179.45**	-	160.22	19.23
	Sub-total	**859.25**	**256.99**	**499.79**	**102.47**
Administrative Cost (1.5% of Civil Work Cost)		**192.50**	-	192.50	-
Total		**18,236.76**	**5,396.69**	**10,688.12**	**2,151.95**

TABLE 7.5-2 CAVITE-LAGUNA EXPRESSWAY: LAGUNA SECTION SUMMARY OF PROJECT COST: BEFORE O&M STAGE BY COST SHARING

Unit : Million Php in January 2012 Prices

Item		Cost (Million Php)	Cost Sharing (Million Php)		
			GOP	Yen Loan	Concessionaire
Civil Work (Base Cost)	**Civil Work**	**12,278.65**	1,514.81	10,763.84	-
	Toll Facility Installation	**553.38**	-	-	553.38
	Sub-total	**12,832.03**	**1,514.81**	**10,763.84**	**553.38**
Engineering Services Cost (Base Cost)	**Detailed Engineering Design**	**210.82**	22.59	188.23	-
	Tender Assistance for Contractor Selection	**78.61**	8.42	70.19	-
	Construction Supervision	**474.54**	50.85	423.69	-
	Sub-total	**763.97**	**81.86**	**682.11**	**-**
ROW Acquisition Cost (Base Cost)		**3,589.01**	**3,589.01**	**-**	**-**
Physical Contingency (5%)	**Civil Work**	**613.93**	75.74	538.19	-
	Toll Facility Installation	**27.67**	-	-	27.67
	Engineering Services	**38.20**	4.09	34.11	-
	ROW Acquisition	**179.45**	179.45	-	-
	Sub-total	**859.25**	**259.28**	**572.30**	**27.67**
Administrative Cost (1.5% of Civil Work Cost)		**192.50**	192.50	-	-
Total		**18,236.76**	**5,637.46**	**12,018.25**	**581.05**

7.6 COST IN O&M STAGE

Costs in O & M Stage were estimated as follows;

SUMMARY OF COST IN O&M STAGE

Unit: Million Php in 2012 Prices

Description	Estimated Cost (Million Php)	Remarks
Routine Maintenance Cost	33.25	See **Table 7.6-1**
Operation Cost	188.53	See **Table 7.6-2**
Annual O & M Cost	221.78	
Periodic Maintenance Cost (every 5 years)	294.23	See **Table 7.6-3**

TABLE 7.6-1 ROUTINE MAINTENANCE WORK YEARLY COST FOR CALAX (COST IN PHP) LAGUNA SECTION

Description of Routine Maintenance	**Unit**	**Unit Rate (Php)**	**Quantity**	**Amount Php**
Patch Bituminous Pavement (5% of Total Quantity)	m2	870	18,672.00	16,244,640.00
Repair & Replace Guardrail (5% of TQ)	Lm	1,827	910.90	1,664,214.30
Replace Lighting Lamps (5% of TQ)	each	23,165	8.00	185,320.00
Repair of Replace Lighting Poles (5% of TQ)	each	36,000	8.00	288,000.00
General Roadway Maintenance (Total Length)	km	41,760	18.60	776,736.00
Clean Drainage (5% of TQ)	Lm	100	1,821.70	182,170.00
Clean Culverts	Each	6,525	109.00	711,225.00
Repair Culverts	Each	22,838	109.00	2,489,342.00
Inspect Bridge and Viaduct (TL)	Lm	200	7,256.50	1,451,300.00
Repair Bridge and Viaduct (0.5% of TQ)	m2	1,827	743.80	1,358,922.60
Repair Road Marking Lines (10% of TQ)	km	163,908	9.20	1,507,953.60
Repair Signs (10% of TQ)	each	16,965	8.00	135,720.00
Pick-up Litter (Road Cleaning)(TL)	km	73,950	18.60	1,375,470.00
Miscellaneous Maintenance (TL)	km	100,000	18.60	1,860,000.00
Maintenance Management (10% of above cost)	year	3,022,975	1.00	3,022,975.00
Routine Maintenance				**33,253,988.50**

TABLE 7.6-2 OPERATION COST (EVERY YEAR) LAGUNA SECTION

Description	**Unit**	**Unit Rate (Php)**	**Quantity**	**Amount/ Year (Php)**
Electricity	kwh	10	1,500,000.00	15,000,000.00
Cost of Staff	each/yr	520,000	278.00	144,560,000.00
Running Cost for Office anf Toll Booths	m2	8,000	1,371.44	10,971,520.00
Maintenance for Toll System	month	1,500,000	12.00	18,000,000.00
Total of O/M Cost				**188,531,520.00**

TABLE 7.6-3 PERIODIC MAINTENANCE (EVERY FIVE YEARS) LAGUNA SECTION

Description	**Unit**	**Unit Rate (Php)**	**Quantity**	**Amount/ Year (Php)**
Pavement Overlays (TQ) (50% area)	LS	186,724,250	1.00	186,724,250.00
Bridge (TQ)(20%)	LS	54,356,000	1.00	54,356,000.00
Lightning (TQ) (25%)	LS	13,150,000	1.00	13,150,000.00
Toll Collection System	LS	40,000,000	1.00	40,000,000.00
Total of Periodic Maintenance (Every Five Years)				**294,230,250.00**

CHAPTER 8
ECONOMIC AND FINANCIAL EVALUATION

8.1 ECONOMIC EVALUATION

8.1.1 Methodology

The economic analysis shall be determined whether the construction and operation of the proposed project will be feasible based on the benefits and costs to be derived from the project. The transport projects such as Cavite Laguna Expressway (CALAX) can play a very important role in strengthen of the economic growth. It is required however, that the project must be economically viable, satisfying the government-prescribed hurdle rates.

Annual economic cost and benefits shall be estimated under "with project" and "without project" case. The difference in economic costs and benefits in both cases shall be attributed to the project and subjected to economic feasibility measurement. The economic feasibility of the project shall be indicated by the economic internal rate of return (EIRR), benefit-cost ratio (B/C), and net present value (NPV) at an assumed discount rate of 15%, which is acceptable social discount rate for economic appraisal of public investment projects in the country. The hurdle rates for economic feasibility are the following: EIRR $\geq$ 15%, B/C $\geq$ 1.0, and NPV $\geq$ 0. Sensitivity of the project arising from adverse changes in costs and benefits shall be examined to establish the capacity of the project to exhibit economic feasibility under these cases.

(1) General Work Flow of Economic Evaluation

Figure 8.1.1-1 shows the work flow of economic evaluation.

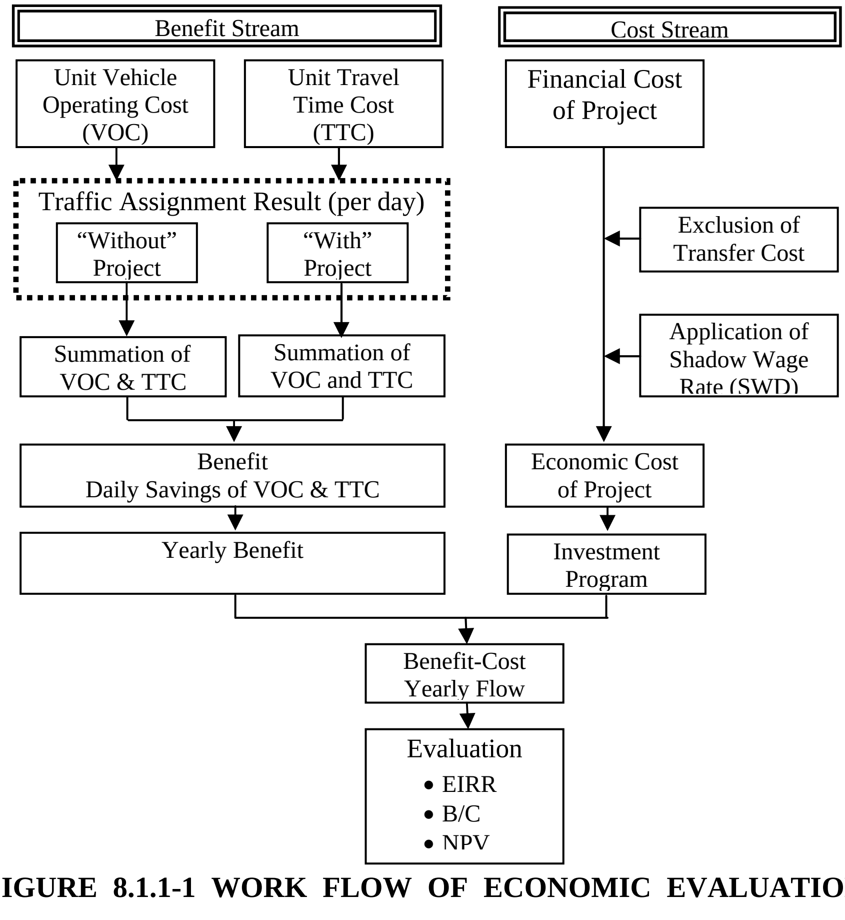


FIGURE 8.1.1-1 WORK FLOW OF ECONOMIC EVALUATION

(2) Indicators of Economic Evaluation

Economic costs and benefits throughout the project life periods are compared by a discount cash flow analysis. The discount rate (hereinafter referred to as “DR”) is at 15%, which is widely used in Philippines as a social discount rate. For economic evaluation, three indicators are calculated: Economic Internal Rate of Return (hereinafter referred to as “EIRR”), Benefit/Cost Ratio (hereinafter referred to as “B/C”) and Net Present Value (hereinafter referred to as “NPV”). In addition, the economic life is assumed to be 30 years, taking into account future rapid growth and changes of socioeconomic conditions. Therefore, the Pro-forma cash flow of a project evaluation will be prepared for 2012-2047. They are defined as **Table 8.1.1-1**.

TABLE 8.1.1-1 INDICATORS OF ECONOMIC EVALUATION

No.	Indicators	Calculation Formula or Value
1	Discount rate (DR)	15% in Philippines as a social discount rate
2	Economic Internal Rate of Return (EIRR)	r satisfying: $\sum \frac{B_n}{(1+r)^n} = \sum \frac{C_n}{(1+r)^n}$ *B*: benefit, *C*: Cost
3	Benefit/Cost Ratio (B/C)	$\sum \frac{B_n}{(1+DR)^n} \div \sum \frac{C_n}{(1+DR)_n}$
4	Net Present Value (NPV)	$\sum \frac{B_n - C_n}{(1+DR)^n}$
5	Pro-forma cash flow of a project evaluation	Period for 2012-2047

Source: JICA Study Team

(3) Economic Evaluation Case

Table 8.1.1-2 shows the economic evaluation case.

TABLE 8.1.1-2 ECONOMIC EVALUATION CASE

Case - 1	CALAX (Cavite Section and Laguna Section)
Case - 2	CALAX (Laguna Section only)

8.1.2 Economic Cost of the Project

(1) Initial Cost

1) Laguna Section

The project cost must be estimated by shadow price in the cost benefit analysis. This is because market price is distorted by governmental system and policies such as custom duty, and market intervention. The shadow price expresses the real value of the resources.

The Project cost of CALAX (Laguna Section) is estimated in market prices in Chapter 7**.** It is converted into economic cost and the residual cost after the project life is calculated for economic evaluation, taking the following process.

(a) Out of material and equipment cost, import duty and value added tax (VAT) at 12% are deducted.

(b) The foreign exchange cost is applied with shadow price of 1.2 while the unskilled labor at 0.6(Guidelines for accomplishing ICC-PE Form, NEDA).

(c) The life year will be considered at 30 years.

Figure 8.1.2-1 illustrated the estimated financial cost and economic cost for construction cost including the physical contingency (5%). **Table 8.1.2-1** shows the financial cost and economic cost of consultant cost.
Other items (ROW Acquisition Cost, Administration Cost) are deducted only VAT at 12%.

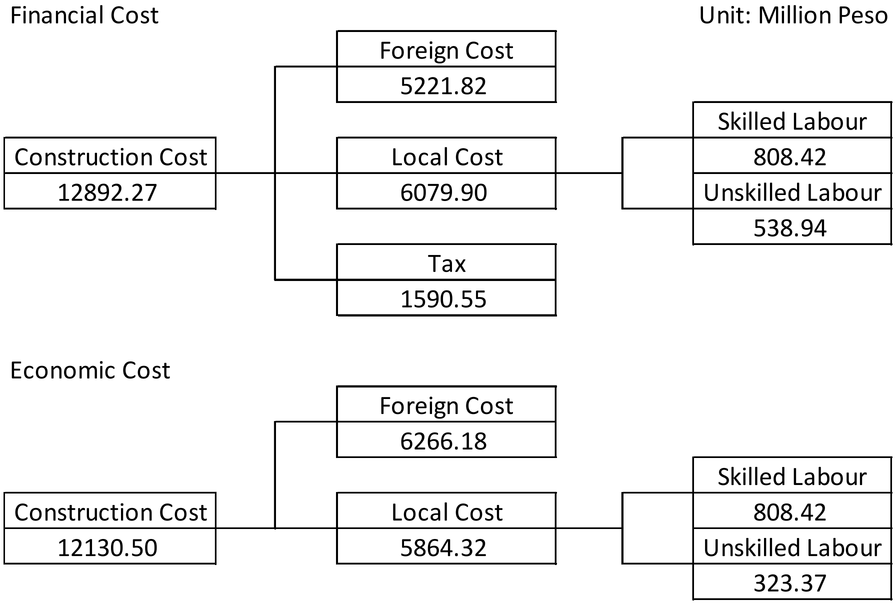


FIGURE 8.1.2-1 ESTIMATED ECONOMIC COST OF CONSTRUCTION COST (LAGUNA SECTION)

TABLE 8.1.2-1 ESTIMATED ECONOMIC COST OF CONSULTANT FEE (LAGUNA SECTION)

	Financial Cost w Physical Contingency (5%)				Economic Cost w shadow price		
	Foreign	Local	Tax	Total	Foreign	Local	Total
Detailed Engineering Design (DED)	179.21	18.43	23.72	221.36	215.06	18.43	233.48
Tender Assistance for selection of Contractor	64.72	8.98	8.84	82.54	77.67	8.98	86.64
Construction Supervision Cost	337.46	107.42	53.38	498.26	404.95	107.42	512.37
Total	581.40	134.82	85.94	802.16	697.67	134.82	832.49

TABLE 8.1.2-2 ESTIMATED ECONOMIC COST (LAGUNA SECTION)

Year 2012 Price

Million Pesos

Description	Financial Cost(A)	Economic Cost(B)	Rate=(B/A)
1. ROW Acquisition Cost	3,768.46	3,364.70	0.89
2. Detailed Engineering Design(DED)	221.36	233.48	1.05
3.Tender Assistance for selection of Contractor	82.54	86.64	1.05
4. Construction Cost	12,892.27	12,130.50	0.94
5. Construction Supervision Cost	498.26	512.37	1.03
6. Administration Cost	192.48	171.86	0.89
Total	**17,655.37**	**16,499.55**	**0.93**

Source: JICA Study Team

2) Cavite Section

The Project cost of CALAX (Cavite Section) is estimated in market prices by SMEC**.** Since the detailed financial cost of Cavite Section is not available, it is converted into economic cost considering the deduction of VAT at 12% for all items.

TABLE 8.1.2-3 ESTIMATED ECONOMIC COST (CAVITE SECTION)

Year 2012 Price

Million Pesos

Description	Financial Cost(A)	Economic Cost(B)	Rate=(B/A)
1.ROW Acquisition Cost	4,000.00	3,560.00	0.89
2.Detailed Engineering Design(DED)	231.89	207.40	0.89

3.Insurance Cost of DED	28.80	25.72	0.89
4.Independent Consultant(IC) for DED Stage	25.76	22.93	0.89
5.Construction Cost	16,300.00	14,507.00	0.89
6.Insurance Cost of Construction	158.40	140.98	0.89
7.Construction Supervision	493.52	439.23	0.89
8.IC for Construction Stage	70.78	63.21	0.89
9.Administration Cost	455.00	406.25	0.89
Total	**21,764.15**	**19,372.35**	**0.89**

Source: JICA Study Team

Table 8.1.2-4 ~ **5** shows the implementation schedule and yearly initial cost flow.

TABLE 8.1.2-4 IMPLEMENTATION SCHEDULE AND INITIAL COST (ECONOMIC COST PER YEAR, CAVITE SECTION)

Description	Eco. Cost (Mil.Peso)	2012	2013	2014	2015	2016
1. ROW Acquisition Cost	3,560.00	▬	▬	▬		
2. Detailed Engineering Design(DED)	207.40		▬	▬		
3. Insurance Cost of DED	25.72		▬	▬		
4. Independent Consultant (IC) for DED Stage	22.93		▬	▬		
5. Construction Cost	14,507.00			▬	▬	▬
6. Insurance Cost of Construction	140.98			▬	▬	▬
7. Construction Supervision	439.23			▬	▬	▬
8. IC for Construction Stage	63.21			▬	▬	▬
9. Administration Cost	406.25	▬	▬	▬	▬	▬
Economic Cost (Mil. Peso)	**19,372.72**	**1,091.00**	**2,083.35**	**4,409.66**	**6,150.44**	**5,637.91**

TABLE 8.1.2-5 IMPLEMENTATION SCHEDULE AND INITIAL COST (ECONOMIC COST PER YEAR, LAGUNA SECTION)

Description	Eco. Cost (Mil.Peso)	2013	2014	2015	2016	2017
1. ROW Acquisition Cost	3,364.70	▬	▬	▬		
2. Detailed Engineering Design(DED)	233.48	▬	▬			
3. Tender Assistance for Selection of Contractor	86.64		▬	▬		
4. Construction Cost	12,130.50			▬	▬	▬
5. Construction Supervision Cost	512.37			▬	▬	▬
6. Administration Cost	171.86	▬	▬	▬	▬	▬
Economic Cost (Mil. Peso)	**16,499.55**	**489.87**	**2,494.94**	**4,704.90**	**5,873.36**	**2,936.68**

(2) Operation and Maintenance Cost

The Operation and Maintenance Cost was estimated. The operation cost is for daily road/traffic management of the road facility. The maintenance cost consists of the routine maintenance and the periodic maintenance. The operation and maintenance costs was estimated and shown in **Table 8.1.2-6.**

TABLE 8.1.2-6 OPERATION AND MAINTENANCE AND OTHER COSTS

Million Pesos

Item		Financial Cost (A)	Economic Cost (B)	Rate (B/A)
CALAX(Cavite Section)				
1	O &M Cost per year	270.00	253.13	0.89
2	Insurance Cost per year	24.00	22.88	0.89
3	Periodic M Cost every 5 years	455.00	406.25	0.89
CALAX(Laguna Section)				
1	O &M Cost per year	221.78	198.02	0.89
2	Insurance Cost per year	20.90	18.60	0.89
3	Periodic M Cost every 5 years	292.71	262.71	0.89

Source: JICA Study Team

8.1.3 Economic Benefit of the Project

Economic benefits are calculated according to multiplied the estimated traffic volumes and unit Vehicle Operating Cost (VOC) /Travel Time Cost (TTC) respectively for each case, and the amount of ‘without’ case minus ‘with’ case is considered as the benefit provided by the project.

(1) Unit Vehicle Operating Cost (VOC) and Unit Travel Time Cost (TTC)

(a) Unit Vehicle Operating Cost (VOC)

The VOC per unit distance is estimated by type of vehicle being composed of the following components; they are a) fuel cost, b) oil cost, c) tire cost, d) spare parts cost, e) depreciation cost, f) capital opportunity cost and g) crew and overhead cost. The type of vehicles is motor-tricycle, car, van, Jeepney, bus and truck.

The Department of Public Works and Highways (DPWH) has been periodically updating VOC data in order to use as input to the HDM Model for the appraisal of highway development and maintenance projects. There are the detailed data of VOC in 2008 (see **Table 8.1.3-1**), therefore, these data are revised and updated in accordance with the consumer price indices (Average CPI 3.6%) . They are summarized in **Table 8.1.3-2**.

TABLE 8.1.3-1 UNIT VOC BY VEHICLE TYPE IN SEPTEMBER 2008

(Pesos per veh-km)

Speed (km/h)	1 Motor-Tricycle	2 Car	3 Jeepney	4 Goods Utility	5 Small Bus	6 Large Bus	7 Rigid Truck 2ax	8 Rigid Truck 3ax	9 Semi-Trailer 4ax	10 Semi-Trailer 5ax
20	3.32	12.33	9.54	10.85	23.81	33.37	23.17	37.71	41.40	43.79
30	2.78	10.51	8.09	9.06	20.31	28.11	20.02	32.50	36.37	38.73
40	2.43	9.19	7.13	7.83	17.78	24.40	17.89	29.06	33.26	35.63
50	2.32	8.53	6.75	7.31	16.53	22.66	17.01	27.86	32.46	34.86
60	2.35	8.22	6.72	7.18	15.96	22.00	16.76	27.85	32.79	35.13
70	2.46	8.14	6.91	7.32	15.79	22.04	16.83	28.51	33.55	35.78
80	2.48	8.21	7.24	7.61	15.83	22.55	17.06	29.45	34.52	36.69
90	2.48	8.37	7.63	7.97	15.95	22.57	17.35	29.45	35.58	37.73
100	2.48	8.58	8.00	8.32	16.10	22.57	17.51	29.45	36.04	38.19
110	2.48	8.78	8.30	8.59	16.22	22.57	17.51	29.45	36.04	38.19
120	2.48	8.83	8.52	8.78	16.30	22.57	17.51	29.45	36.04	38.19

Source: DPWH

TABLE 8.1.3-2 UNIT VOC BY VEHICLE TYPE IN 2012

(Pesos per veh-km)

Speed (km/h)	1 Motor-Tricycle	2 Car	3 Jeepney	4 Goods Utility	5 Small Bus	6 Large Bus	7 Rigid Truck	8 Rigid Truck	9 Semi-Trailer	10 Semi-Trailer
20	3.70	13.71	10.61	12.07	26.48	37.11	25.77	41.93	46.04	48.69
50	2.58	9.48	7.51	8.13	18.38	25.19	18.91	30.98	36.10	38.77
80	2.76	9.12	8.05	8.47	17.60	25.07	18.97	32.75	38.38	40.79
90	2.76	9.31	8.49	8.87	17.74	25.10	19.29	32.75	39.56	41.95
100	2.76	9.54	8.90	9.25	17.90	25.10	19.47	32.75	40.08	42.47

Source: DPWH, JICA Study Team

The VOC saving in whole road network will be calculated according to multiplied the estimated traffic volumes and unit VOC. The unit VOC by type of vehicles will be corresponded to the four (4) vehicle types of estimated traffic volume such as 1) Passenger Car, 2) Jeepney, 3) Large Bus and 4) Truck. The VOC of truck types will be converted by weighted average of vehicle composition. The unit VOC cost by type of vehicles by vehicle speed is shown in **Table 8.1.3-3.**

TABLE 8.1.3-3 UNIT VOC BY FOUR (4) VEHICLE TYPES IN 2012

Peso/km/veh

Speed (km/hr)	Passenger Car	Jeepney	Bus	Truck
20	13.71	10.61	37.11	32.79
30	11.69	9.00	31.26	28.45
40	10.22	7.93	27.14	25.60
50	9.48	7.51	25.19	24.57
60	9.14	7.47	24.46	24.45
70	9.05	7.68	24.51	24.78
80	9.12	8.05	25.07	25.33
90	9.31	8.49	25.10	25.73
100	9.54	8.90	25.10	25.93

Source: DPWH, JICA Study Team

(b) Unit Travel Time Cost (TTC)

The Travel Time Cost (TTC) is normally calculated based on the average labor productivity in the Philippines. The basic costs for TTC by type of passenger were obtained also from the DPWH. The values are 2012 price level. In the derivation of the TTC, the average income, employment and the gross national product were used as the basis to calculate for the working time and non-working time per person-hour for representative vehicle type and thence estimate for the passenger time cost per person.

Basically, reduction in travel time is the main component in the derivation of the TTC saving. The annual savings was calculated as the difference in travel time between the base road network and with CALAX road network. Travel time as estimated in the model is the result of the changes in traffic volume caused changes in the congestion level brought by diversion of part of traffic to a more convenient route in the road network.

The unit TTC of vehicles will also be corresponded to the four (4) vehicle types of estimated traffic volume such as 1) Passenger Car, 2) Jeepney, 3) Large Bus and 4) Truck. The TTC of truck types will be converted by weighted average of vehicle composition. The unit TTC cost by type of vehicles in year 2012 which were updated based on the consumer price indices (Average CPI 3.6%), is shown in **Table 8.1.3-5.**

TABLE 8.1.3-4 UNIT TRAVEL TIME COST IN 2008

Peso/min/veh.

1. Motorcycle/ Tricycle	2. Passenger Car	3. Jeepney	4. Goods Utility	5. Small Bus	6. Large Bus	7. Rigid Truck 2axle	8. Rigid Truck 3axle	9. Rigid Truck 4axle	10. Rigid Truck 5axle
1.37	6.81	7.44	2.57	12.69	27.82	1.02	1.46	2.10	2.10

Source: DPWH

TABLE 8.1.3-5 UNIT TRAVEL TIME COST IN 2012

Peso/min/veh.

Vehicle Type	2012
Passenger Car	7.84
Jeepney	8.57

Bus	32.05
Truck	1.49

Source: JICA Study Team

(2) Estimation of Economic Benefit (VOC and TTC Saving)

Based on the unit VOC by vehicle type by vehicle speed and the total vehicle-km, daily VOC saving by year will be estimated. The daily TTC saving by year also will be estimated based on the unit TTC by vehicle type and the total vehicle-hour. **Table 8.1.3-6**.

TABLE 8.1.3-6 ECONOMIC BENEFIT

Year	Economic Benefit (1,000 Peso/day)		
	VOC	TTC	Total
CALAX (Cavite and Laguna Section) CASE-1			
2017	8,820	27,672	36,492
2020	13,058	42,043	55,101
2030	7,199	62,910	70,109
CALAX (Laguna Section only) CASE-2			
2017	6,229	12,906	19,135
2020	8,379	15,295	23,674
2030	6,082	25,264	31,346

Source: JICA Study Team

(3) Other Economic Benefits

With the increasing congestion of the existing road, the greater is the likelihood of the occurrence of the accidents due to conflicts between pedestrian and vehicle. It is anticipated that with the project, accidents happening on at-grade could be avoided. In this Study, however, benefit from possible reduction of road accident is not considered since there is no acceptable value assigned to traffic accidents in the country.

8.1.4 Results of Economic Analysis

The performance at **Table 8.1.4-1** and **Table 8.1.4-2** of the project based on indicators of economic feasibility is:
<Year 2012, Philippine Peso Base>

Case-1 Cavite and Laguna Section

EIRR	33.0%
B/C	2.85
NPV (Million Peso @ i=15%)	47,806.6

Case-2 Laguna Section

EIRR	35.0%
B/C	2.92
NPV (Million Peso @ i=15%)	21,208.5

The economic costs and benefits of the project generated a positive NPV and on EIRR that is much higher than the government prescribed hurdle rate (15%). These values indicate that the project is economically viable.

TABLE 8.1.4-1 COST-BENEFIT STREAM (CASE-1, CAVITE AND LAGUNA SECTION)

Undiscounted Benefit Cost Stream Revenue

Million Peso

sq	Year	Construction Cost	Other Cost (ROW,DED, CS etc.)	O &M	Cost Total	VOC Benefit	TTC Benefit	Benefit	Benefit - Cost
1	2012	0.0	1,091.0		1,091.0			0.0	-1,091.0
2	2013	0.0	2,573.2		2,573.2			0.0	-2,573.2
3	2014	3,385.0	3,519.4		6,904.4			0.0	-6,904.4
4	2015	9,535.3	1,320.1		10,855.3			0.0	-10,855.3
5	2016	10,917.9	593.3	21.9	11,533.1	78.8	449.1	527.9	-11,005.2
6	2017	2,799.3	137.3	375.8	3,312.5	2,082.5	7,744.9	9,827.4	6,515.0
7	2018			489.1	489.1	3,669.1	11,611.4	15,280.5	14,791.5
8	2019			489.1	489.1	4,181.8	13,348.6	17,530.4	17,041.3
9	2020			489.1	489.1	4,766.2	15,345.7	20,111.9	19,622.8
10	2021			1,171.2	1,171.2	4,490.6	15,976.8	20,467.4	19,296.3
11	2022			489.1	489.1	4,231.1	16,633.8	20,864.9	20,375.8
12	2023			489.1	489.1	3,986.5	17,317.9	21,304.3	20,815.3
13	2024			489.1	489.1	3,756.0	18,030.1	21,786.1	21,297.0
14	2025			489.1	489.1	3,538.9	18,771.5	22,310.4	21,821.3
15	2026			1,171.2	1,171.2	3,334.3	19,543.5	22,877.8	21,706.6
16	2027			489.1	489.1	3,141.6	20,347.2	23,488.8	22,999.7
17	2028			489.1	489.1	2,960.0	21,184.0	24,143.9	23,654.9
18	2029			489.1	489.1	2,788.9	22,055.1	24,844.0	24,354.9
19	2030			489.1	489.1	2,627.6	22,962.2	25,589.8	25,100.7
20	2031			1,171.2	1,171.2	2,627.6	22,962.2	25,589.8	24,418.6
21	2032			489.1	489.1	2,627.6	22,962.2	25,589.8	25,100.7
22	2033			489.1	489.1	2,627.6	22,962.2	25,589.8	25,100.7
23	2034			489.1	489.1	2,627.6	22,962.2	25,589.8	25,100.7
24	2035			489.1	489.1	2,627.6	22,962.2	25,589.8	25,100.7
25	2036			1,171.2	1,171.2	2,627.6	22,962.2	25,589.8	24,418.6
26	2037			489.1	489.1	2,627.6	22,962.2	25,589.8	25,100.7
27	2038			489.1	489.1	2,627.6	22,962.2	25,589.8	25,100.7
28	2039			489.1	489.1	2,627.6	22,962.2	25,589.8	25,100.7
29	2040			489.1	489.1	2,627.6	22,962.2	25,589.8	25,100.7
30	2041			1,171.2	1,171.2	2,627.6	22,962.2	25,589.8	24,418.6
31	2042			489.1	489.1	2,627.6	22,962.2	25,589.8	25,100.7
32	2043			489.1	489.1	2,627.6	22,962.2	25,589.8	25,100.7
33	2044			489.1	489.1	2,627.6	22,962.2	25,589.8	25,100.7
34	2045			489.1	489.1	2,627.6	22,962.2	25,589.8	25,100.7
35	2046			1,171.2	1,171.2	2,627.6	22,962.2	25,589.8	24,418.6
36	2047			244.5	244.5	1,313.8	11,481.1	12,794.9	12,550.4
		26,637.5	9,234.4	18,918.1	54,790.0	92,989.9	620,197.2	713,187.1	658,397.1

Discounted Benefit Cost Stream Revenue

Million Peso

sq	Year	Discounted	Construction Cost	Other Cost (ROW,DED, CS etc.)	O &M	Cost Total	VOC Benefit	TTC Benefit	Benefit	Benefit - Cost
1	2012	1.00	0.0	1,091.0		1,091.0			0.0	-1,091.0
2	2013	1.15	0.0	2,237.6		2,237.6			0.0	-2,237.6
3	2014	1.32	2,559.5	2,661.2		5,220.7			0.0	-5,220.7
4	2015	1.52	6,269.6	868.0		7,137.6			0.0	-7,137.6
5	2016	1.75	6,242.4	339.2		6,581.6	45.1	256.8	301.9	-6,279.8
6	2017	2.01	1,391.8	68.3	186.8	1,646.9	1,035.4	3,850.6	4,886.0	3,239.1
7	2018	2.31			211.4	211.4	1,586.3	5,019.9	6,606.2	6,394.8
8	2019	2.66			183.9	183.9	1,572.1	5,018.2	6,590.3	6,406.5
9	2020	3.06			159.9	159.9	1,558.1	5,016.5	6,574.6	6,414.7
10	2021	3.52			332.9	332.9	1,276.5	4,541.6	5,818.1	5,485.2
11	2022	4.05			120.9	120.9	1,045.9	4,111.6	5,157.5	5,036.6
12	2023	4.65			105.1	105.1	856.9	3,722.4	4,579.2	4,474.1
13	2024	5.35			91.4	91.4	702.0	3,369.9	4,072.0	3,980.6
14	2025	6.15			79.5	79.5	575.2	3,050.9	3,626.1	3,546.6
15	2026	7.08			165.5	165.5	471.2	2,762.1	3,233.3	3,067.8
16	2027	8.14			60.1	60.1	386.1	2,500.6	2,886.6	2,826.5
17	2028	9.36			52.3	52.3	316.3	2,263.8	2,580.1	2,527.9
18	2029	10.76			45.4	45.4	259.2	2,049.5	2,308.7	2,263.2
19	2030	12.38			39.5	39.5	212.3	1,855.5	2,067.8	2,028.3
20	2031	14.23			82.3	82.3	184.6	1,613.4	1,798.1	1,715.8
21	2032	16.37			29.9	29.9	160.5	1,403.0	1,563.5	1,533.7
22	2033	18.82			26.0	26.0	139.6	1,220.0	1,359.6	1,333.6
23	2034	21.64			22.6	22.6	121.4	1,060.9	1,182.3	1,159.7
24	2035	24.89			19.6	19.6	105.6	922.5	1,028.1	1,008.4
25	2036	28.63			40.9	40.9	91.8	802.2	894.0	853.0
26	2037	32.92			14.9	14.9	79.8	697.5	777.4	762.5
27	2038	37.86			12.9	12.9	69.4	606.6	676.0	663.0
28	2039	43.54			11.2	11.2	60.4	527.4	587.8	576.6
29	2040	50.07			9.8	9.8	52.5	458.6	511.1	501.4
30	2041	57.58			20.3	20.3	45.6	398.8	444.5	424.1
31	2042	66.21			7.4	7.4	39.7	346.8	386.5	379.1
32	2043	76.14			6.4	6.4	34.5	301.6	336.1	329.6
33	2044	87.57			5.6	5.6	30.0	262.2	292.2	286.7
34	2045	100.70			4.9	4.9	26.1	228.0	254.1	249.3
35	2046	115.80			10.1	10.1	22.7	198.3	221.0	210.9
36	2047	133.18			1.8	1.8	9.9	86.2	96.1	94.2
			16,463.2	7,265.3	2,161.4	25,889.9	13,172.5	60,523.9	73,696.5	47,806.6

Net Present Value (Million peso)	47,806.6
B/C Ratio	2.85
EIRR	33.0%

TABLE 8.1.4-2 COST-BENEFIT STREAM (CASE-2, LAGUNA SECTION ONLY)

Undiscounted Benefit Cost Stream Revenue

Million Peso

sq	Year	Construction Cost	Other Cost (ROW,DED, CS etc.)	O &M	Cost Total	VOC Benefit	TTC Benefit	Benefit	Benefit - Cost
1	2012				0.0			0.0	0.0
2	2013	0.0	489.9		489.9			0.0	-489.9
3	2014	0.0	2,494.7		2,494.7			0.0	-2,494.7
4	2015	3,732.5	972.4		4,704.9			0.0	-4,704.9
5	2016	5,598.7	274.7		5,873.4			0.0	-5,873.4
6	2017	2,799.3	137.3	99.0	3,035.7	1,136.8	2,355.3	3,492.1	456.4
7	2018			198.0	198.0	2,509.8	4,985.1	7,494.8	7,296.8
8	2019			198.0	198.0	2,770.5	5,275.4	8,045.9	7,847.9
9	2020			198.0	198.0	3,058.3	5,582.7	8,641.0	8,443.0
10	2021			460.7	460.7	2,961.9	5,870.0	8,831.9	8,371.2
11	2022			198.0	198.0	2,868.5	6,172.1	9,040.6	8,842.6
12	2023			198.0	198.0	2,778.1	6,489.8	9,267.8	9,069.8
13	2024			198.0	198.0	2,690.5	6,823.8	9,514.2	9,316.2
14	2025			198.0	198.0	2,605.6	7,174.9	9,780.6	9,582.6
15	2026			460.7	460.7	2,523.5	7,544.2	10,067.7	9,607.0
16	2027			198.0	198.0	2,443.9	7,932.5	10,376.4	10,178.4
17	2028			198.0	198.0	2,366.8	8,340.7	10,707.6	10,509.6
18	2029			198.0	198.0	2,292.2	8,770.0	11,062.2	10,864.2
19	2030			198.0	198.0	2,219.9	9,221.4	11,441.3	11,243.3
20	2031			460.7	460.7	2,219.9	9,221.4	11,441.3	10,980.6
21	2032			198.0	198.0	2,219.9	9,221.4	11,441.3	11,243.3
22	2033			198.0	198.0	2,219.9	9,221.4	11,441.3	11,243.3
23	2034			198.0	198.0	2,219.9	9,221.4	11,441.3	11,243.3
24	2035			198.0	198.0	2,219.9	9,221.4	11,441.3	11,243.3
25	2036			460.7	460.7	2,219.9	9,221.4	11,441.3	10,980.6
26	2037			198.0	198.0	2,219.9	9,221.4	11,441.3	11,243.3
27	2038			198.0	198.0	2,219.9	9,221.4	11,441.3	11,243.3
28	2039			198.0	198.0	2,219.9	9,221.4	11,441.3	11,243.3
29	2040			198.0	198.0	2,219.9	9,221.4	11,441.3	11,243.3
30	2041			460.7	460.7	2,219.9	9,221.4	11,441.3	10,980.6
31	2042			198.0	198.0	2,219.9	9,221.4	11,441.3	11,243.3
32	2043			198.0	198.0	2,219.9	9,221.4	11,441.3	11,243.3
33	2044			198.0	198.0	2,219.9	9,221.4	11,441.3	11,243.3
34	2045			198.0	198.0	2,219.9	9,221.4	11,441.3	11,243.3
35	2046			460.7	460.7	2,219.9	9,221.4	11,441.3	10,980.6
36	2047			99.0	99.0	1,110.0	4,610.7	5,720.6	5,621.6
		12,130.5	4,369.0	7,516.8	24,016.4	71,855.2	244,690.3	316,545.4	292,529.1

Discounted Benefit Cost Stream Revenue

Million Peso

sq	Year	Discounted	Construction Cost	Other Cost (ROW,DED, CS etc.)	O &M	Cost Total	VOC Benefit	TTC Benefit	Benefit	Benefit - Cost
1	2012	1.00	0.0	0.0		0.0			0.0	0.0
2	2013	1.15	0.0	426.0		426.0			0.0	-426.0
3	2014	1.32	0.0	1,886.4		1,886.4			0.0	-1,886.4
4	2015	1.52	2,454.2	639.4		3,093.5			0.0	-3,093.5
5	2016	1.75	3,201.1	157.0		3,358.1			0.0	-3,358.1
6	2017	2.01	1,391.8	68.3	49.2	1,509.3	565.2	1,171.0	1,736.2	226.9
7	2018	2.31			85.6	85.6	1,085.0	2,155.2	3,240.2	3,154.6
8	2019	2.66			74.4	74.4	1,041.5	1,983.2	3,024.8	2,950.3
9	2020	3.06			64.7	64.7	999.8	1,825.0	2,824.8	2,760.0
10	2021	3.52			131.0	131.0	842.0	1,668.6	2,510.6	2,379.6
11	2022	4.05			48.9	48.9	709.1	1,525.6	2,234.7	2,185.8
12	2023	4.65			42.6	42.6	597.1	1,394.9	1,992.1	1,949.5
13	2024	5.35			37.0	37.0	502.9	1,275.4	1,778.3	1,741.3
14	2025	6.15			32.2	32.2	423.5	1,166.1	1,589.6	1,557.4
15	2026	7.08			65.1	65.1	356.6	1,066.2	1,422.9	1,357.7
16	2027	8.14			24.3	24.3	300.3	974.9	1,275.2	1,250.9
17	2028	9.36			21.2	21.2	252.9	891.3	1,144.3	1,123.1
18	2029	10.76			18.4	18.4	213.0	815.0	1,028.0	1,009.6
19	2030	12.38			16.0	16.0	179.4	745.1	924.5	908.5
20	2031	14.23			32.4	32.4	156.0	647.9	803.9	771.6
21	2032	16.37			12.1	12.1	135.6	563.4	699.1	687.0
22	2033	18.82			10.5	10.5	117.9	489.9	607.9	597.4
23	2034	21.64			9.1	9.1	102.6	426.0	528.6	519.4
24	2035	24.89			8.0	8.0	89.2	370.5	459.6	451.7
25	2036	28.63			16.1	16.1	77.6	322.1	399.7	383.6
26	2037	32.92			6.0	6.0	67.4	280.1	347.6	341.5
27	2038	37.86			5.2	5.2	58.6	243.6	302.2	297.0
28	2039	43.54			4.5	4.5	51.0	211.8	262.8	258.3
29	2040	50.07			4.0	4.0	44.3	184.2	228.5	224.6
30	2041	57.58			8.0	8.0	38.6	160.2	198.7	190.7
31	2042	66.21			3.0	3.0	33.5	139.3	172.8	169.8
32	2043	76.14			2.6	2.6	29.2	121.1	150.3	147.7
33	2044	87.57			2.3	2.3	25.4	105.3	130.7	128.4
34	2045	100.70			2.0	2.0	22.0	91.6	113.6	111.7
35	2046	115.80			4.0	4.0	19.2	79.6	98.8	94.8
36	2047	133.18			0.7	0.7	8.3	34.6	43.0	42.2
			7,047.0	3,177.1	841.2	11,065.2	9,144.7	23,129.0	32,273.7	21,208.5

Net Present Value (Million peso)	21,208.5
B/C Ratio	2.92
EIRR	35.0%

8.1.5 Project Sensitivity

The Project Sensitivity to the identified risks is shown in **Table 8.1.5-1** and **Table 8.1.5-2.**

TABLE 8.1.5-1 PROJECT SENSITIVITY (CASE-1 : CAVITE AND LAGUNA SECTION)

	CASE -1			CASE -2		
	Base	Cost plus 10%	Cost plus 20%	Base	Cost plus 10%	Cost plus 20%
Base	33.0%	31.0%	29.2%	35.0%	32.7%	30.7%
Benefit less 10%	28.7%	26.8%	25.2%	30.0%	28.0%	26.2%
Benefit less 20%	24.3%	22.6%	21.2%	25.1%	23.3%	21.8%

Results of Case-1 and Case-2 show that the project is able to hurdle the minimum acceptance criteria of EIRR =15%.

In order to hurdle the minimum criteria EIRR=15%, cost up and/or benefit down should be below condition.

Case 1:	**Case 2**:
● Cost Plus 184% ● Benefit less 42% ● Cost plus 33% and Benefit less 33%	● Cost plus 191% ● Benefit less 42% ● Cost plus 33% and Benefit less 33%

8.2 FINANCIAL EVALUATION

8.2.1 PPP Modalities Studied

The possible four (4) types of PPP modalities for CALAX are as shown below;

Type-1: BOT with GFS

Design and construction work for both Cavite section and Laguna section is undertaken by the single concessionaire with the government financial support (GFS). The same single concessionaire will operate and maintain both sections.

Type-2: Segment divided Type (pattern 1)

Each of Cavite section and Laguna section is implemented independently. Namely, Cavite section is designed and constructed by the concessionaire with GFS, while the design and construction of Laguna section is undertaken by GOP with ODA loan, and O & M Concessionaire is selected for this section.

Two different concessionaires will operate and maintain each section independently. The one concessionaire will operate and maintain Cavite section under the self financing business scheme, while the other concessionaire will undertake Laguna section under the lease business scheme.

Type-3: Segment divided Type (pattern 2)

Each section is designed and constructed independently. However, operation and maintenance is undertaken by the single concessionaire, selected for the Cavite Section.

Cavite section is designed and constructed by the concessionaire with GFS, while the design and construction of Laguna section is undertaken by GOP with ODA loan.

The concessionaire selected for Cavite Section operates and maintains both sections and the Concessionaire pays the lease fee to GOP as concession fee of Laguna section.

Type-4: Lease Type

Both sections are designed and constructed by GOP with ODA loan. The single concessionaire operates and maintains both sections under the lease business scheme.

Above 4 types of the PPP modality are shown in **Figure 8.2.1-1.**

TABLE 8.2.1-1 PPP MODALITY FOR CALAX

		Cavite Section	Laguna Section	Examples	Remarks
Type-1: BOT with GFS	Design &Construction	**Concessionaire A (with GFS)**		TPLEX	• GOP expenditure for ROW acquisition is included in subsidy.
	O&M	**Concessionaire A**			
Type-2: Segment divided Case (pattern 1)	Design &Construction	**Concessionaire A (with GFS)**	**GOP (with ODA loan)**	TPLEX (Cavite Section) SCTEX (Laguna Section)	• Tendering for Cavite sec. can be ahead of the Laguna section. • Interoperability agreement for both sections for especially toll collection must be secured. • Commencement of construction work for Cavite sec. can be done earlier than the one for Laguna sec.. However the time of completion of construction work for both sections should be almost same. • Same toll rates will not necessarily be applied to both sections. • Construction work for Laguna section undertaken by GOP is not considered as subsidy.
	O&M	**Concessionaire A**	↓ Lease **Concessionaire B**		
Type-3: Segment divided Case (pattern 2)	Design &Construction	**Concessionaire A (with GFS)**	**GOP (with ODA loan)** ↓ Lease	STAR (GOP segment completed ahead of private segment)	• Tendering for Cavite section will be done ahead of the Laguna section. • Commencement of construction work for Cavite section can be done earlier than the one for Laguna section. However, the time of completion of construction work for both sections should be almost same. • Same toll rates will not necessarily be applied to both sections. • Construction work for Laguna section undertaken by GOP is not considered as subsidy.
	O&M	**Concessionaire A**			
Type-4: Lease Type	Design &Construction	**GOP (with ODA loan)**		SCTEX	• Construction work for both sections undertaken by GOP is not considered as subsidy. • This is the same scheme as SLEX
	O&M	↓ Lease **Concessionaire A**	↓ Lease		

8.2.2 Financial Evaluation of Alternative PPP Schemes with Tentative Cost

1) Assumptions and Conditions of Financial Analysis

Assumptions and conditions of financial analysis are summarized in the **Table 8.2.2-1**.

TABLE 8.2.2-1 ASSUMPTIONS AND CONDITIONS OF FINANCIAL ANALYSIS (TENTATIVE COST)

Items	Assumptions
Base year for financial analysis	・year of 2012
Implementation/Operation Period	
Beginning year of the implementation	・year of 2012 (*the date of signing of the Concession Agreement is the end of 2012)
Concession Period	・35 years from the signing of the Concession Agreement
ROW Acquisition Period	・25 months (from Jul. 2012 to Sept. 2014)
Detailed Engineering Design (DED) Period	・12 months (from Apr. 2013 to Apr. 2014)
Construction Period	・24 months (from March 2015 to Aug. 2017)
Beginning year of the operation	・Sept. 2017
Toll Tariff Revenue	
Toll Rate	・** Pesos / Vehicle
Toll Rate Adjustment	・+**% / Every 2 years
Costs	
Project Cost (in 2012 prices)	
(i) ROW Acquisition Cost	・*** Million Pesos (*The government shall be fully responsible)
(ii) Main Civil Work Cost	・*** Million Pesos
(iii) GFS for Main Civil Work	・*** Million Pesos (*The government shoulders **% of the Main Civil Work Cost)
(iv) GFS provision schedule	・1st (year: **), 2nd (year: **), 3rd (year: **) (*1st provision is 30%, 2nd provision is 40% and 3rd provision is remaining 30% of GFS.)
(v) Utility Relocation Cost	・*** Million Pesos
(vi) DED Cost	・*** Million Pesos
(vii) Construction Supervision Cost	・*** Million Pesos
(viii)Project Management Cost	・***Million Pesos (*The government shall be fully responsible.)
(ix)Independent Consultant Fee (*Government: Private = 50% : 50%)	・*** Pesos / year at DED stage ・*** Pesos / year at Construction stage
(x)Insurance Cost (Construction All Risk)	・*** Million Pesos
(xi)Physical Contingency	・5.0%～10.0 % of above cost from (i) to (x)
Sub Total	・*** Million Pesos
O & M Cost	
(i) Operation Cost	・*** Million Pesos / year
(ii) Routine Maintenance Cost	・*** Million Pesos / year
(iii) Periodic Maintenance Cost	・***Million Pesos/ every 10 years
(iv) Annual Insurance Fee (O&M All Risk)	・** Million Pesos / year
(ix)Independent Consultant Fee (*Government: Private=50%:50%)	・** Million Pesos / year (for how many years?)
Other Cost items	
(i) Price Escalation	Foreign ・1.6% / year Local ・4.0% / year
Financing Structure of the Concessionaire in Capital Investment	
Equity	・Cases of share of Project Cost excluded the government fund (e.g. ROW acquisition cost/Administration cost etc.) are shown as below. ・30%
Debt	・Cases of share of Project Cost are shown as below. ・70%
Loan Interest Rate	(i) Commercial Bank Loan: 10.0% (ii) JAPAN ODA Loan: 1.4%
Loan Tenure (Commercial Bank Loan)	
(i) Grace Period	・0 year

TABLE 8.2.2-1 ASSUMPTIONS AND CONDITIONS OF FINANCIAL ANALYSIS (TENTATIVE COST)

Items	Assumptions
(ii) Loan Repayment Period	・12 years from financial closure
(iii) Financing Charge	・1.0% of Loan
Loan Tenure (JAPAN ODA Loan)	
(i) Grace Period	・7 years (during Construction Period)
(ii) Loan Repayment Period	・25 years from financial closure
(iii) Commitment Charge	・0.1% of Loan
Repayment Structure	・Even annuity basis (Annual loan amortization is done at constant amount)
Short-term Loan	
(i)Interest Rate	5.0% (*The short-term loan is assumed to be mobilized to supplement negative cash flow.)
(ii)Repayment Period	1 year
Depreciation	
Depreciation Cost	・Calculation formula: Annual depreciation cost = PC / T PC: Private sector share of the Project Cost T : Operation Period (30 years)
Taxation	
Corporate Tax	・Calculation Formula: [Revenue - O&M cost - Insurance cost - Annual deprecation cost - Interest payment - Local Government Tax] × Tax Rate (30%)
VAT	・12.0 % applied to toll rate
Local Government Tax	・2.0% of Gross Revenue
Property Tax	・Not considered since ownership of the assets is not attributed to the Concessionaire
Tax Exemption	Scenario 1: With Corporate Income Tax Holiday ・7 years from the commencement of the operation (in accordance with Executive Order No. 226, The Omnibus Investments Code of 1987) Scenario 2: Without Corporate Income Tax Holiday ・The Net Operating Loss of the Concessionaire shall be carried over as a deduction from gross income for the next 3 taxable years.

2) Lease Fee

Lease fee payment procedure is considered as to Type-2, 3 and 4 of PPP modality. The assumption for calculation of amount of lease fee as well as payment period is shown in the **Table 8.2.2-2**.

TABLE 8.2.2-2 ASSUMPTION FOR LEASE FEE

Item	Assumptions
Amount of Lease Fee	• To check various levels of lease fee, lease fee was set in the financial model to be certain % of the annual toll revenue. A certain % of toll revenue is paid to GOP as lease fee (or concession fee) every year.
Judgment	• Preferably, total lease fee for the duration of O & M period can cover the amount of principal repayment and interest of ODA Loan. • Some cases of lease fee can achieve above condition and some are not, all depends on financial viability of each case of analysis.

3) Indices for Financial Viability

The following 3 kinds of Internal Rate of Return (IRR) as shown below are set for the examination of financial viability of CALA Expressway.

Project IRR:	It is calculated with toll tariff revenue and the whole project cost including ROW acquisition, etc. under assumption that all cost including ROW acquisition cost are funded by the private sector. It is the basic indicator for financial viability.
IRR for SPV:	It is an internal rate of return of the project from viewpoint of a concessionaire. This indicator is usually called as “Project IRR”, however, “Project IRR” is defined as mentioned above, and this indicator is called as “IRR for SPV” in this report.
Equity IRR:	It is an internal rate of return against equity investments for the project.

Each of indices follows the following formula:

- Project IRR:

$$\sum \frac{R_i - I_i - C_i}{(1 + \text{Project IRR})^{\mathrm{i}}} = 0$$

Whereby:

R_i : Annual revenue from Toll Tariff at year i
I_i ; Annual project costs at year i
C_i : Annual operating costs at year i

- IRR for a Concessionaire (SPC):

$$\sum \frac{R_i - I'_i - C'_i}{(1 + \text{IRR for SPC})^{\mathrm{i}}} = 0$$

Whereby:

I'_i : Annual project costs invested by the Concessionaire at year i
C'_i : Annual operating costs shouldered by the Concessionaire at year i

- Equity IRR

$$\sum \frac{D_i - E_i}{(1 + \text{Equity IRR})^{\mathrm{i}}} = 0$$

Whereby:

D_i : Amount of the dividend for investors at year i (= *Ri - I'i - C''i*)
* C"i is including loan amortization
E_i : Equity investment from investor

WACC is calculated from the weighted average of interest-bearing debt cost and equity cost, and represents financing cost for the Concessionaire as criteria of Project IRR and IRR for SPC. Calculation formula of WACC is stated as below.

$$WACC_{\text{after tax}} = r(E) \times \frac{E}{(D+E)} + r(D) \times (1-t) \times \frac{D}{(D+E)}$$

Whereby:

$r(E):$ Rate of return on Equity
$r(D):$ Bank Loan interest rate
$E:$ Total amount of equity
$D:$ Total amount of debt
$t:$ Corporate Income Tax Rate

4) Implementation Schedule of Each Type

Implementation schedule of each type of modality is shown in **Table 8.2.2-3.**

5) Benchmark of IRR

Benchmark of IRR was set as follows;

IRR for SPC

Weighted average of capital cost (WACC) was simply calculated as follows;

$$\text{WACC} = \frac{\text{Equity x Expected Return + Debt x Interest Rate}}{100}$$

$$= \frac{30\% \text{ x } 15\% + 70\% \text{ x } 10\%}{100}$$

Equity IRR

With consultation with the private sector, Equity IRR benchmark was set at 15%.

Other indices studied were as follows;

ODA Repayment vs. Income of Lease Fee

This is to check if lease fee assumed can be enough to repay the amount of ODA amortization (principal plus interest). It is expressed in 2012 prices.

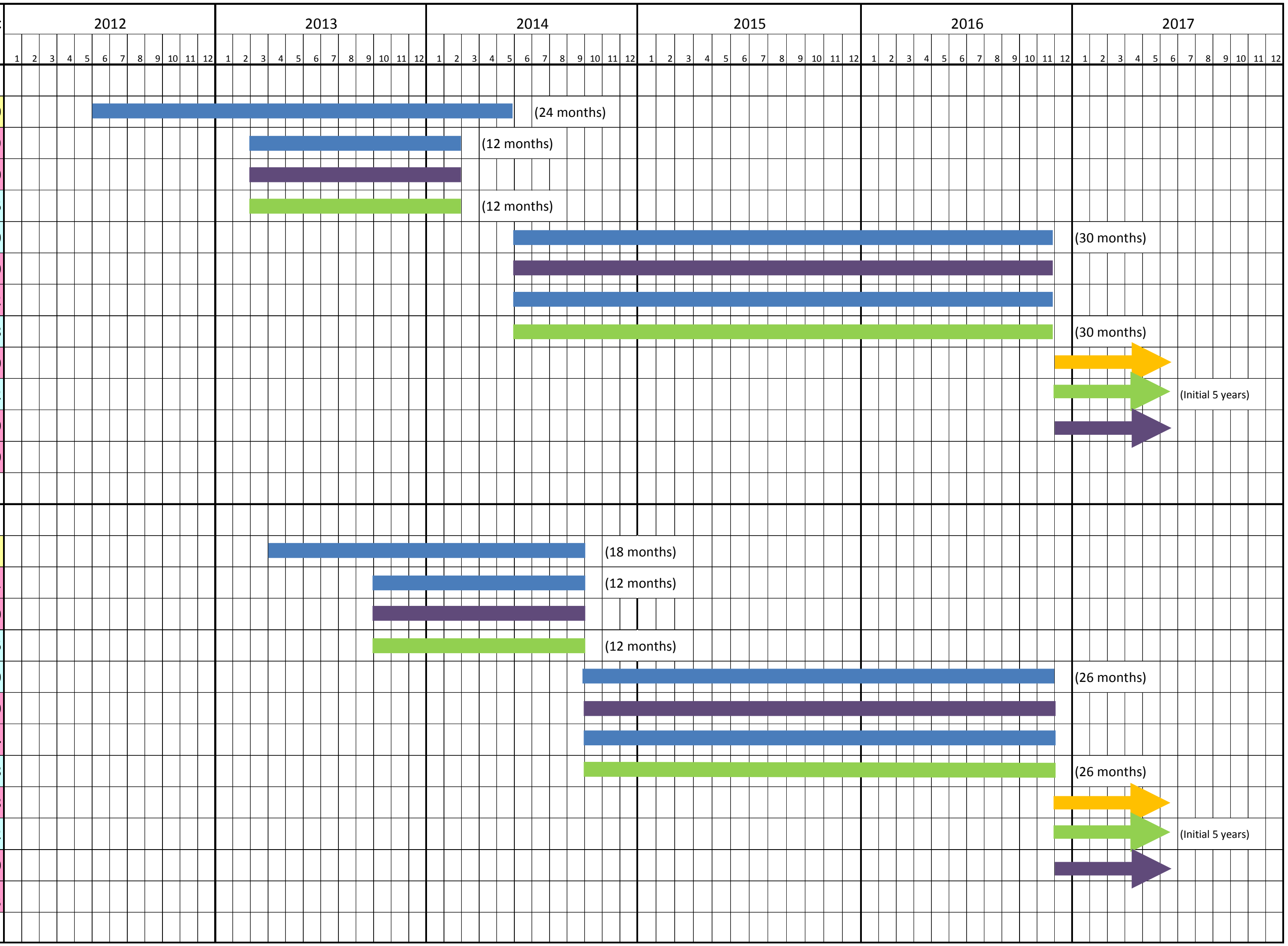
Net Government Expenditure (NGE)

NGE is expressed as follows;

NGE = Total Government Expenditure – Total Government Income
(which includes VAT, Corporate Tax, Lease Fee, etc.)

TABLE 8.2.2-3 (1/4) IMPLEMENTATION SCHEDULE: PPP SCHEME TYPE-1: BOTH SECTION BY BOT WITH SUBSIDY

	Estimated Cost (Million Php)
[Cavite Section]	
ROW Acquisition	**4,000.00**
Detailed Engineering Design	**231.89**
Insurance Cost	**28.80**
IC for DED Stage	**25.76**
Construction	**16,300.00**
Insurance Cost	**158.40**
Construction Supervision	**493.52**
IC for Construction Stage	**70.78**
O & M per Year	**270.00**
IC for O & M Stage per Year	**29.22**
O & M (Insurance per Year)	**24.40**
O & M (Periodic, every 5 yrs)	**455.00**
[Laguna Section]	
ROW Acquisition	**3,200.00**
Detailed Engineering Design	**210.81**
Insurance Cost	**25.40**
IC for DED Stage	**25.76**
Construction	**12,800.00**
Insurance Cost	**139.70**
Construction Supervision	**474.54**
IC for Construction Stage	**61.58**
O & M per Year	**221.78**
IC for O & M Stage per Year	**29.22**
O & M (Insurance per Year)	**19.90**
O & M (Periodic, every 5 yrs)	**294.23**



Cost Shouldered by:

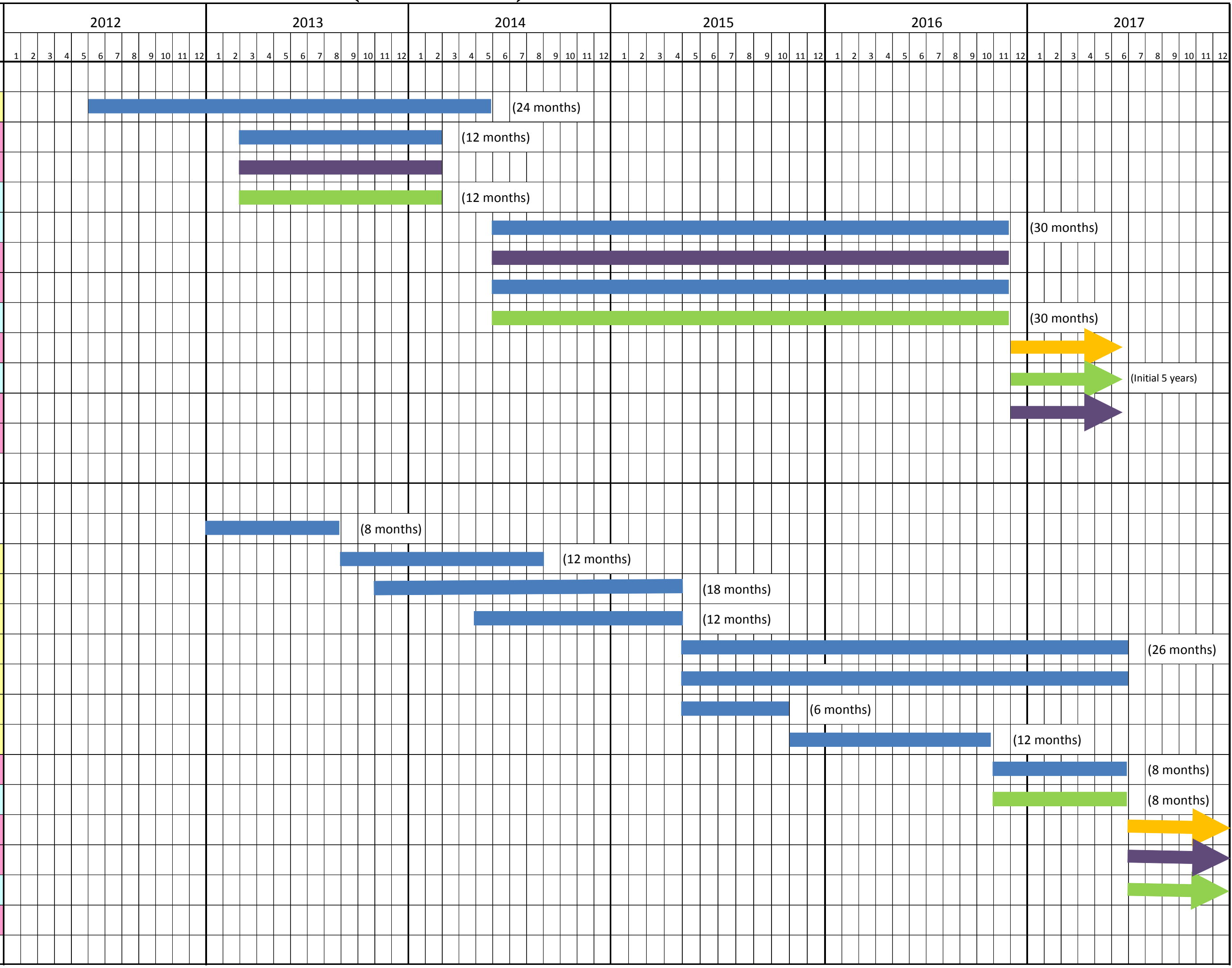
🟨 : **GOP**
🟥 : **Private**
🟦 : **Cost sharing between GOP and Private**

Source: JICA Study Team

Note: Cost is as of March 2012 and not final cost

TABLE 8.2.2-3 (2/4) IMPLEMENTATION SCHEDULE: PPP SCHEME TYPE-2 : CAVITE SECTION + LAGUNA SECTION (2 PROJECTS)

	Estimated Cost (Million Php)
[Cavite Section]	
🟨 ROW Acquisition	4,000.00
🟥 Detailed Engineering Design	231.89
🟥 Insurance Cost	28.80
🟦 IC for DED Stage	25.76
🟦 Construction	16,300.00
🟥 Insurance Cost	158.40
🟥 Construction Supervision	493.52
🟦 IC for Construction Stage	70.78
🟥 O & M per Year	270.00
🟦 IC for O & M Stage	29.22
🟥 O & M (Insurance per Year)	24.40
🟥 O & M (Periodic, every 5 yrs)	455.00
[Laguna Section]	
Selection of Consultant	-
🟨 Detailed Engineering Design	210.81
🟨 ROW Acquisition	3,200.00
🟨 Selection of Contractor	69.43
🟨 Construction	12,130.00
🟨 Construction Supervision	474.54
🟨 Preparation of Bid Documents	74.27
🟨 Selection of O & M Concessionaire	53.86
🟥 Design & Installation of Toll Facility	670.00
🟦 IC for Design & Installation Stage	20.00
🟥 O & M per Year	221.78
🟥 O & M (Insurance per Year)	19.90
🟦 IC for O & M Stage	29.22
🟥 O & M (Periodic, every 5 years)	294.23



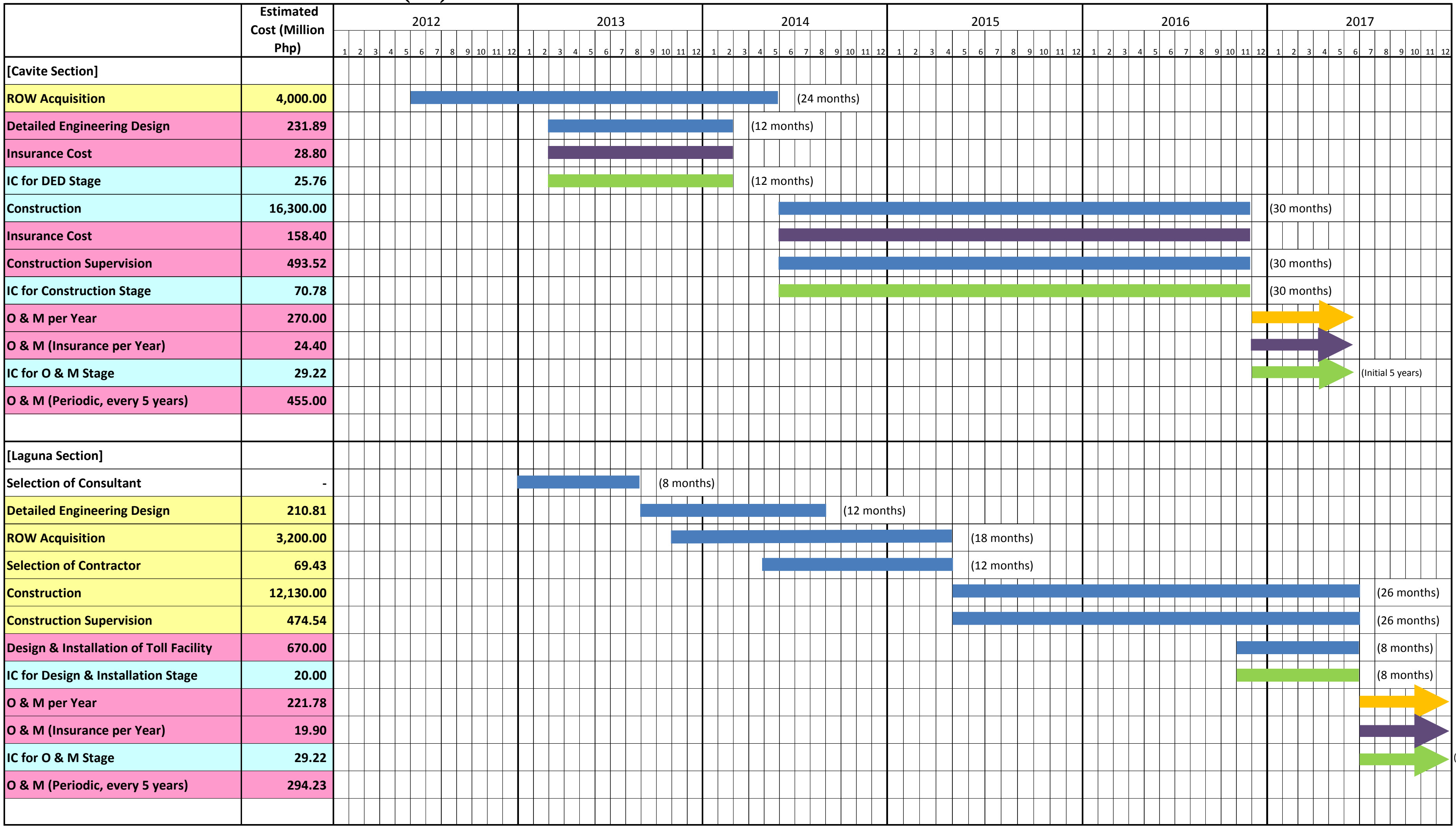
Cost Shouldered by:

🟨 : GOP 🟥 : Private 🟦 : Cost sharing between GOP and Private

Source: JICA Study Team

Note: Cost is as of March 2012 and not final cost

TABLE 8.2.2-3 (3/4) IMPLEMENTATION SCHEDULE: PPP SCHEME TYPE-3: HYBRID



	Estimated Cost (Million Php)	2012	2013	2014	2015	2016	2017
[Cavite Section]							
ROW Acquisition	4,000.00			(24 months)			
Detailed Engineering Design	231.89			(12 months)			
Insurance Cost	28.80						
IC for DED Stage	25.76			(12 months)			
Construction	16,300.00						(30 months)
Insurance Cost	158.40						
Construction Supervision	493.52						(30 months)
IC for Construction Stage	70.78						(30 months)
O & M per Year	270.00						
O & M (Insurance per Year)	24.40						
IC for O & M Stage	29.22						(Initial 5 years)
O & M (Periodic, every 5 years)	455.00						
[Laguna Section]							
Selection of Consultant	-		(8 months)				
Detailed Engineering Design	210.81			(12 months)			
ROW Acquisition	3,200.00				(18 months)		
Selection of Contractor	69.43				(12 months)		
Construction	12,130.00						(26 months)
Construction Supervision	474.54						(26 months)
Design & Installation of Toll Facility	670.00						(8 months)
IC for Design & Installation Stage	20.00						(8 months)
O & M per Year	221.78						
O & M (Insurance per Year)	19.90						
IC for O & M Stage	29.22						(Initial 5 years)
O & M (Periodic, every 5 years)	294.23						

Cost Shouldered by:

🟨 : GOP

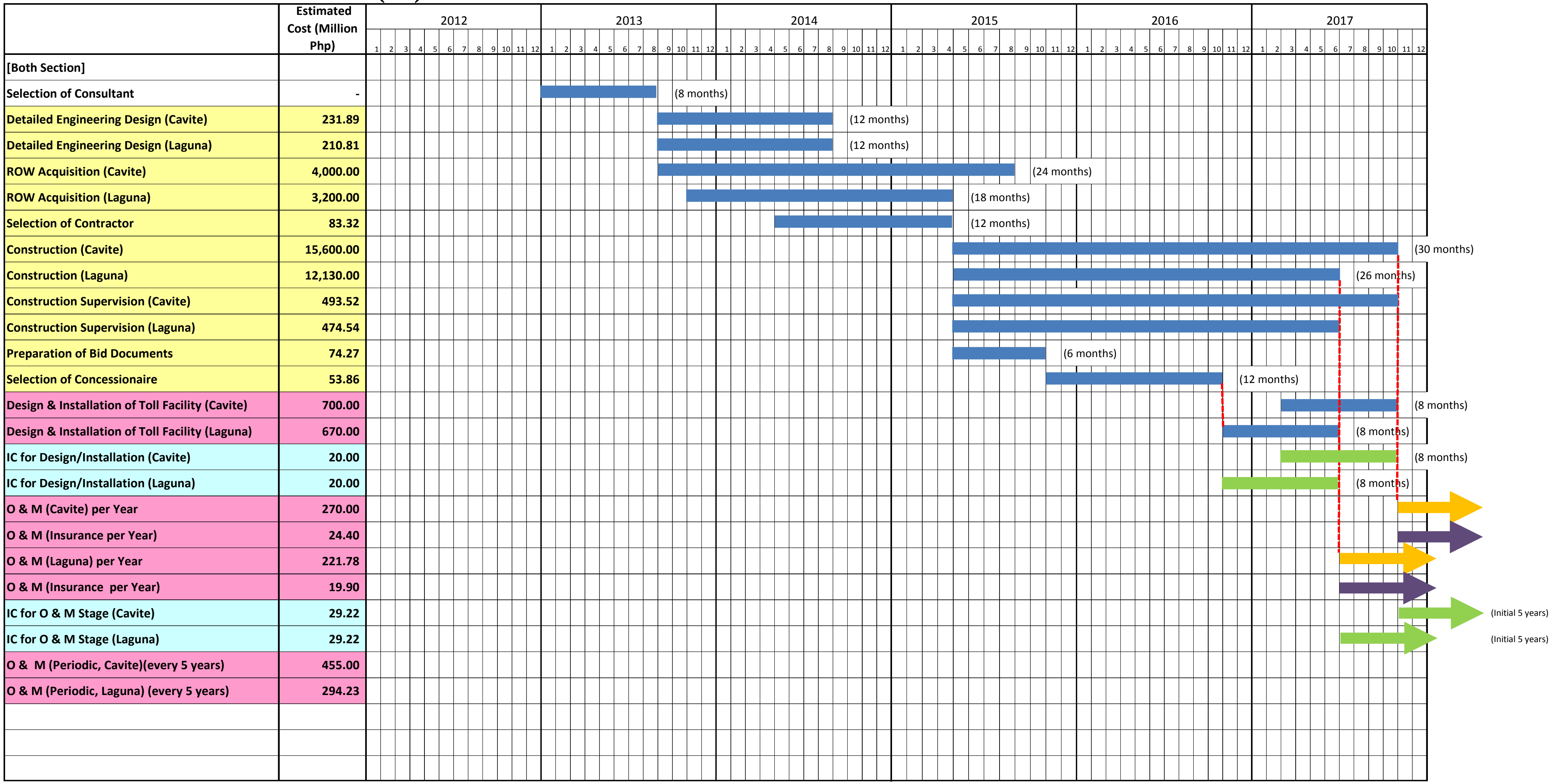
🟥 : Private

🟦 : Cost sharing between GOP and Private

Source: JICA Study Team

Note: Cost is as of March 2012 and not final cost

TABLE 8.2.2-3 (4/4) IMPLEMENTATION SCHEDULE: PPP SCHEME TYPE-4: LEASE TYPE



	Estimated Cost (Million Php)	2012	2013	2014	2015	2016	2017	
[Both Section]								
Selection of Consultant	-		(8 months)					
Detailed Engineering Design (Cavite)	231.89			(12 months)				
Detailed Engineering Design (Laguna)	210.81			(12 months)				
ROW Acquisition (Cavite)	4,000.00				(24 months)			
ROW Acquisition (Laguna)	3,200.00				(18 months)			
Selection of Contractor	83.32				(12 months)			
Construction (Cavite)	15,600.00						(30 months)	
Construction (Laguna)	12,130.00						(26 months)	
Construction Supervision (Cavite)	493.52							
Construction Supervision (Laguna)	474.54							
Preparation of Bid Documents	74.27				(6 months)			
Selection of Concessionaire	53.86					(12 months)		
Design & Installation of Toll Facility (Cavite)	700.00						(8 months)	
Design & Installation of Toll Facility (Laguna)	670.00						(8 months)	
IC for Design/Installation (Cavite)	20.00						(8 months)	
IC for Design/Installation (Laguna)	20.00						(8 months)	
O & M (Cavite) per Year	270.00							
O & M (Insurance per Year)	24.40							
O & M (Laguna) per Year	221.78							
O & M (Insurance per Year)	19.90							
IC for O & M Stage (Cavite)	29.22							(Initial 5 years)
IC for O & M Stage (Laguna)	29.22							(Initial 5 years)
O & M (Periodic, Cavite)(every 5 years)	455.00							
O & M (Periodic, Laguna) (every 5 years)	294.23							

Cost Shouldered by:

🟨 : GOP

🟥 : Private

🟦 : Cost sharing between GOP and Private

Source: JICA Study Team

Note: Cost is as of March 2012 and not final cost

8.2.3 Results of Financial Analysis of Alternative PPP Schemes

1) Results of Financial Analysis

Results of financial analysis are shown in **Table 8.2.3-1,** and summarized as follows;

Type-1 : In case that 50% of construction cost and 100% of ROW acquisition cost is shouldered by the Government, percent (%) of subsidy exceeds 50% of the Project Cost, which is not allowed by BOT Law (should be less than 50%).

When 40% of construction cost and 100% of ROW acquisition cost is shouldered by the Government, Equity IRR is below benchmark. Possible Government's subsidy for construction cost will be between 40% and 50% (say about 48%).

Type-2 : Cavite Section will require subsidy of about 40% of construction cost, in addition to ROW acquisition cost. Laguna Section can adopt higher lease fee than assumed (50% of toll revenue) or toll rate can be lowered.

Since this type assumed that each section is independently managed and operated, the profit of Laguna Section cannot be shared by the Laguna Section. On the other hand, Type-3 can share profit of Laguna Section.

DPWH strongly wished that the project be formed as "one project", particularly O&M stage, since its entire length is not long to require two contracts. Thus, this scheme was not favored by DPWH.

This scheme was dropped for further assessment.

Type-3 : Subsidy of 20% of Cavite Section construction cost and about 16% of lease fee for Laguna Section satisfies IRR benchmark.

Type-4 : Lease fee of more than 50% of toll revenue is possible (in this case, the Government can enjoy high income from lease fee), or toll rate can be lowered.

This scheme does not require the private sector's investment for construction. The private sector is quite positive to finance construction of this expressway, thus it will be advantageous to select another type of scheme to fully utilize financing capability of the private sector. DPWH has the same concept to utilize private sector financing as much as possible.

This scheme was dropped for further assessment.

TABLE 8.2.3-1 (1/3) CALAX: SUMMARY OF FINANCIAL ANALYSIS (TYPE 1 AND 2)

Case	PPP Scheme	Condition (Amount of Subsidy & Lease Fee) *(Note-1)*	Results of Financial Analysis		% of Subsidy *(Note-3)*	ODA Repayment vs. Income of Lease Fee *(Note-1)*	Net Government Expenditure
			IRR for SPV (%)	Equity IRR (%)			(Php) *(Note-2)*
Type-1: (Cavite + Laguna) as one Project	BOT with 40% Subsidy	• Subsidy ❖ 40% of Construction Cost **(11.65 Billion)** ❖ 100% of ROW Acquisition Cost **(7.58 Billion)** ❖ **Total 19.23 Billion**	12.6 (OK)	12.9 (Low)	• 47% of Project Cost	–	• GOP Expenditure 14.61 Billion • GOP Income 4.72 Billion • Net GOP Expenditure 9.89 Billion
	BOT with 50% Subsidy	• Subsidy ❖ 50% of Construction Cost **(14.57 Billion)** ❖ 100% of ROW Acquisition Cost **(7.58 Billion)** ❖ Total **22.15 Billion**	14.2 (OK)	15.5 (OK)	• 53% of Project Cost (Exceeds 50%)	–	• GOP Expenditure 16.57 Billion • GOP Income 4.77 Billion • Net GOP Expenditure 11.80 Billion
Type-2: Two Individual Project	Cavite Section: BOT with 40% Subsidy	• Subsidy ❖ 40% of Construction Cost **(6.52Billion)** ❖ 100% of ROW Acquisition Cost **(4.00 Billion)** ❖ **Total 10.52 Billion**	13.7 (OK)	14.7 (Marginally OK)	• 46% of Project Cost	–	• GOP Expenditure 8.23 Billion • GOP Income 3.08 Billion • Net GOP Expenditure 5.15 Billion
	Cavite Section: BOT with 50% Subsidy	• Subsidy ❖ 45% of Construction Cost **(7.34Billion)** ❖ 100% of ROW Acquisition Cost **(4.00 Billion)** ❖ Total **11.34 Billion**	14.5 (OK)	16.0 (OK)	• 50% of Project Cost	–	• GOP Expenditure 8.78 Billion • GOP Income 3.09 Billion • Net GOP Expenditure 5.69 Billion
	Laguna Section: ODA with Lease Type	• Subsidy ❖ 100% of ROW Acquisition Cost **(3.58 Billion)** • Lease Fee ❖ 50% of Toll Revenue	21.3 (Too High)	26.4 (Too High) *(Note-4)*	-	• ODA Loan Repayment Amount 19.18 Billion • Lease Fee Income 50.36 Billion (Too High)	• GOP Expenditure 5.70 Billion • GOP Income 4.55 Billion • Net GOP Expenditure 1.15 Billion

Note-1 : 2012 Price
Note-2 : NPV (Discount Rate = 15%)
Note-3 : % of Discounted Amount
Note-4 : Can adopt higher lease fee, or reduce toll rates.

Source: JICA Study Team

General Note: Above analysis is base on the estimated cost as of March, 2012.

TABLE 8.2.3-1 (2/3) CALAX: SUMMARY OF FINANCIAL ANALYSIS (TYPE 3)

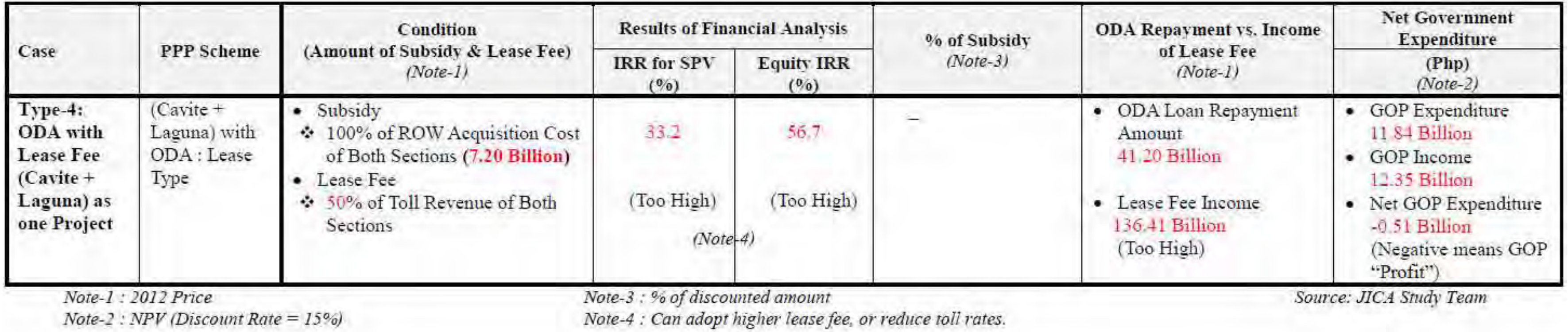
Case	PPP Scheme	Condition (Amount of Subsidy & Lease Fee) *(Note-1)*	Results of Financial Analysis		% of Subsidy *(Note-3)*	ODA Repayment vs. Income of Lease Fee *(Note-1)*	Net Government Expenditure
			IRR for SPV (%)	Equity IRR (%)			(Php) *(Note-2)*
Type-3: Hybrid Type	Cavite: BOT with subsidy Laguna: ODA with Lease Type O & M: One Concessionaire	• Subsidy ❖ 40% of Construction Cost of Cavite Section **(6.52 Billion)** ❖ 100% of ROW Acquisition Cost of Both Section **(7.58Billion)** ❖ **Total 14.10 Billion** • Lease Fee ❖ 20% of Toll Revenue of Laguna Section	16.3 (OK)	18.9 (OK)	• 46% of Project Cost	• ODA Loan Repayment Amount 18.18 Billion • Lease Fee Income 20.15 Billion	• GOP Expenditure 15.77 Billion • GOP Income 5.84 Billion • Net GOP Expenditure 9.94 Billion
		• Subsidy ❖ No subsidy for Construction Cost ❖ 100% of ROW Acquisition Cost of both Sections **(7.58 Billion)** • Lease Fee ❖ 5% of Toll Revenue of Cavite Section	12.6 (OK)	12.8 (Low)	• 21% of Project Cost	• ODA Loan Repayment Amount **18.18 Billion** • Lease Fee Income **5.04 Billion** (Lease Fee not enough to cover ODA Loan Repayment) *(Note-1)*	• GOP Expenditure 8.97 Billion • GOP Income 4.90 Billion • Net GOP Expenditure 4.07Billion
		• Subsidy ❖ 30% of Construction Cost of Cavite Section **(4.89 Billion)** ❖ 100% of ROW Acquisition Cost of Both Section **(7.58 Billion)** ❖ **Total 12.47 Billion** • Lease Fee ❖ 15% of Toll Revenue of Cavite Section	15.2 (OK)	17.0 (OK)	• 40% of Project Cost	• ODA Loan Repayment Amount **18.18 Billion** • Lease Fee Income **15.11 Billion** (lower than Loan Repayment Amount)	• GOP Expenditure 14.07 Billion • GOP Income 5.54 Billion • Net GOP Expenditure 8.53 Billion
		15%	13.4	14.2			6.02
		20%	13.9	15.0			6.85
		25%	14.5	16.0			7.69

Note-1: 2012 Prices
Note-2: NPV (Discount Rate = 15%)
Note-3: % of discounted amount

Source: JICA Study Team

General Note: Above analysis is base on the estimated cost as of March, 2012.

TABLE 8.2.3-1 (3/3) CALAX: SUMMARY OF FINANCIAL ANALYSIS (TYPE 4)



Case	PPP Scheme	Condition (Amount of Subsidy & Lease Fee) *(Note-1)*	Results of Financial Analysis		% of Subsidy *(Note-3)*	ODA Repayment vs. Income of Lease Fee *(Note-1)*	Net Government Expenditure
			IRR for SPV (%)	Equity IRR (%)			(Php) *(Note-2)*
Type-4: ODA with Lease Fee (Cavite + Laguna) as one Project	(Cavite + Laguna) with ODA : Lease Type	• Subsidy ❖ 100% of ROW Acquisition Cost of Both Sections **(7.20 Billion)** • Lease Fee ❖ 50% of Toll Revenue of Both Sections	33.2 (Too High) *(Note-4)*	56.7 (Too High)	–	• ODA Loan Repayment Amount 41.20 Billion • Lease Fee Income 136.41 Billion (Too High)	• GOP Expenditure 11.84 Billion • GOP Income 12.35 Billion • Net GOP Expenditure -0.51 Billion (Negative means GOP "Profit")

Note-1 : 2012 Price
Note-2 : NPV (Discount Rate = 15%)
Note-3 : % of discounted amount
Note-4 : Can adopt higher lease fee, or reduce toll rates.
Source: JICA Study Team

General Note: Above analysis is base on the estimated cost as of March, 2012.

2) Comparison of Type-1 and Type-3

Type-1 and Type-3 are possible schemes for comparison. **Table 8.2.3-2** shows the comparison of two schemes.

TABLE 8.2.3-2 COMPARISON OF TYPE-1 AND TYPE-3

Item	**Type-1** (40% subsidy for construction cost)	**Type-3** (20% subsidy for construction cost of Cavite Section. 15% Lease Fee)	**Assessments**
Amount of Government's subsidy for Construction Cost and ROW Acquisition (2012 prices)	11.65 + 7.58 = 19.23 Billion Php (1.00)	3.26 + 7.58 = 10.84 Billion Php (0.56)	● The Government has to prepare about 20 Billion Php for Type-1 compared to 10.8 Billion Php. of Type-3. ● Type-3 is more advantageous to the government.
Amount of Private Sector Fund required for Construction (2012 prices)	17.46 Billion Php (1.00)	13.04 Billion Php (0.75)	● The private sector has to prepare about 17.5 Billion Php for construction under Type-1 compared to 13 Billion Php of Type-3. ● Type-3 is more advantageous also to the private sector, since Type-3 achieves less investment with the almost same return of Type-1.
% of Subsidy	47%	30%	-
Net Government Expenditure (NPV : Discounted at 15%)	9.89 Billion Php (1.00)	6.85 Billion Php (0.69)	● NGE of Type-1 is higher by about 1.4 times than Type-3. ● Thus, Type-3 is more advantageous to the Government.

8.2.4 Recommendations on PPP Modality

As shown in **Table 8.2.3-2**, Type-3 has the following advantages over Type-1;

- Type-3 can reduce the Government subsidy to about 60% of Type-1 (or from 19.2 Billion Php to 10.84 Billion Php). The government can reduce the initial investment drastically.
- When the Government subsidy for construction cost is compared, Type-3 requires about 3.26 Billion Php, whereas Type-1 requires about 11.65 Billion Php which is about 3.6 times of Type-3.

- The private sector is also benefitted. For Type-1, the private sector is required to raise about 17.5 Billion Php, whereas Type-3 requires 13.0 Billion Php. The private sector can reduce its risk drastically and can expect the same financial return of Type-1.

- Net Government Expenditure (NGE) of Type-3 is about 70% of Type-1, which is advantageous to the Government.

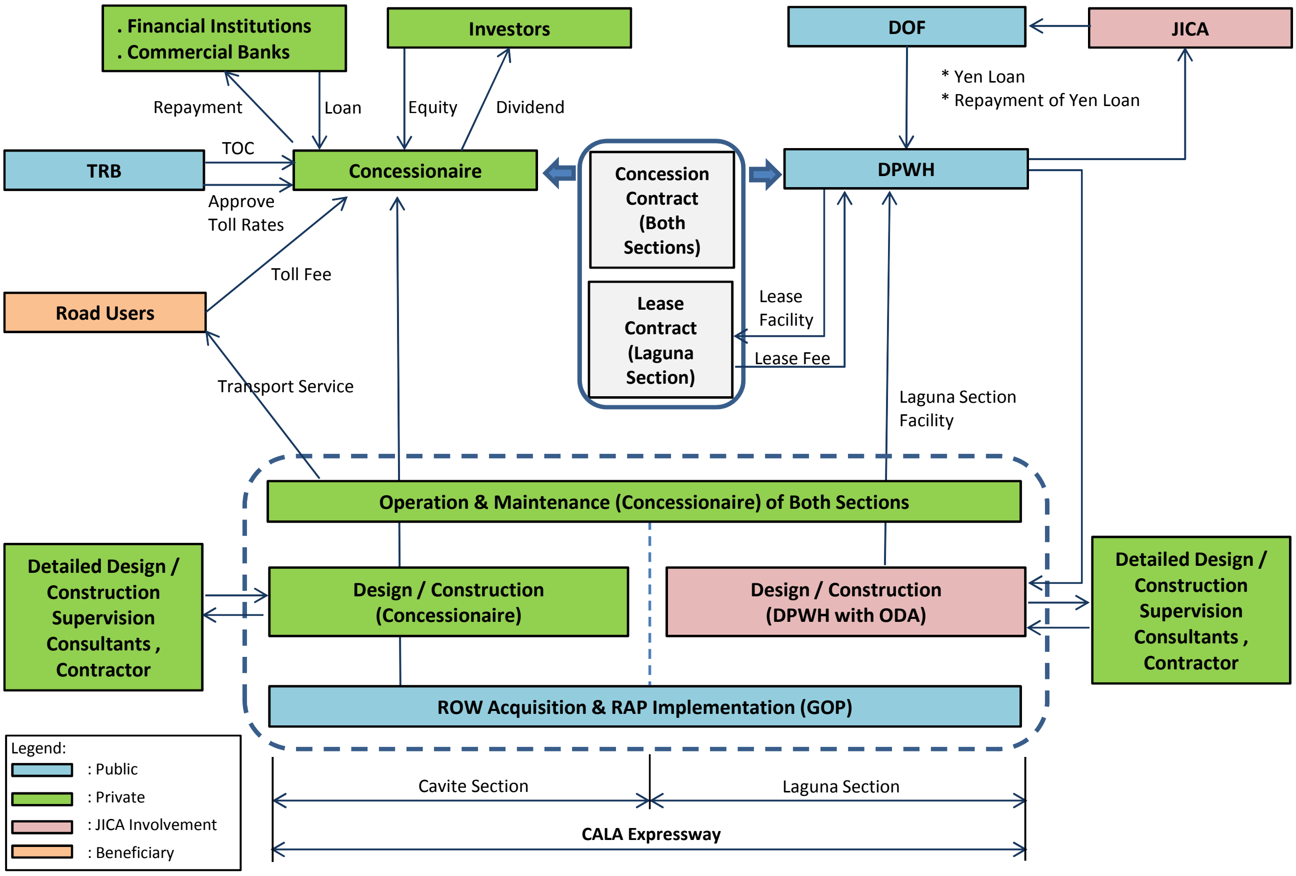
In view of above, Type-3 was recommended for the PPP modality of this project.

8.2.5 Financial Evaluation of Selected PPP Scheme

1) Selected PPP Scheme

Selected PPP scheme structure is shown in **Figure 8.2.5-1.**

A concessionaire will be selected to undertake design and construction including its financing for Cavite Section. The concessionaire is also responsible for O & M of both Cavite and Laguna sections, and collect toll fees from both sections under the condition that lease fee of Laguna section facility is paid by a Concessionaire to the Government as a form of concession fee which is at least equivalent to the repayment amount of ODA loan.



Source: JICA Study Team

FIGURE 8.2.5-1 SELECTED PPP SCHEME STRUCTURE FOR CALA EXPRESSWAY

2) Financial Analysis Conditions

Financial analysis conditions are shown in **Table 8.2.5-1.**

TABLE 8.2.5-1 ASSUMPTIONS AND CONDITIONS OF FINANCIAL ANALYSIS

Items	Assumptions	
	Cavite Section	Laguna Section
Base year for financial analysis	**● Year 2012**	
Implementation/Operation Period		
Beginning year of the implementation	● April 2013	● Sep. 2013
Concession Period	● April 2013 – Dec. 2046	
ROW Acquisition Period	● July 2013 – Dec. 2014	● Sep. 2013 – Apr. 2015
Detailed Engineering Design (DED) Period	● Apr. 2013 – Mar. 2014	● Sep. 2013 – Aug. 2014
Construction Period	● Feb. 2014 – Jan. 2017	● May 2015 – June 2017
Beginning year of the operation	● Feb. 2017	● July 2017
Toll Tariff Revenue		
Toll Rate	● 5.0 Pesos/km in 2017	
Toll Rate Adjustment	● 8% at every 2 years	
Costs		
Project Cost (in 2012 prices)	(in Million Php)	
(i) ROW Acquisition Cost	5,146.69	3,589.01
(ii) Main Civil Work Cost	14,526.97	12,278.65
(iii) GFS for Main Civil Work	None	
(iv) GFS provision schedule	Not Applicable	
(v) Utility Relocation Cost	Included in Civil Work Cost	
(vi) DED Cost	253.19	210.81
(vii) Construction Supervision Cost	345.74	474.54
(viii)Project Management Cost	174.32	192.50
(ix)Independent Consultant Fee (*Government: Private = 50% : 50%)	26.58 (DED) 52.30 (C/S)	-
(x)Insurance Cost (Construction All Risk)	119.43	Included in Civil Works Cost
(xi)Physical Contingency	5%	5%
O & M Cost		
(i) Operation and Maintenance Cost	340.04	221.78
(ii) Periodic Maintenance Cost at every 5 years	360.50	294.23
(iii) Annual Insurance Fee (O&M All Risk)	23.54	19.90
(ix)Independent Consultant Fee (*Government: Private=50%:50%)	29.22	29.22
Other Cost items		
(i) Price Escalation	Foreign	1.6%
	Local	4.0%
Financing Structure of the Concessionaire in Capital Investment		
Equity	30%	
Debt	70%	
Loan Interest Rate	(i)Commercial Bank Loan : 10%	
	(ii)Japan ODA: 1.4%	
Loan Tenure (Commercial Bank Loan)		
(i) Grace Period	● 3 years	
(ii) Loan Repayment Period	● 12 years including Grace Period	
(iii) Financing Charge	● 1% of Loan	
Loan Tenure (JAPAN ODA Loan)		
(i) Grace Period	● 7 years	
(ii) Loan Repayment Period	● 25 years including Grace Period	
(iii) Commitment Charge	● 0.1% of Loan	

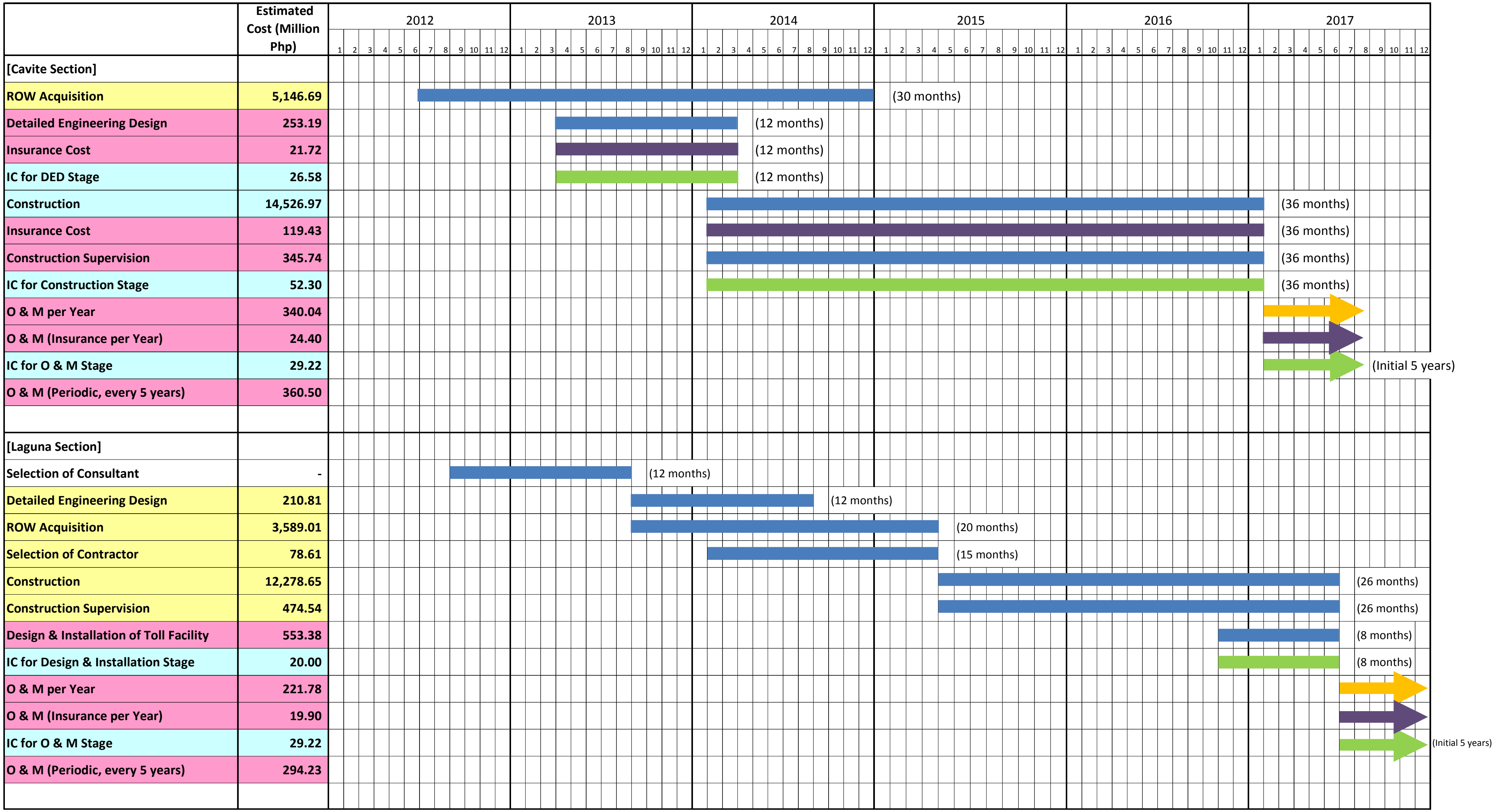
TABLE 8.2.5-1 ASSUMPTIONS AND CONDITIONS OF FINANCIAL ANALYSIS

		Assumptions
	Repayment Structure	● Even annuity basis (annual loan amortization is done at constant amount)
	Short-term Loan	
	(i)Interest Rate	● 5% (Assumed to be used to supplement negative cash flow)
	(ii)Repayment Period	● 1 year
Depreciation		
	Depreciation Cost	● Calculation Formula Annual depreciation cost = PC/T PC= Private Sector share of Project Cost T= Operation Period (30 years)
Taxation		
	Corporate Tax	● Calculation Formulation [Revenue - O&M cost - Insurance Cost - Annual depreciation cost - Interest payment - Local Government Tax] x Tax Rate (30%)
	VAT	● 12.0% applied to toll rate
	Local Government Tax	● 2.0% of Gross Avenue
	Property Tax	● Not considered since ownership of the assets is not attributed to the Concessionaire
	Tax Exemption	● With Corporate Income Tax Holiday ● 4 years from the commencement of the operation (in accordance with Executive Order No. 226, The Omnibus Investments Code of 1987)

Source: JICA Study Team

Table 8.2.5-1 shows the implementation schedule of the selected PPP scheme.

TABLE 8.2.5-2 IMPLEMENTATION SCHEDULE: PPP SCHEME TYPE-3: HYBRID



	Estimated Cost (Million Php)	
[Cavite Section]		
ROW Acquisition	5,146.69	(30 months)
Detailed Engineering Design	253.19	(12 months)
Insurance Cost	21.72	(12 months)
IC for DED Stage	26.58	(12 months)
Construction	14,526.97	(36 months)
Insurance Cost	119.43	(36 months)
Construction Supervision	345.74	(36 months)
IC for Construction Stage	52.30	(36 months)
O & M per Year	340.04	
O & M (Insurance per Year)	24.40	
IC for O & M Stage	29.22	(Initial 5 years)
O & M (Periodic, every 5 years)	360.50	
[Laguna Section]		
Selection of Consultant	-	(12 months)
Detailed Engineering Design	210.81	(12 months)
ROW Acquisition	3,589.01	(20 months)
Selection of Contractor	78.61	(15 months)
Construction	12,278.65	(26 months)
Construction Supervision	474.54	(26 months)
Design & Installation of Toll Facility	553.38	(8 months)
IC for Design & Installation Stage	20.00	(8 months)
O & M per Year	221.78	
O & M (Insurance per Year)	19.90	
IC for O & M Stage	29.22	(Initial 5 years)
O & M (Periodic, every 5 years)	294.23	

Cost Shouldered by:

🟨 : GOP 🟥 : Private 🟦 : Cost sharing between GOP and Private

Source: JICA Study Team

3) Cases of Analysis

The case of “no subsidy for construction cost of Cavite Section” was studied, however, the case was not financially viable, and especially Equity IRR could not attain the benckmark of 15%.

Several trial runs of financial analysis was made by varying subsidy of construction cost of Cavite Section and lease fee of Laguna Section.

Case-1: Lease fee is fixed at 20% and seeked amount of subsidy for construction cost of Cavite Section to attain Equity IRR of 15%.

Case-2: Lease fee is fixed at 25% and same exercise as Case-1 was carried out.

Case-3: Lease fee is fixed at 30% and same exercise as Case-1 was carried out.

Results of above analysis were as follows and shown in **Table 8.2.5-3.**

SUMMARY OF CASE ANALYSIS

Case	Lease Fee	Required Subsidy for
Case-1	20% of Revenue	**3.59 Billion Php** (24.7% of Construction Cost)
Case-2	25% of Revenue	**3.99 Billion Php** (27.5% of Construction Cost)
Case-3	30% of Revenue	**4.40 Billion Php** (30.3% of Construction Cost)

TABLE 8.2.5-3 COMPARISON OF TYPE-3 FOR VARIOUS LEASE FEE AND SUBSIDY

Case	**PPP Scheme**	**Condition** *(Note 1)*	**Results of Financial Analysis**		**% of Subsidy** *(Note-2)*	**ODA Repayment vs. Income of Lease Fee** *(Note-3)*	**Net Government Expenditure (Million Php)** *(Note-4)*
			IRR for SPV (%)	**Equity IRR (%)**			
Case-1	Up to Construction - Cavite Section: BOT - Laguna Section: ODA O & M - Both Section by Cavite Concessionaire	❖ Subsidy - 24.7% of civil work cost of Cavite Sec. **(3.59 Billion)** - 100% of ROW Acquisition Cost **(8.74 Billion)** - Total 15.58 Billion ❖ Lease Fee of Laguna Section - 20% of revenue	14.6	15.0	- 40.4% of Project Cost	- ODA Loan Repayment Amount 15.56 Billion - Lease Fee Income 20.14 Billion	- GOP Expenditure 13.94 Billion - GOP Income 5.59 Billion - Net GOP Expenditure 8.35 Billion
Case-2	Up to Construction - Cavite Section: BOT - Laguna Section: ODA O & M - Both Section by Cavite Concessionaire	❖ Subsidy - 27.5% of civil work cost of Cavite Sec. **(3.59 Billion)** - 100% of ROW Acquisition Cost **(8.74 Billion)** - Total 12.73 Billion ❖ Lease Fee of Laguna Section - 25% of revenue	14.6	15.0	- 42.1% of Project Cost	- ODA Loan Repayment Amount 15.56 Billion - Lease Fee Income 25.18 Billion	- GOP Expenditure 14.37 Billion - GOP Income 5.88 Billion - Net GOP Expenditure 8.49 Billion
Case-3	Up to Construction - Cavite Section: BOT - Laguna Section: ODA O & M - Both Section by Cavite Concessionaire	❖ Subsidy - 30.3% of civil work cost of Cavite Sec. **(4.40 Billion)** - 100% of ROW Acquisition Cost **(8.74 Billion)** - Total 13.14 Billion ❖ Lease Fee of Laguna Section - 30% of revenue	14.6	15.0	- 43.7% of Project Cost	- ODA Loan Repayment Amount 15.56 Billion - Lease Fee Income 30.22 Billion	- GOP Expenditure 14.79 Billion - GOP Income 6.17 Billion - Net GOP Expenditure 8.62 Billion

Note-1 : 2012 Price *Note-2 : % of discounted amount at 15%*
Note-3 : 2012 Price *Note-4 : % of discounted amount at 15%*

Recommendation

- Case-1 is recommended. Case-1 can achieve the following;
  - Lease fee of 20% of the revenue can recover the amount of ODA lone repayment.
  - Government subsidy for Laguna section construction cost is the minimum among three cases, thus the government can reduce the subsidy at the initial phase of the project.
  - Net Government Expenditure is the minimum among three cases.
  - Benchmark of Equity IRR can be satisfied.

- Case-1 is the most advantageous both for the Government side and the private side.

8.3 RISK MATRIX

Risk matrix of Type-3 is shown in **Table 8.3-1.**

TABLE 8.3-1 RISK MATRIX (1/4)
LAGUNA SECTION: DESIGN AND CONSTRUCTION PHASE

Implementation Stage	**Laguna Section (Up to Construction by ODA)**	
	Risk of GOP	
	Risk	**Mitigation**
Tendering	Delay in procurement of Consultants and Civil Work Contractor which leads to delay in delivery of the facility to a Concessionaire.	• Strict implementation of tender in accordance with schedule established with sufficient preparation
Detailed Design Stage	Delay in Detailed Design	• Employment of competent engineering firm.
	Change of Scope of Civil Work	• Extensive consultation meetings with LGUs and other concerned agency and PAPs.
	Delay in Approval of Detailed Design	• Periodic consultation meetings with BOD of DPWH and TRB.
	Over Design/ Under Design	• Undertake value engineering.
	Design Error	• Design checking by Independent Consultant (IC). • Professional Indemnity Insurance.
	Objection of Residents on Alignment Design	• Intensive stakeholders meeting with PAPs. • Provide appropriate compensation to PAPs.
	Different Design Standards and Materials Specification	• Adopt the same standards and specifications.
ROW Acquisition Stage	Delay in ROW acquisition which leads to delay in delivery of facility to Concessionaire.	• Ask the private developers to issue “Permit to enter” prior to ROW acquisition.
	Delay in release of ROW Acquisition Budget.	• Arrange in advance the release of budget.
	Delay in payment to PAPs due to lack of complete documents.	• Arrange with the COA for flexible payment to PAPs.
Construction Stage	Delay in Construction Completion and Delay in Delivery of Facility	• Contractor be imposed liquidated damage payable to GOP. • GOP be imposed Liquidated Damage payable to the Concessionaire.
	Poor quality of work (materials and workmanship)	• Employment of qualified contractor. • Strict construction supervision by CS Consultant. • Supervision by IC. Keep material tests record and quantity measurement.
	Cost Overrun	• Responsibility of the Contractor. • No adjustment of Contract Amount.
	Suspension or abandonment of Construction Work due to Contractor’s own reasons.	• Sanction against the concessionaire to be specified in the Contract.
	Failure to follow environmental requirements.	• Strict monitoring of environmental requirements.
	Poor traffic management.	• Proper coordination with LGUs. • Strict construction supervision.

TABLE 8.3-1 RISK MATRIX (2/4)
CAVITE SECTION: DESIGN AND CONSTRUCTION PHASE

Implementation Stage	**Cavite Section (Up to Construction by BOT with Subsidy, O & M : Both Section)**			
	Risk of GOP		**Risk of the Private**	
	Risk	**Mitigation Measure**	**Risk**	**Mitigation Measure**
Detailed Design Stage	-	• Include Liquidated damage clause in TCA payable to the Government.	Delay in Detailed Design	• Employment of competent engineering firm.
	-	• Jointly undertake extensive consultation meeting.	Change of Scope of Civil Work	• Extensive consultation meetings with LGUs and other concerned agency and PAPs.
	Delay in Approval of Detailed Design due to Government side fault.	• Periodic meetings with the Design Consultant. • Pay liquidated damage.	Remain due to Private side fault	• Periodic consultation meetings with BOD of DPWH and TRB.
	-	• Check Value Engineering results.	Over Design/ Under Design	• Undertake value engineering.
	-	• Require Professional Indemnity Insurance clause in TCA.	Design Error	• Design checking by Independent Consultant (IC). • Professional Indemnity Insurance.
	-	• Jointly undertake consultation meetings with PAPs.	Objection of Residents on Alignment Design	• Intensive stakeholders meeting with PAPs.
	-	• Receive reports from IC, if they are following same standards and specifications.	Different Design Standards and Materials Specification	• Adopt the same standards and specifications.
ROW Acquisition Stage	Delay in ROW Acquisition and RAP, resulting in delay of Delivery to the Concessionaire	• Early start of ROW acquisition. • Put enough manpower. • Liquidated damage to be paid to Concessionaire.	Delay in Financial Closure due to delayed ROW Acquisition and delayed start of construction.	• GOP be imposed Liquidated damage to be paid to the private.
	Delay in release of ROW Acquisition Budget	• Arrange with the private sector for advancing ROW acquisition cost.	-	-
	Delay in payment of PAPs due to lack of complete documents.	• Arrange with the Private Sector for advancing ROW acquisition cost, if Key documents are prepared.	-	-
Construction Stage	-	-	Delay in Financial Closure with other reasons than delayed delivery of ROW.	• The private sector be imposed Liquidated Damage payable to GOP.
	-	-	Delay in Construction Completion due to Concessionaire side fault.	• The private sector be imposed Liquidated Damage payable to GOP.
	-	-	Poor quality of work (materials and workmanship)	• Employment of qualified contractor. • Strict checking by IC.
	-	-	Cost Overrun	• Responsibility of the Concessionaire and no adjustment of toll rates.
	-	-	Suspension or abandonment of Construction Work due to Concessionaire's own reasons.	• Sanction against the Concessionaire to be specified in the TCA.
	-	-	Failure to follow environmental requirements	• Strict monitoring by IC. • Penalty to be imposed on the Concessionaire.
	Delayed issuance of Government's Permits	• Liquidated damage to be paid to the Concessionaire.		-
	-	-	Poor Traffic Management	• Proper coordination with the LGUs. • Penalty imposed to the Concessionaire.

TABLE 8.3-1 RISK MATRIX (3/4)
BOTH SECTIONS: OPERATION AND MAINTENANCE STAGE

Implementation Stage	**Cavite Section (Up to Construction by BOT with Subsidy, O & M : Both Section)**			
	Risk of GOP		**Risk of the Private**	
	Risk	**Mitigation Measure**	**Risk**	**Mitigation Measure**
O & M Stage	Delay in the delivery of Laguna Section to the Concessionaire	• Delivery date shall be specified with some allowance (say 6 months). • Liquidated damage to be paid to the Concessionaire.		
	Delay in Issuance of Toll Operation Certificate (TOC)	• Liquidated damage to be paid to the Concessionaire.		
	Delay in Approval of Toll Rates	• Liquidated damage to be paid to the Concessionaire.		
	Delay in Approval of Toll Rates Adjustment	• Liquidated damage to be paid to the Concessionaire.		
			Failure or Delay in Commencement of Operation.	Liquidated damage to be paid to GOP.
			Less traffic demand and toll revenue than expected.	• Ramp-up factor to be considered in the financial analysis.
			Failure to satisfy Minimum Performance Requirements for maintenance and operation.	• Pay penalty to GOP in accordance with the TCA.
			Delay in Payment of Lease Fee (or Concession Fee) to the Government	• Pay compensation to GOP in accordance with the TCA.
	Failure or Delay in Payment of Compensation of Foregone Toll Income	• Toll rate adjustment or extension of toll concession period.		
	Premature deterioration of Laguna Section Facility due to poor quality of work	• Specify clearly how to deal with this issue. • IC judge and impose compensation to be paid by the Government to Concessionaire.		

TABLE 8.3-1 RISK MATRIX (4/4)
BOTH SECTIONS: COMMON TO ALL STAGES

Implementation Stage	**Cavite Section (Up to Construction by BOT with Subsidy, O & M : Both Section)**			
	Risk of GOP		**Risk of the Private**	
	Risk	**Mitigation Measure**	**Risk**	**Mitigation Measure**
Common to all Stages	Force Majeure	• Both parties should discuss how to cope with the situation in accordance with the TCA.	Force Majeure	• Partially covered by All Risk Insurance.
		• Toll rate adjustment or extension of toll concession period.	Change in Laws including Taxation	
		• Both parties should discuss how to cope with the situation in accordance with the TCA.	Economic Risk (extraordinary high inflation, foreign exchange rates, oil crisis, worldwide economic recession, etc.)	

CHAPTER 9
ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

9.1 DESCRIPTION OF THE PROJECT

9.1.1 Background and Purpose

The proposed Cavite Laguna Expressway or CALAX (Laguna Section) has and extension of 18.1 kilometer, 4-lane, access controlled expressway that is designed to provide fast, safe, comfortable and reliable means of transport in Cavite and Laguna Provinces. The project also aims to improve access to the economic/industrial zones in CALABARZON and to boost the developmental of the area traversed.

The CALAX Project aims in the meeting the following specific objectives:

- Provide a free-flowing alternative route for the heavily congested Aguinaldo Highway, Governor's Drive and Sta. Rosa-Tagaytay Road. Serving the province of Cavite and Laguna;
- Support economic development by providing better transport access to economic/industrial zones in the area, this contributes improvement of local/foreign investments in the area;
- Support sound urbanization in the area;
- Provide a highway of international standards access controlled facility.

9.1.2 Necessity of Project

CALAX is needed from the following viewpoints;

(1) Traffic Congestion of National Roads in Cavite and Laguna Provinces

Both Cavite and Laguna Provinces are neighboring provinces of Metro Manila. The two provinces are rapidly urbanizing to accommodate spilled over population from Metro Manila. Population growth rates of the two provinces are quite high (4.76% per annum in the Cavite Province and 3.34% per annum in the Laguna Province from 2000 to 2007. Economic activities, particularly manufacturing industry, are also quite active. Thus, two provinces are within socio-economic activities of Metro Manila.

In spite of rapid urbanization, the road network development was not so significant, only widening of Aguinaldo Highway and Governor's Drive to a 4-lane road was made and a portion of Daang Hari Road was constructed in the last 20 years. Road network development was lagged behind the rapid urbanization. There are several Provincial Roads, however, that are still 2-lane roads.

Insufficient road network development is now resulting in traffic congestions of national roads and most of provincial roads.

High capacity roads which allows fast, safe, comfortable and reliable means of transport is highly needed in the areas to reduce traffic congestions in Cavite and Laguna Provinces.

(2) Economic and Social Activities in the Two Provinces

Many economic zones/industrial estates have already been operated and will be further developed in two provinces by making advantages of proximity to Metro Manila. The two provinces are now the center of manufacturing industry in the Philippines contributing to economic development of the country and generation of a lot of job opportunities.

Many universities and high schools have been transferred or established in the area, such as the Technological University of the Philippines and De La Salle in Dasmariñas, Cavite; Adventist University of the Philippines in Silang, Cavite; University of Sto. Tomas in Sta. Rosa, Laguna, etc.

Various real estate companies (land developers) are developing commercial areas and residential areas in the project areas. They have already acquired lands and some areas have been developed and have been sold out or are selling lands/lots they developed. It is expected that their lands will be sold out within 10 to 15 years and will be fully urbanized.

Above development will stimulate economic and social activities in the two provinces, thus transport network to support such economic and social activities is definitely needed.

(3) Urbanization

As mentioned in (2) above, urbanization of the area is lead by the private sector, particularly by land developers. With the lack of land development master plan by the Government, and developers only plan within their own properties and transport access to/from their properties is only made to the existing roads and/or existing expressway.

Sound urbanization should be guided/lead by the proper road network. National road network in the area of Laguna section is quite scarce, thus CALAX is needed to be planned to guide/lead sound urbanization of the area.

(4) Lack of Public Roads

The area of Laguna section lacks public roads which are only Aguinaldo Highway, Governor’s Drive and Sta. Rosa – Tagaytay Road. Instead, there are many private roads developed by land developers, most of which are not open to the general public and only these cars allowed by the land owners can pass. Thus, the development of public roads which can be used by the general public is needed.

(5) Expressway Network

There are two expressways in Cavite and Laguna Provinces, namely SLEX and CAVITEX, however they are functioning individually and the expressway network is not formed yet. If something happens and traffic of an expressway becomes interrupted, travelers have no other choice but to select/use the congested road.

9.1.3 Project Component

The proposed CALAX (Laguna Section) is to be constructed in the provinces of Cavite and Laguna, which are part of Region IV-A. The starting point of the expressway is at Aguinaldo highway, Silang Municipality and ends at Mamplasan Interchange of SLEX, Biñan City. The proposed Project has a ROW of 50~60 meters in width, and a length of 18.1 kilometers.

TABLE 9.1.3-1 PROJECT PROFILE

Project Name	Cavite Laguna Expressway Project: Laguna Section
Project Proponent	Department of Public Works and Highways (DPWH)
Project Contents	Expressway construction through Silang,Sta. Rosa City and Biñan City
Road Length	18.1 km
Number of Lane	4-lane
ROW (width)	50~60m
Total Cost (Peso)	18.8 Billion Pesos

Source: *JICA Study Team (2012)*

FIGURE 9.1.3-1 ROUTE OF PROPOSED ROAD

9.1.4 Project Rational

(1) PHILIPPINE DEVELOPMENT PLAN (2011 – 2016)

Philippine Development Plan (PDP), 2011-2016 was announced in 2011. Development policies of infrastructure are as follows;

DEVELOPMENT POLICIES OF INFRASTRUCTURE

"Accelerating Infrastructure Development"

(1) To optimize resources and investment
- Improve project preparation, development and implementation
- Synchronize planning and budgeting
- Coordinate and integrate infrastructure initiative

(2) To attract investments in infrastructure
- Improve the institutional and regulatory environment of the infrastructure sector
- Encourage PPPs

(3) To foster transparency and accountability in infrastructure development
- Encourage stakeholder participation

(4) To adopt to climate change and mitigate the impacts of natural disasters
- Institutionalize Climate Change Act (CCA) and Disaster Risk Reduction Management (DRRM)

(5) To provide productive employment opportunities
- Adopt a labor-intensive scheme where applicable.

With regards to the transport sector, issues and challenges are established as follows;

TRANSPORT SECTOR ISSUES AND CHALLENGES

(a) Assessment and Issues
- Lack of integrated and coordinated transport network
- Overlapping and conflicting functions of transport and other concerned agencies
- Transport safety and security concerns

(b) Strategic Plan and Focus
- Adopt a comprehensive long-term National Transport Policy (NTP)
- Develop strategic transport infrastructure assets
  - – Prioritize asset preservation
  - – Provide access to major and strategic tourism destinations and production areas
  - – Promote environmentally sustainable and people-oriented transport

(c) Develop an Integrated Multi-modal Logistics and Transport System
- Identify and develop strategic logistics corridors based on a National Logistics Master Plan
- Improve Roll-on/roll-off ship (RORO) terminal system
- Explore ASEAN connectivity through sea linkages

(d) Separate the Regulatory and Operation Functions of Transport and Other Concerned Agencies. To address the overlapping and conflicting functions of transport and other concerned agencies.

(e) Comply with Safety and Security Standards. To ensure transport safety and standards.

(f) Provide Linkages to Bring Communities into the Mainstream of Progress and Development. To promote conflict-affected and highly impoverished areas.

(2) ROAD DEVELOPMENT GOALS

Public Investment Program (PIP) (2011 - 2016) was formulated by DPWH in 2011. Goals were set as follows;

DEVELOPMENT GOALS UNDER PIP

1. Provide safe environment through quality infrastructure facilities;
2. Increase mobility and total connectivity of people through quality infrastructure resulting to improved quality of life;
3. Strengthen national unity, family bonds and tourism by making the movement of people faster, cheaper and safer;
4. Facilitate the decongestion of Metro Manila via a transport logistics system that would ensure efficient linkages between its business centers and nearby provinces;
5. Implement more Public-Private Partnership (PPP) projects for much needed infrastructure and level playing field for investment;
6. Study the mechanism for longer maintenance period for roads and bridges; and
7. Generate more transport infrastructure with minimal budget cover or contingent liabilities.

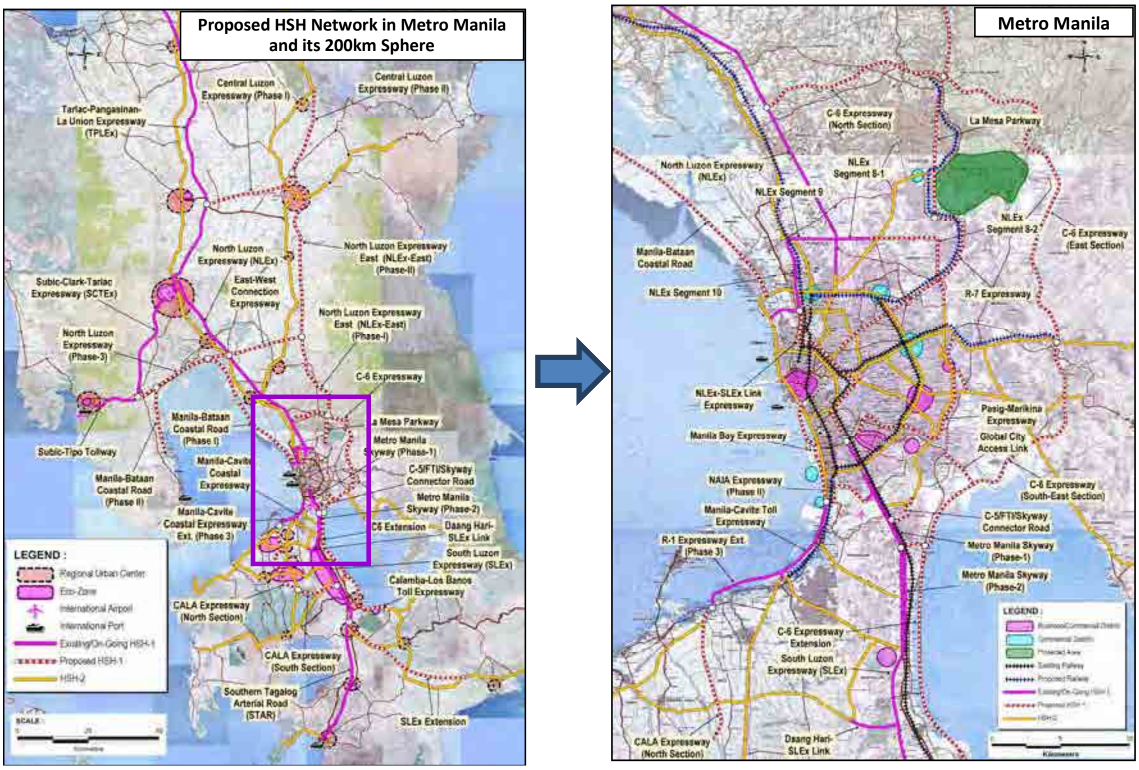
Strategic focuses were set as follows;

STRATEGIC FOCUS

- Implement activities in the following order of priorities:
  a. Maintenance or asset preservation – to preserve existing roads in good condition
  b. Rehabilitation – to restore damaged roads to their original designed condition
  c. Improvement – to upgrade road features so that they efficiently meet traffic demands; and
  d. New Construction
- Prioritize upgrading of the national road network, as to quality and safety standards
- Prioritize national roads to address traffic congestion and safety in urban centers and designated strategic tourism destinations
- Completion of on-going bridges along national roads
- Develop more Public-Private Partnership (PPP) projects for much needed infrastructure and level playing field for investments
- Study the mechanism for a longer maintenance period (5 – 10 years) in road and bridges construction contract provision
- Prioritize flood control projects in major and principal river basins to address climate change based on master plan and adopting new technologies in flood control and slope management
- Prioritize adequate flood control and upgraded drainage design standards and facilities in flood-disaster prone areas to mitigate loss of river and damage to properties
- Promote innovative technology such as geo-textiles and coco-netting in slope protection and soil erosion control
- Promote retarding basin and rain water harvesting for non-domestic use
- Prioritize water supply in designated strategic tourist destinations/centers

(3) Master Plan on High Standard Highway Network

The study of master plan on High Standard Highway (HSH) Network Development was conducted in Year 2010. **Figure 9.1.4-1** shows the proposed HSH network in Metro Manila and 200 km sphere. Based on this master plan, Public Investment Program (2011-2016) for expressway projects was formulated.



Source: The Study of Masterplan on High Standard Highway Network Development, 2010, JICA

FIGURE 9.1.4-1 PROPOSED HSH NETWORK

CALA Expressway is one of the1st priority projects in this Master plan shown in **Table 9.1.4-1**.

TABLE 9.1.4-1 PROPOSED HSH PROJECTS PRIORITY

	Name of HSH	Length (km)	Cost (billion pesos)
1st Priority Group	NLEx–SLEx Link Expressway	13.4	31.14
	CALA Expressway	41.8	19.67
	C-5/FTI/SKYWAY Connector Rd.	3.0	4.76
	NAIA Expressway (Phase 2)	4.9	12.18
	C-6 Expressway/Global City Link	66.5	54.29
	Central Luzon Expressway(CLLEX)	63.9	29.23
	SLEx Extension (to Lucena)	47.8	16.45
	Calamba-Los Banos Expressway	15.5	5.23
	Sub-total	256.8	172.95
2nd Priority Group	R-7 Expressway	16.1	25.81
	NLEX East / La Mesa Parkway	103.0	38.94
	Manila – Bataan Coastal Road	70.3	72.94
	NLEX (Phase 3)	36.2	28.42
	East-West Con. Expressway	26.6	16.48
	C-6 Extension	43.6	18.61
	Manila Bay Expressway	8.0	46.54
	Pasig Marikina Expressway	15.7	49.58
	Sub-total	319.5	297.32
TOTAL		576.3	470.27

Source: The Study of Master Plan on High Standard Highways 2010, JICA

9.2 PHILIPPINES' LEGAL / POLICY FRAMEWORK ON ENVIRONMENTAL AND SOCIAL CONSIDERATION

9.2.1 Governing Laws and Regulations

Environmental related laws in the Philippines are composed of under the Presidential Decree (PD) No.1151 as environmental policy and PD No. 1152 as environmental regulation in relation to the national policy and regulation (**Table 9.2.1-1**).

TABLE 9.2.1-1 THE GOVERNED LAW ON ENVIRONMENTAL RELATED LAWS

Governed Law and Decree	Remarks
Presidential Decree (PD)No.1151	Environmental policy
Presidential Code (PD)No. 1152	Environmental regulation

Major environmental laws are made for natural resources, protection of wild life and bio-diversity, forest resources, mining, coastal and marine, ambient air, water quality, waste and disposal, land use and resettlement, conservation of historical and cultural assets, environmental assessment, and national integrated protected area system. Major environmental related laws and decrees are summarized in the table below.

TABLE 9.2.1-2 LIST OF ENVIRONMENTAL RELATED LAWS AND DECREE

Category	Law, Decree, Act	Remarks
Natural resources	Constitution Article 12. Clause 2.	Investigation of natural resources, development use
	Presidential Decree (PD) No.1198	Protection of natural environment
Protection of wild life , bio-diversity	Republic Decree No. 826	Preservation of Natural parks and establishment of wildlife protection committee
	Republic Decree No. 1086 (1954)	Prohibition of capture of Mindoro buffalo (Tamaraw)
	Republic Decree No. 6147	Preservation of Monkey Eating Eagle
	Statement No. 2141	Preservation of wilderness region
	Administrative order No.243 (1970)	Prohibition of slaughter for buffalo
Forest resources	Presidential Decree (PD) No.209	Encourage of common forest project
	Presidential Decree (PD) No. 277	Encourage of report on offender against forest law
	Presidential Decree (PD) No. 278	Procedural regulation on development application for forest resources and forest land development use
	Presidential Decree (PD) No. 331 (1973)	Sustainable forest development
	Presidential Decree (PD) No. 389	Regulation on forest recovery
	Presidential Decree (PD) No. 705 (1975)	Amendment of regulation on forest recovery
	Presidential Decree (PD) No. 865	Export of lumber (selective deforestation)
	Presidential Decree (PD) No. 953	Request of forestation
	Presidential Decree (PD) No. 1153	Decree of forestation

Category	Law, Decree, Act	Remarks
	DNR DecreeNo.78 (1987)	Regulation on permission range for felling and collection of oak, other hard wood
	DNR Decree No.79 (1987)	Establishment of foundation of forest regeneration
	DNR memorandum No.8 (1986)	Full prohibition of log export
	Notification No. 818	Diminution of forest
	Forest development bureau circular No. 13 (1986)	Full prohibition of land possession within mangrove area, river area, preservation area, wilderness area, National park, wildlife reserve, experimental forest and etc.
Mining	Presidential Decree (PD) No.1251	Prospect mining
	Presidential Decree (PD) No.463 (1974)	Mining resource development Decree
	Presidential Decree (PD) No.1189 (1979)	Land use of ex-mining site for compensation of the land owner
Coastal, marine	Presidential Decree (PD) No.600 (1974)	Prevention of marine pollution
	Presidential Decree (PD) No. 602 (1974)	Establishment for oil pollution management center
	Presidential Decree (PD) No. 979	Prevention of ocean pollution
Ambient air	Republic law No. 3931	Establishment of National air, water pollution control committee , definition of pollution and penalty
	Presidential Decree (PD) No.1181	Air pollution regulation on incidence origin of travelling
	Presidential Decree (PD) No.1160	Barangay captain Community leader on implementation of law on prevention of public nuisance
	Circulation No. 247	Appointment of highway patrol guard
	Circulation No 551	Equipment of prevention devices of motor vehicles
Water quality	Republic law No.4850	Establishment of Laguna Lake development Bureau
	Republic law No.3931	Establishment of National committee for ambient air pollution management
	Presidential Decree (PD) No.600	Establishment of Philippine coastal guard, measure for marine pollution
	Presidential Decree (PD) No.1252	Establishment of foundation for treatment of mining discharge water
	Presidential Decree (PD) No.602	Establishment of National oil pollution management center
	Republic law No.274	Pasig river pollution measures
	Republic law No. 361	Establishment of Pasig river development council
	Circulation No.712	Discharge water regulation for Manila bay and Laguna lake
	DENR Decree No. 34	Classification of water and use
	DENR Decree No. 35	Regulation on discharge water for Industrial and urban drainage
Waste disposal	Presidential Decree (PD) No. 825 (1975)	Penalty regulation on illegal dump of disposal, dirt and other wastes
	Presidential Decree (PD) No. 826 (1975)	Regulation on treatment responsibility of solid and liquid wastes by local government
	Presidential Decree (PD) No.1152 (1977)	Regulation on treatment method and treatment management for wastes
	Republic Act (RA) 6969 (1990)	An Act to Control Toxic Substances and Hazardous and Nuclear Wastes, Providing

Category	Law, Decree, Act	Remarks
		Penalties for Violations thereof , and for their Purposes
	DAO 36 Series of 2004 (DAO 04-36)	DAO 04-36 is a procedural manual of DAO 92-29, a comprehensive documentation on the legal and technical requirements of hazardous waste management
	DAO 98-50	Adopting the Landfill Site Identification and Screening Criteria for Municipal Solid Waste Disposal Facilities
	DAO 98-49	Technical Guidelines for Municipal Solid Waste Management
	RA 9003	Ecological and Solid Waste Management Act
	DAO 01-34	Implementing Rules and Regulations (IRR) of RA 9003
	AO 93-90	Creating a Project Management Office on Solid Waste Management (PTWFM) under the Presidential Task Force on Waste Management
Land use, resettlement	Constitution Article 13	Establishment of human protective committee and their responsibility
	DPWH Decree No.65	Land use procedure for public project and expressway project
	DPWH Decree No.120 (1988)	Compensation of private land for DPWH project
	DPWH Decree No.234 (1990)	Amendment of compensation of private land for DPWH project
	Revised administrative code No. 64	Competence of house of justice on private land acquisition by the government
	DPWH Decree No.65 (1983)	Guideline for land use and right of way
	Presidential Decree (PD) No. 1517	Designation of reserve area at reorganization of urban land use
	Senate article No. 328	Decree of temporally prohibition for removal of displaced persons
	Republic Act 7279 (Urban Development and Housing Act of 1992)	An act to provide doe a comprehensive and continuing urban development and housing program, establish the mechanism for its implementation, and for other purpose; Procedure for removal of habituated peoples
Land Acquisition	Republic Act 6389 (1971): The Agricultural Land Reform Code,	The agricultural lessee shall be entitled to disturbance compensation equivalent to five times the average of the gross harvests on his landholding during the last five preceding calendar years
	Executive Order (1985)	Providing the procedures and guidelines for the expeditions acquisition by the government of private real properties or rights thereon for infrastructure and other government development projects
	Republic Act 8974 (2000)	An act to facilitate the acquisition of right-of-way, site or location for national government infrastructure project and for other purposes
Human rights	Executive Order NO.153 (2002);	Instituting the national drive to suppress and eradicate professional squatting and squatting syndicates; Amending E.O.178 (1999) and E.O. 128 (1993)
	Indigenous People's Rights Act (IPRA) of 1997	sets the conditions, requirements, and safeguards for plans, programs and projects affecting Indigenous Peoples (IPs)
	NCIP Administrative Order No. 1, Series of 2006	the procedure for obtaining the "Free and Prior Informed Consent" (FPIC) for affected

Category	Law, Decree, Act	Remarks
		communities
Conservation of historical, cultural assets	Republic Decree No. 4365	Responsibility of National historic committee on authorization , restoration and maintenance for historical assets
	Republic Decree No.4346	Responsibility of protection and propulsion of maintenance for cultural assets within National museum
Environmental assessment	Presidential Decree (PD) No. 1586	Environmental assessment system and administrative organization
	Presidential Proclamation No. 2146	3 Industrial sectors with large environmental impacts and 12 environmentally critical regions
National integrated protected area system	National integrated protected area system act (1992)	Review of National integrated protected area

Source: Countries' environmental information maintenance study report; the Philippines (JICA), 1997 et al

The government of Philippine has been ratified international treaties, agreements, and protocols in relation to environmental and social consideration which are listed below.

- Washington Treaty: Convention on the international trade in endangered species of wild flora and fauna (1981)
- International tropical timber agreement (1983)
- United Nations convention on the law of the sea (1984)
- World heritage convention concerning the protection of the world cultural and natural heritage (1985)
- Montreal Protocol on substances that deplete the Ozone layer (1991)
- Vienna convention for the protection of the ozone layer (1991)
- Convention on biological diversity (1993)
- Basel convention on the control of trans-boundary movement of hazardous wastes and their disposal (1993)
- Ramsar convention on wetlands of international importance, especially as waterfowl habitat (1994)
- Framework convention on climate change (1994)
- Kyoto protocol (1998)
- Cartagena protocol on bio-safety to the convention on biological diversity (2000)
- Stockholm convention on persistent organic pollutants (2001)

9.2.2 Philippines Environmental Impact Statement System (PEISS)

In the Philippines, all private or public projects or activities which are envisaged to potentially have a negative impact on the environment are subject to environmental impact assessment (EIA) by Philippine Environmental Impact Statement System (PEISS). EIA is the preliminary analysis of the potential impacts of the project on the environment. Aware of the possible negative effects of the implementation of industrial and other activities, the Philippine government has instituted measures to encourage the use of EIA as a planning and decision making tool.

PEISS is a set of laws, regulations, administrative orders and guidelines concerned with Environmental Impact Assessment (EIA). The following are some of the most important of these laws and guidelines:

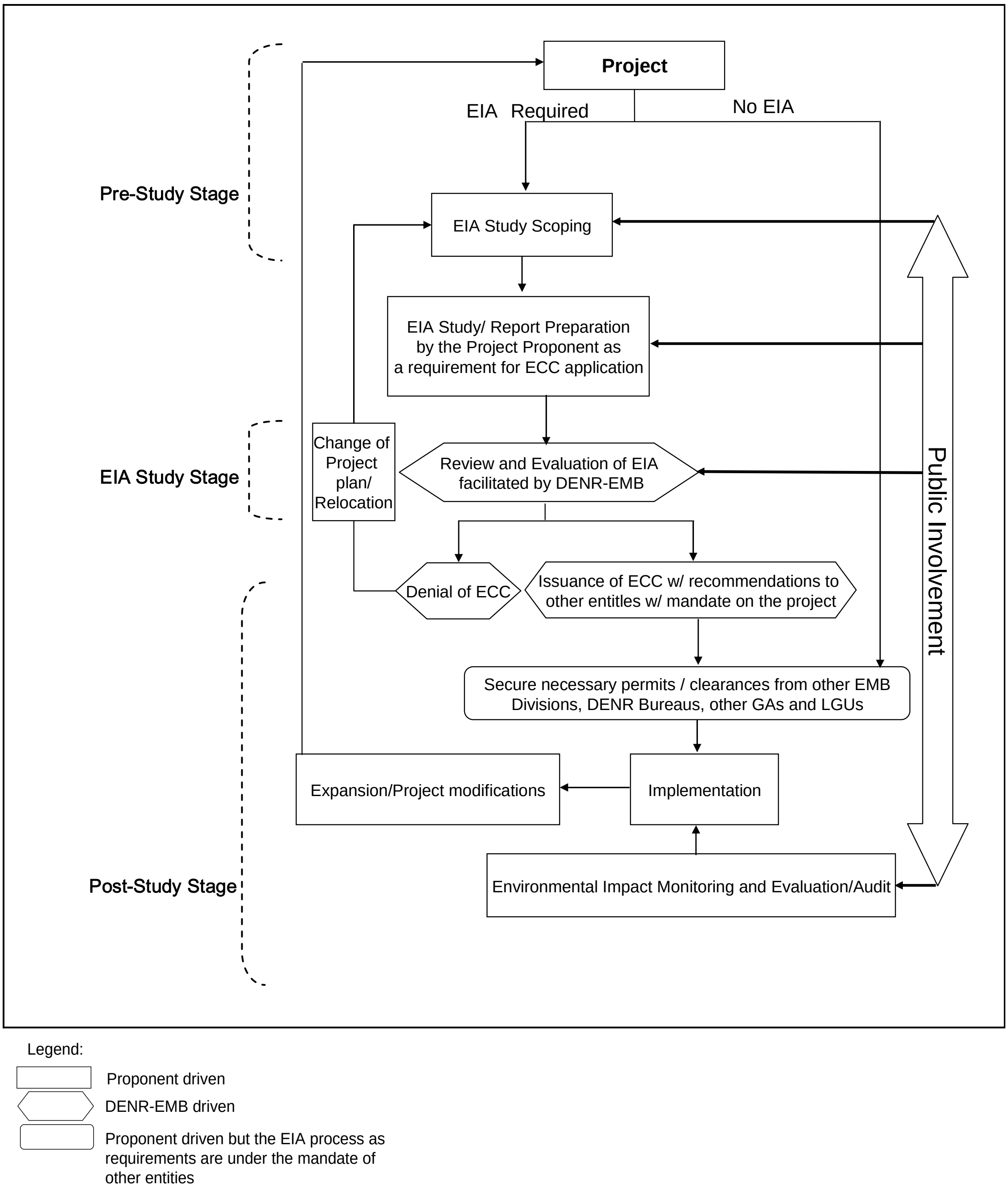
Environmental Impact Statement System (EISS), Presidential Decree No. 1586 (1978): An act establishing and centralizing the Environmental Impact Statement (EIS) System under the National Environmental Protection Council (NEPC), which merged with the National Pollution Control Commission (NPCC) in June 1987 to become the Environmental Management Bureau (EMB).

Presidential Proclamation No. 2146 (1981) and No. 803 (1996): It proclaims Environmentally Critical Projects (ECPs) to have significant impact on the quality of environment and Environmentally Critical Areas (ECAs) as environmentally fragile areas within the scope of the EIS System.

DAO 96-37 revised to become DAO 92-21 (Devolved responsibility for EIS to the EMB-Regional Office and further strengthened the PEISS. Placed emphasis on promoting maximum public participation in EIA process to validate the social acceptability of the Project.

DENR Administrative Order No. 30 Series of 2003 (DAO 03-30), Revised Procedural Manual (2007): Provides for implementation of rules and regulations of Presidential Decree No. 1586, establishing PEISS. Also, provided detailed definitions of technical terms and detailed information regarding procedures, related laws and regulations.

The procedures of EIA can be grouped into; the following stages (as shown in the following diagram): (1) pre-study stage (screening and scoping), (2) EIA study stage and (3) post-study stage (review, decision-making and monitoring).



Source: Revised Procedural Manual for DENR Administrative Order No. 30 Series of 2003 (DAO 03-30)(2007)

FIGURE 9.2.2-1 EIA PROCESS FLOW

9.2.3 Involuntary Resettlement and Land Acquisitions

9.2.3.1 Republic Act 8974 and its implementation (IRR)

In November 2000, another law was passed by the Philippine congress to avoid delays in the implementation of development projects due to ROW acquisition-related problems. Republic Act 8974, otherwise known as “An Act to Facilitate the Acquisition of Right-of-Way, Site or

Location for National Government Infrastructure Projects and For Other Purposes" prescribed new standards for assessment of the value of the land subject of negotiated sale or expropriation proceedings, namely:

- The classification and use for which the property is suited shall be based "on the approved land use plan and/or zoning ordinance, if any, of the city concerned";
- The size, shape or location, tax declaration and zonal valuation of the land;
- The price of the land as manifested in the ocular findings, oral, as well as documentary evidence presented;
- The reasonable disturbance compensation for the removal and/or demolition of certain improvement on the land and for the value of improvements thereon;
- The development costs for improving the land (this shall be based on the records and estimates of the City or Municipal Assessor concerned);
- The value declared by the owners (as shown in their latest Tax Declaration Certificates or Sworn Statements);
- The current price of similar lands in the vicinity (This shall be based on the records on the Deeds of Sale in the Office of the Register of Deeds Concerned); and
- Such facts and events as to enable the affected property owners to have sufficient funds to acquire similarly-situated lands of approximate area as those required from them by the government, and thereby rehabilitate themselves as early as possible.

Another feature of R.A. 8974's IRR that makes ROW acquisition more acceptable to property owners is Section 10 which prescribes valuation of affected improvements and/or structures to be computed based on replacement cost method. The replacement cost of improvements/structures is defined as "the amount necessary to replace the improvements/structures, based on the current market prices for materials, equipment, labor, contractor's profit and overhead, and all other attendant cost associated with the acquisition and installation in place of the affected improvement/structures".

Compared to the previous statues, valuation of land and improvements using this legislation is by far the most equitable and practical. Adherence to these provisions would also close the gap between Philippine legislation and compliance to WB O.P. 4.12 smaller.

Shown below are other important and applicable provisions of the IRR:

- Section 4 states that any Implementing Agency which requires acquisition of ROW for its projects may explore donation as the first option;
- Sets the 1st offer for negotiated sale of land (just compensation) as the price indicated in the current zonal valuation issued by the BIR for the area where the property is located;

- Provides for the engagement of government financing institutions or private appraisers as an option to undertake appraisal of the land and/or improvements/structures, to determine its fair market value (if PAFs refused the first two offers);
- Tasked the National Housing Authority (NHA) to establish and develop informal settlers (squatter) relocation sites, including provision of adequate utilities and services

9.2.3.2 Executive Order 152 (2002)

- Designated the Presidential commission for the Urban Poor (PCUP) as the sole clearing house for the conduct of demolition and eviction activities involving the homeless and underprivileged citizens.
- Mandated the PCUP to ensure strict compliance to the requirements of just and humane demolition and eviction under the UDHA of 1992 and the implementing Rules and Regulations of Section 28.

9.2.3.3 DPWH Department Order No. 5, Series of 2003

- Created the Infrastructure Right of Way and Resettlement Project Management Office (IROW-PMO) and the Implementation of the Improved IROW Process;
- Implementing Office (IO) shall ensure that IROW costs are always included in project budgets;
- The IO shall provide an estimated cost breakdown of each project to the IROW-PMO and the CFMS prior to any disbursement of funds. The first priority of the budget for a project shall be all costs prior to construction (note that this includes ROW acquisition);
- If ROW costs differ from the approved ROW budget after detailed design has been finalized, a budget adjustment shall be approved;
- A Land Acquisition Plan and Resettlement Action Plan (LAPRAP) shall be prepared for all projects, whether local of foreign funded, that will require ROW acquisitions, using a standardized compensation package;
- Determination of Affected Persons (AP) and improvements shall be based on the cut-off date, which is the start of the census of APs and tagging for improvements; and
- The IO shall prepare the final as-built ROW Plan upon completion of the project, for submission to the IROW and Resettlement PMO.

9.2.3.4 Land Acquisition, Resettlement, Rehabilitation, and Indigenous People's (LARRIP) Policy, 3rd Edition, (2007)

- The Land Acquisition Plan and Resettlement Action Plan (LAPRAP) document shall describe the project, expected impacts and mitigation measures, socio-economic profile of the APs, compensation package, timetable of implementation, institutional arrangements, participation, consultation, and grievance procedures;

- LAPRAP shall be prepared using inputs from the IROW Action Plan, the census and socio-economic survey conducted, detailed engineering study, and parcellary survey results;
- LAPRAP shall be the basis for qualifying and compensating APs for lands, structures and/or improvements, that are partially or fully affected by the Department's infrastructure projects; and
- Provision of resettlement sites shall be the responsibility of the Local Government Units (LGUs) concerned, with assistance from the concerned government agencies tasked with providing housing.

9.2.3.5 Execuive Order 708 (2008)

EO 708 (2008) has been devolved the clearing house functions of the PCUP to the respective cities and municipalities in whose territorial jurisdiction the proposed demolition and eviction activities of government agencies are to be undertaken.

9.2.3.6 Civil Code of the Philippines, Chapter 3, Prescription of Actions, Article 1141

This Article specifies the prescription of thirty (30) years for real actions over immovable objects. All lands which shall have been used by the public as a highway, airport, etc. for a period of thirty (30) years or more, shall be a highway, airport, etc. with the same force and effect as if it had been duly laid out and recorded as a highway, airport, etc. in the cadastral map.

9.2.3.7 DPWH Department Order No. 187 (Series of 2002)

DO 187 requires all offices to include the cost of ROW acquisition, informal settler (squatter) relocation, and the development of a resettlement site in the total construction cost of any proposed projects.

9.2.3.8 Republic Act 7160 (1991): "Local Government Code"

RA 7160 allows the local government units (LGU) to exercise the power of eminent domain for public use. The law also empowers the concerned LGU to open or close roads within its territorial jurisdiction.

9.2.3.9 Republic Act 8371: "Indigenous People's Rights Act" (IPRA law)

A "certification precondition" (consent) is required from affected indigenous peoples before any land taking and/or relocation from their ancestral domain by the project. The process will be closely followed by representatives of the National Commission on Indigenous Peoples

(NCIP). The IPRA together with the “Free and Prior Informed Consent” (FPIC) guidelines of 2006, will serve as the guiding framework on addressing IP issues.

9.2.3.10 Republic Act 7279 (Urban Development and Housing Act of 1992) and its IRR

Section 5 of the Act, and Sections 3.1 and 6.6 of its Annex (Guidelines for the inventory and identification of Lands and Sites for Socialized Housing) states that lands or portions thereof, set aside by government offices, facilities, and other installations, whether owned by the National Government, its agencies and instrumentalities, including government-owned and controlled corporations, or by the Local Governments Units, but which have not been used for the purpose for which they have been reserved or set aside for the past 10 years from the effective of the Act (i.e. as of 2002) shall be covered. As such, these areas, when identified as suitable for socialized housing, shall immediately be transferred to the NHA, subject to the approval of the President of the Philippines, or by the LGU concerned, as the case may be, for proper disposition with the Act;

- Section 8 of the Act and its Annex “A” mandated all local government units in coordination with the NHA HLURB, NAMRIA, and the DENR land Management Bureau (LMB) to identify lands for socialized housing and resettlement areas for the immediate and future needs of the underprivileged and homeless in the urban areas;
- Section 6.3 of the Act’s Annex sets the following criteria to be used for evaluating the suitability of sites for socialized housing:
- To the extent feasible, socialized housing and resettlement projects shall be located in new areas where employment opportunities are available;
- Priority shall be given to areas where basic services and facilities are already existing or where they can be introduced within a short time;
- Transportation costs to work places and other services should be affordable considering that the target beneficiaries are the homeless and underprivileged;
- The site shall not require excessive leveling, cutting and filling. Sites requiring excessive engineering works shall be avoided. Likewise, sites on steep slopes and/or week soil foundation shall not be considered;
- Environmentally critical areas like those that are flood prone or earthquake zones or areas near rivers and canal shall be avoided;
- Compatibility with existing zoning; and
- Financial feasibility and viability where land valuation offer is low; and
- Tenurial status.
- Section 16 of the Act provides the eligibility criteria for program beneficiaries as follows:
- Must be a Filipino citizen;
- Must be an underprivileged and homeless citizen i.e. as defined in Section 3 of the same Act, refers to beneficiaries of the Act and to individuals or families residing in urban and

urbanizing areas whose income or combined household income falls within the poverty threshold as defined by the NEDA and who do not own housing facilities, including those who live in makeshift dwelling units and do not enjoy security of tenure;

- Must not own any other real property whether in the urban or rural area; and
- Must not be a professional squatter or a member of squatting syndicates.
- Section 28 of the Act stipulates that eviction or demolition as a practice shall be discouraged; however it may be allowed under the following conditions;
- When persons or entities occupy danger areas such as esteros, railroad tracks, garbage dumps, riverbanks, shorelines, waterways, and other public places such as sidewalks, roads, parks and playgrounds;
- When government infrastructure projects with available funding are about to be implemented; or
- When there is a court order for eviction and demolition.
- In the execution of the above Section 28, the following shall be mandatory:
- Notice upon the affected persons or entities at least thirty (30) days prior to date of eviction and demolition;
- Adequate consultations on the matter of resettlement with the duly designated representatives of the families to be resettled and the affected communities in the areas where they are to be relocated;
- Presence of local government officials or their representatives during eviction or demolitions;
- Proper identification of all persons taking part in the demolition;
- Execution of eviction or demolition only during regular office hours from Mondays to Fridays and during good weather unless the affected families consent otherwise;
- No use of heavy equipment for demolition except for structures that are permanent and others of concrete materials;
- Proper uniforms for members of the Philippine National Police who shall occupy the first line of law enforcement and observe proper disturbance control procedures; and
- Adequate relocation, whether temporary or permanent; provided however, that in cases of eviction and demolition pursuant to a court order involving underprivileged and homeless citizens, relocation shall be undertaken by the LGU concerned and the NHA with assistance of other government agencies within 45 days from service of notice of final judgment by the court, after which period the said order shall be executed; provided further that should relocation not be possible within the said period, financial assistance in the amount equivalent to the prevailing minimum daily wage multiplied by 60 days shall be extended to the affected families by the LGU concerned.

9.3 RESPONSIBLE ORGANIZATIONS

9.3.1 Proponent of the Project

The proponent of the Project is the **Department of Public Works and Highways (DPWH)**.

After a long process of evolution by virtue of Executive Order No. 124, dated January 30, 1987, the Department of Public Works and Highways (DPWH) was organized with five (5) bureaus, six (6) services, sixteen (16) regional offices, twenty-four (24) project management offices, sixteen (16) regional equipment services and one-hundred eighteen (118) district engineering offices. Organization chart of DPWH is shown in **Figure 9.3.1-1** and the function and responsibilities pertaining to be development and management of PPP expressway projects at DPWH are presently distributed among several offices. Major players on PPP are listed below.

PMO-BOT: This Office is the project implementing office in DPWH and will be upgraded to PPP Service. It is tasked to identify and initiate projects for BOT/PPP implementation; prepare/review feasibility studies (FS) and proposals for BOT/PPP projects for approval of the NEDA-Investment Coordinating Committee (ICC); prepare bidding documents; participate in negotiations and finalization of BOT/PPP contracts; and monitor/supervise the implementation of BOT/PPP projects. Organizational chart is shown in **Figure 9.3.1-2,** and **Figure 9.3.1-3** respectively.

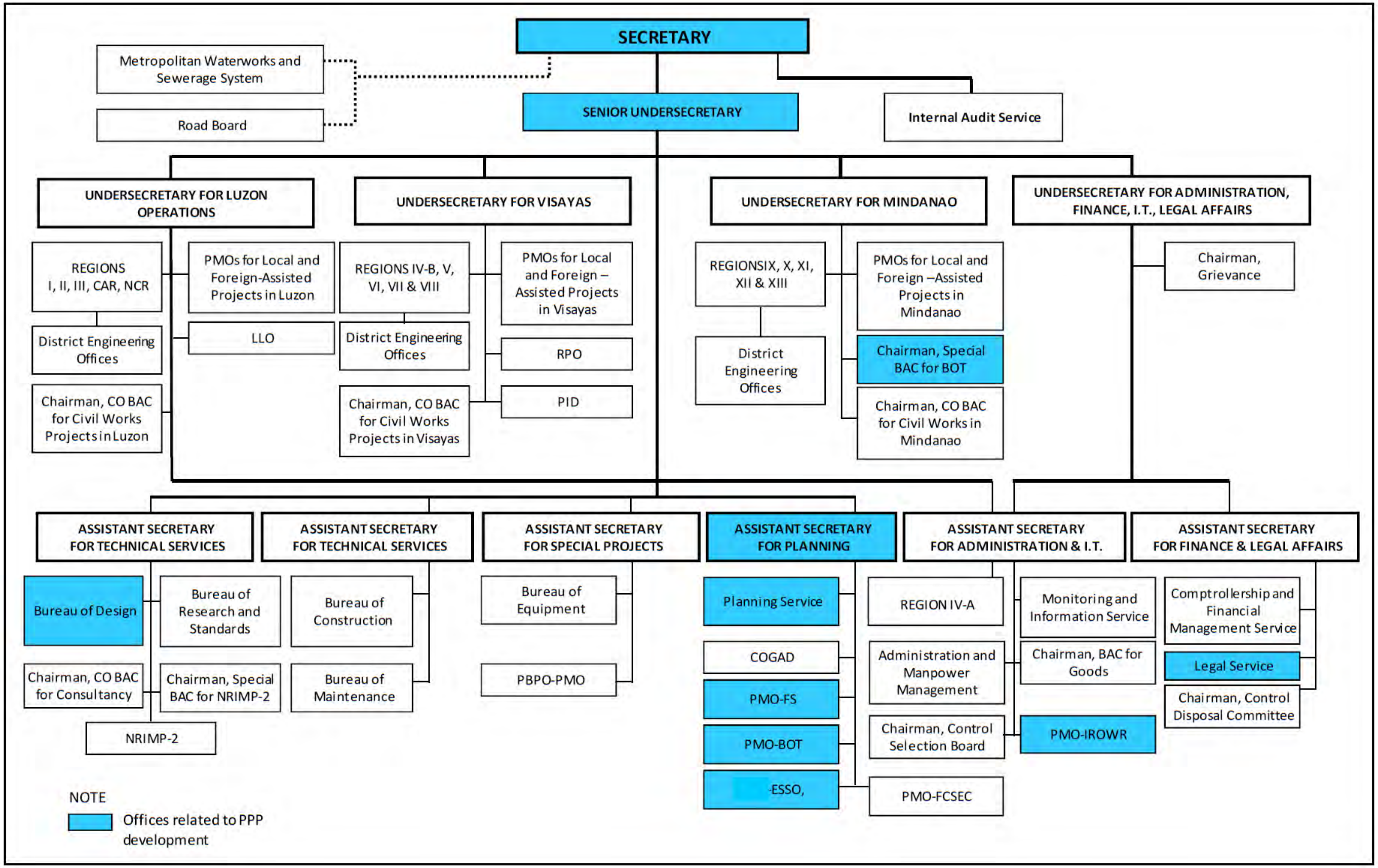
Planning Service (PS): This Service is assigned to formulate policies, plans and programs for the development of the national road network, which includes expressways; conduct/review FS of road/expressway projects; prepare PPP proposals for ODA financing; maintain a national road database; and prepare multi-year and annual budgets for the construction (including right-of-way and engineering) and maintenance of national roads.

PMO-Feasibility Studies: This office is assigned to conduct/supervise FS of major foreign-assisted and locally-funded road and expressway projects; and assist the PS and PMO-BOT in preparing project proposals for ODA financing.

Bureau of Design (BOD): This Bureau is mandated to set engineering design standards; conduct/supervise/review/approve engineering surveys, designs and construction plans of roads/ expressways, including specifications, quantity estimates and tender documents for roads and expressways.

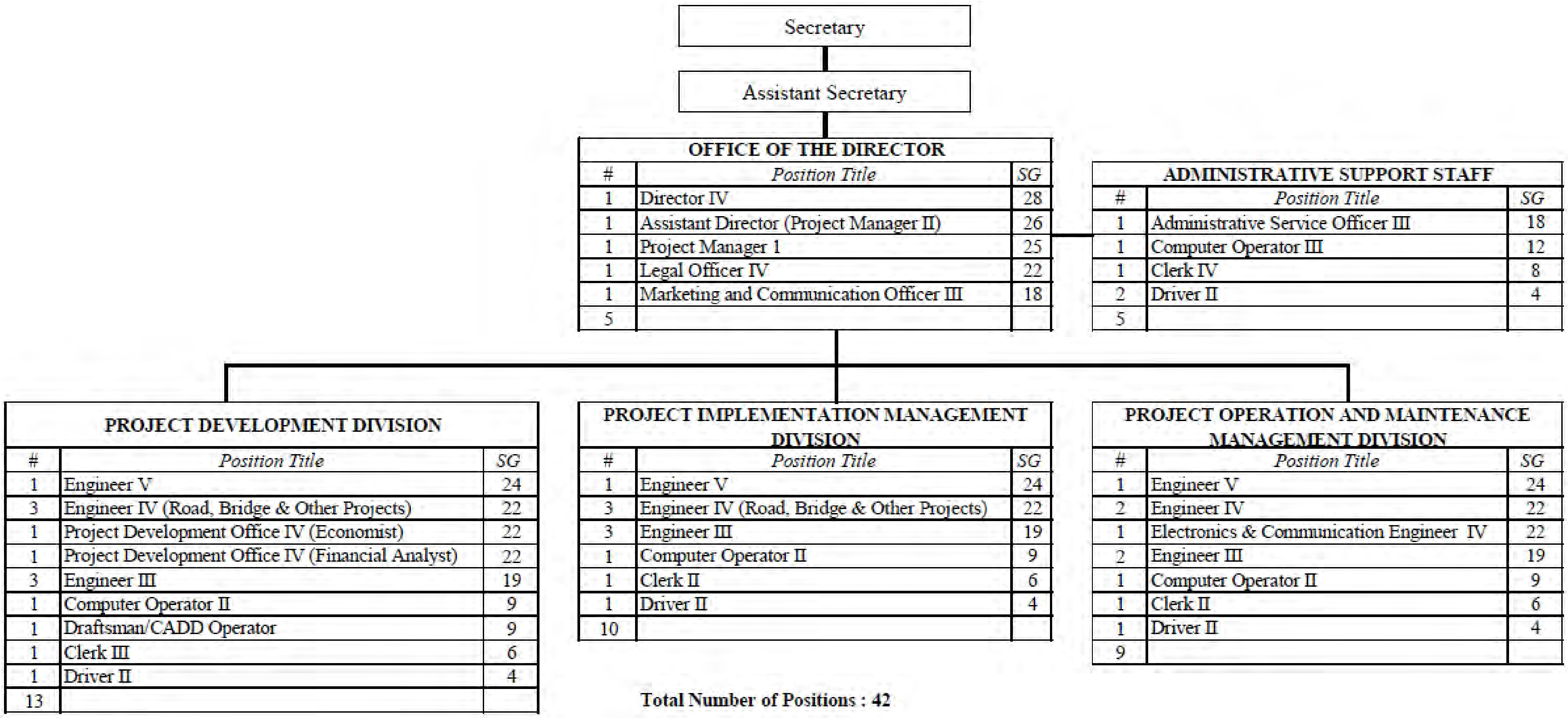
Environmental and Social Services Office (ESSO) and **PMO-Infrastructure Right-of-Way and Resettlement (PMO-IROWR)** are responsible on social and environmental consideration and relocation respectively. Detail of these functions is discussed in the next section. Organization chart of ESSO and its function is shown in **Figure 9.3.1-4**

and **Table 9.3.1-1**, respectively. Organization chart and function of PMO-IROWR is shown in **Figure 9.3.1-5**, and **Table 9.3.1-2**.



Source: JICA Study Team (2012)

FIGURE 9.3.1-1 DPWH ORGANOGRAM



OFFICE OF THE DIRECTOR

#	*Position Title*	*SG*
1	Director IV	28
1	Assistant Director (Project Manager II)	26
1	Project Manager 1	25
1	Legal Officer IV	22
1	Marketing and Communication Officer III	18
5		

ADMINISTRATIVE SUPPORT STAFF

#	*Position Title*	*SG*
1	Administrative Service Officer III	18
1	Computer Operator III	12
1	Clerk IV	8
2	Driver II	4
5		

PROJECT DEVELOPMENT DIVISION

#	*Position Title*	*SG*
1	Engineer V	24
3	Engineer IV (Road, Bridge & Other Projects)	22
1	Project Development Office IV (Economist)	22
1	Project Development Office IV (Financial Analyst)	22
3	Engineer III	19
1	Computer Operator II	9
1	Draftsman/CADD Operator	9
1	Clerk III	6
1	Driver II	4
13		

PROJECT IMPLEMENTATION MANAGEMENT DIVISION

#	*Position Title*	*SG*
1	Engineer V	24
3	Engineer IV (Road, Bridge & Other Projects)	22
3	Engineer III	19
1	Computer Operator II	9
1	Clerk II	6
1	Driver II	4
10		

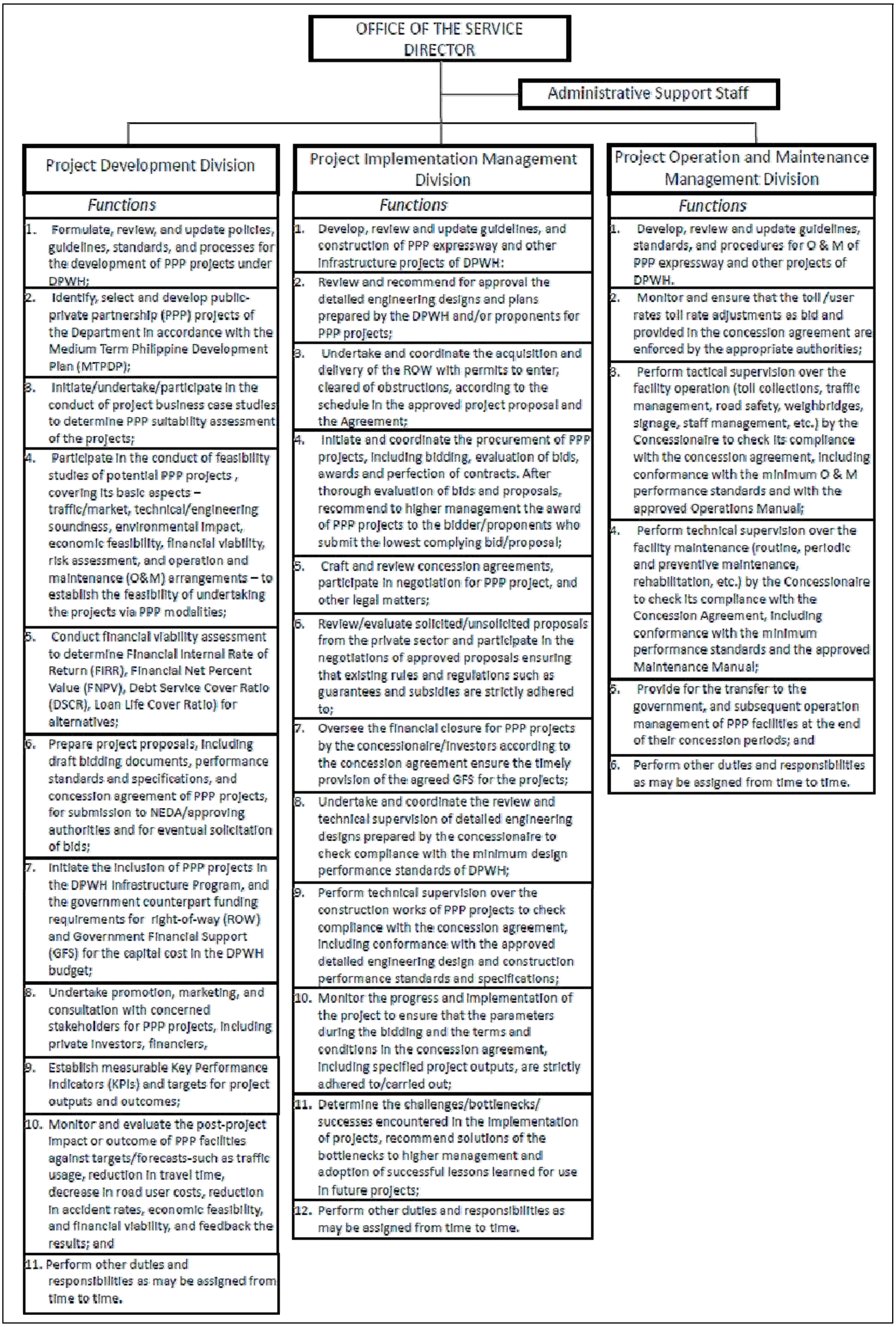
PROJECT OPERATION AND MAINTENANCE MANAGEMENT DIVISION

#	*Position Title*	*SG*
1	Engineer V	24
2	Engineer IV	22
1	Electronics & Communication Engineer IV	22
2	Engineer III	19
1	Computer Operator II	9
1	Clerk II	6
1	Driver II	4
9		

Total Number of Positions : 42

Source: JICA Study Team (2012)

FIGURE 9.3.1-2 ORGANIZATION CHART OF PMO-BOT (PPP SERVICE)



Project Development Division

Functions

1. Formulate, review, and update policies, guidelines, standards, and processes for the development of PPP projects under DPWH;
2. Identify, select and develop public-private partnership (PPP) projects of the Department in accordance with the Medium Term Philippine Development Plan (MTPDP);
3. Initiate/undertake/participate in the conduct of project business case studies to determine PPP suitability assessment of the projects;
4. Participate in the conduct of feasibility studies of potential PPP projects , covering its basic aspects – traffic/market, technical/engineering soundness, environmental impact, economic feasibility, financial viability, risk assessment, and operation and maintenance (O&M) arrangements – to establish the feasibility of undertaking the projects via PPP modalities;
5. Conduct financial viability assessment to determine Financial Internal Rate of Return (FIRR), Financial Net Percent Value (FNPV), Debt Service Cover Ratio (DSCR), Loan Life Cover Ratio) for alternatives;
6. Prepare project proposals, including draft bidding documents, performance standards and specifications, and concession agreement of PPP projects, for submission to NEDA/approving authorities and for eventual solicitation of bids;
7. Initiate the inclusion of PPP projects in the DPWH Infrastructure Program, and the government counterpart funding requirements for right-of-way (ROW) and Government Financial Support (GFS) for the capital cost in the DPWH budget;
8. Undertake promotion, marketing, and consultation with concerned stakeholders for PPP projects, including private investors, financiers,
9. Establish measurable Key Performance Indicators (KPIs) and targets for project outputs and outcomes;
10. Monitor and evaluate the post-project impact or outcome of PPP facilities against targets/forecasts-such as traffic usage, reduction in travel time, decrease in road user costs, reduction in accident rates, economic feasibility, and financial viability, and feedback the results; and
11. Perform other duties and responsibilities as may be assigned from time to time.

Project Implementation Management Division

Functions

1. Develop, review and update guidelines, and construction of PPP expressway and other infrastructure projects of DPWH:
2. Review and recommend for approval the detailed engineering designs and plans prepared by the DPWH and/or proponents for PPP projects;
3. Undertake and coordinate the acquisition and delivery of the ROW with permits to enter, cleared of obstructions, according to the schedule in the approved project proposal and the Agreement;
4. Initiate and coordinate the procurement of PPP projects, including bidding, evaluation of bids, awards and perfection of contracts. After thorough evaluation of bids and proposals, recommend to higher management the award of PPP projects to the bidder/proponents who submit the lowest complying bid/proposal;
5. Craft and review concession agreements, participate in negotiation for PPP project, and other legal matters;
6. Review/evaluate solicited/unsolicited proposals from the private sector and participate in the negotiations of approved proposals ensuring that existing rules and regulations such as guarantees and subsidies are strictly adhered to;
7. Oversee the financial closure for PPP projects by the concessionaire/investors according to the concession agreement ensure the timely provision of the agreed GFS for the projects;
8. Undertake and coordinate the review and technical supervision of detailed engineering designs prepared by the concessionaire to check compliance with the minimum design performance standards of DPWH;
9. Perform technical supervision over the construction works of PPP projects to check compliance with the concession agreement, including conformance with the approved detailed engineering design and construction performance standards and specifications;
10. Monitor the progress and implementation of the project to ensure that the parameters during the bidding and the terms and conditions in the concession agreement, including specified project outputs, are strictly adhered to/carried out;
11. Determine the challenges/bottlenecks/ successes encountered in the implementation of projects, recommend solutions of the bottlenecks to higher management and adoption of successful lessons learned for use in future projects;
12. Perform other duties and responsibilities as may be assigned from time to time.

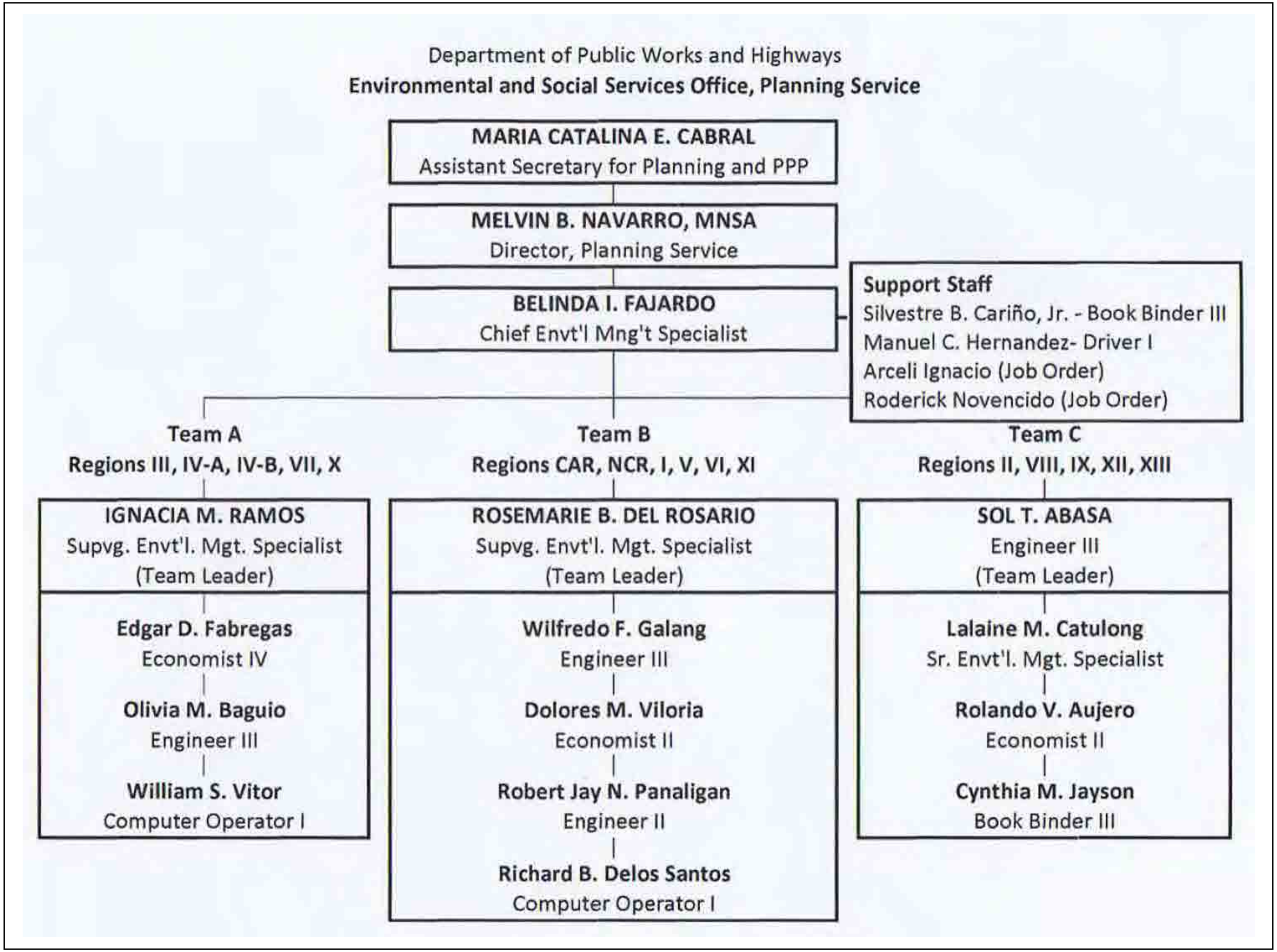
Project Operation and Maintenance Management Division

Functions

1. Develop, review and update guidelines, standards, and procedures for O & M of PPP expressway and other projects of DPWH.
2. Monitor and ensure that the toll /user rates toll rate adjustments as bid and provided in the concession agreement are enforced by the appropriate authorities;
3. Perform tactical supervision over the facility operation (toll collections, traffic management, road safety, weighbridges, signage, staff management, etc.) by the Concessionaire to check its compliance with the concession agreement, including conformance with the minimum O & M performance standards and with the approved Operations Manual;
4. Perform technical supervision over the facility maintenance (routine, periodic and preventive maintenance, rehabilitation, etc.) by the Concessionaire to check its compliance with the Concession Agreement, including conformance with the minimum performance standards and the approved Maintenance Manual;
5. Provide for the transfer to the government, and subsequent operation management of PPP facilities at the end of their concession periods; and
6. Perform other duties and responsibilities as may be assigned from time to time.

Source: JICA Study Team (2012)

FIGURE 9.3.1-3 FUNCTIONAL CHART OF PMO-BOT (PPP SERVICE)



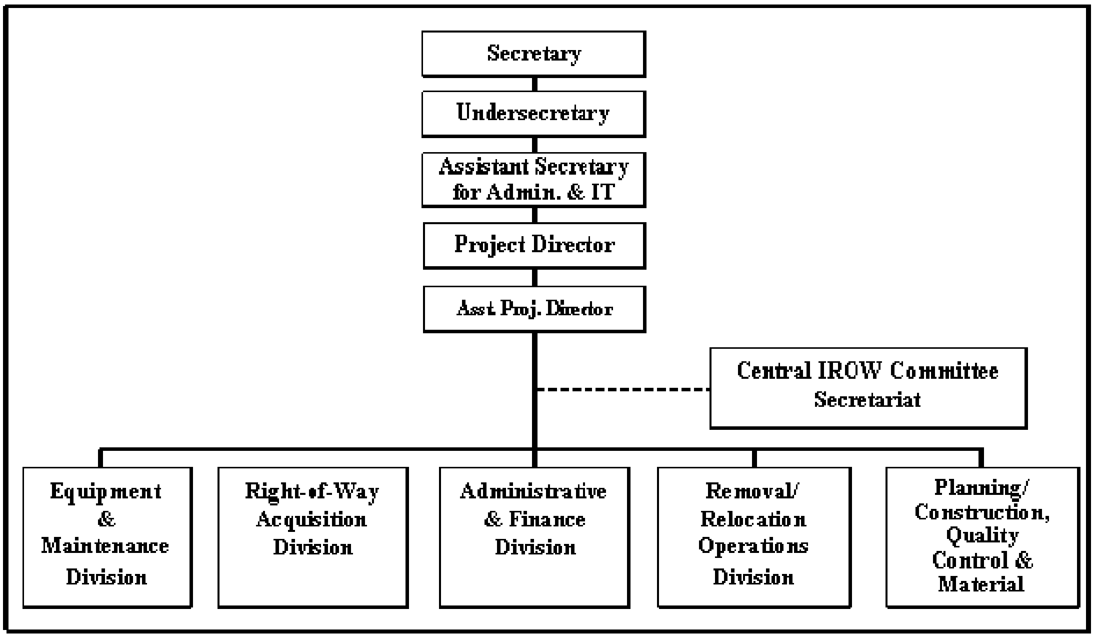
Source: JICA Study Team (2012)

FIGURE 9.3.1-4 ORGANIZATION CHART OF ESSO

TABLE 9.3.1-1 FUNCTION OF ESSO

Conduct assessments for environmental, social impact and land acquisition;
Prepare relevant report such as Initial Environment Examination (IEE), Environmental Impact Statement (EIS), Environmental Management Plans (EMP), Resettlement Action Plan (RAP) and other necessary documents;
Facilitate consultation and information dissemination to project affected persons and other relevant stakeholders;
Conduct environmental monitoring; Monitoring RAP implementation and conduct post implementation evaluation;
Provide guidance to regional and district level DPWH staff and local authorities in carrying out the above studies, preparation of documents and RAP implementation;
Providing training at regional, district and local level for consultation/participation, RAP implementation, environmental management planning, environmental monitoring, EIA tools and other new techniques;
Maintain and update the existing data bank and Geographical Information System (GIS); and
Coordinate environmental concerns with other DPWH offices, Government Agencies, Local Government Units and Non Government Organizations.

Per Department Order Number 220, Series of 1999; as amended by Department Order Number 58, Series of 2004.



Source: DPWH-ESSO

FIGURE 9.3.1-5 ORGANIZATION CHART OF PMO-IROWR

TABLE 9.3.1-2 FUNCTION OF PMO-IROWR

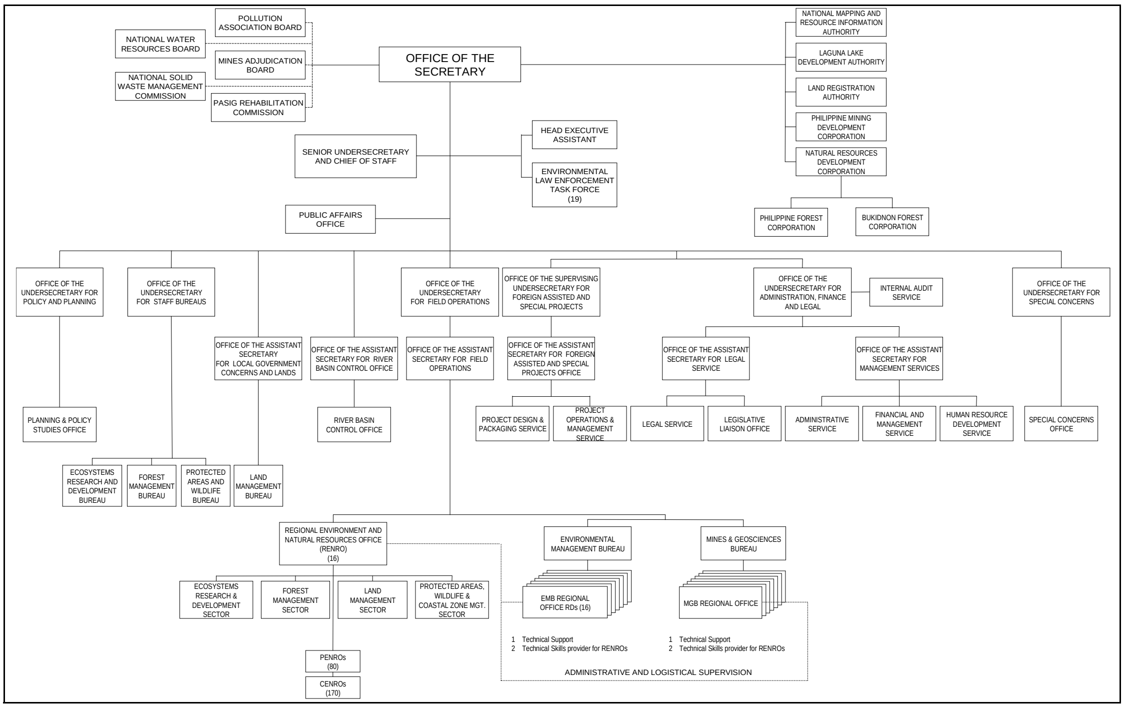
- Prepare the Action Plan and monitor the process of implementation of the new Infrastructure Right of Way (IROW) process;
- Continue with the existing functions of PMO-Action Office for Resettlement of Squatter Families (PMO-AORSF) and PMO-Manggahan Floodway;
- Assist all Implementing Office (IO) in the implementation of the improved ROW policies, processes, and procedures;
- Supervise the improved ROW process in all IO;
- Coordinate with the BIR, Appraisal Committees, and other appropriate agencies for upgrading of valuations;
- Coordinate with appropriate government agencies and the private sector, particularly the utility companies, among others, to ensure the successful implementation of the improved ROW process;
- Consolidate and validate the monthly ROW monitoring reports for submission to the Secretary;
- Consolidate and validate the summaries of payment made by the IO and submit a report to the Secretary;
- Prepare other guidelines needed to clarify issues that may arise from the implementation of the improved process;
- Implement the computerization of ROW Management System once it has been developed or purchased;
- Ensure the proper record keeping of all relevant documents and the archiving of titles with the National Archives;
- Prepare Quarterly Reports for submission to the Secretary; and
- Perform other duties as may be assigned by the Secretary.

Per Department Order Number 5, Series of 2003, the functions and responsibilities of PMO-IROW.

9.3.2 EIA and ECC

New road project of which length is 10 km or more is classified as an Environmentally Critical Project (ECP). Thus, the Project is required of EIA and to secure ECC.

Review and supervision of PEISS are conducted by the Environmental Management Bureau (EMB) and the Department of Environment and Natural Resources (DENR). The respective organization charts of DENR and EMB are shown below.



Source: *JICA Study Team (2012)*

FIGURE 9.3.2-1 DENR ORGANOGRAM

DENR is the government entity which is designated to handle issues related to the following five tasks as described in pertinent legislation:

Assure the availability and sustainability of the country's natural resources through judicious use and systematic restoration or replacement, whenever possible;

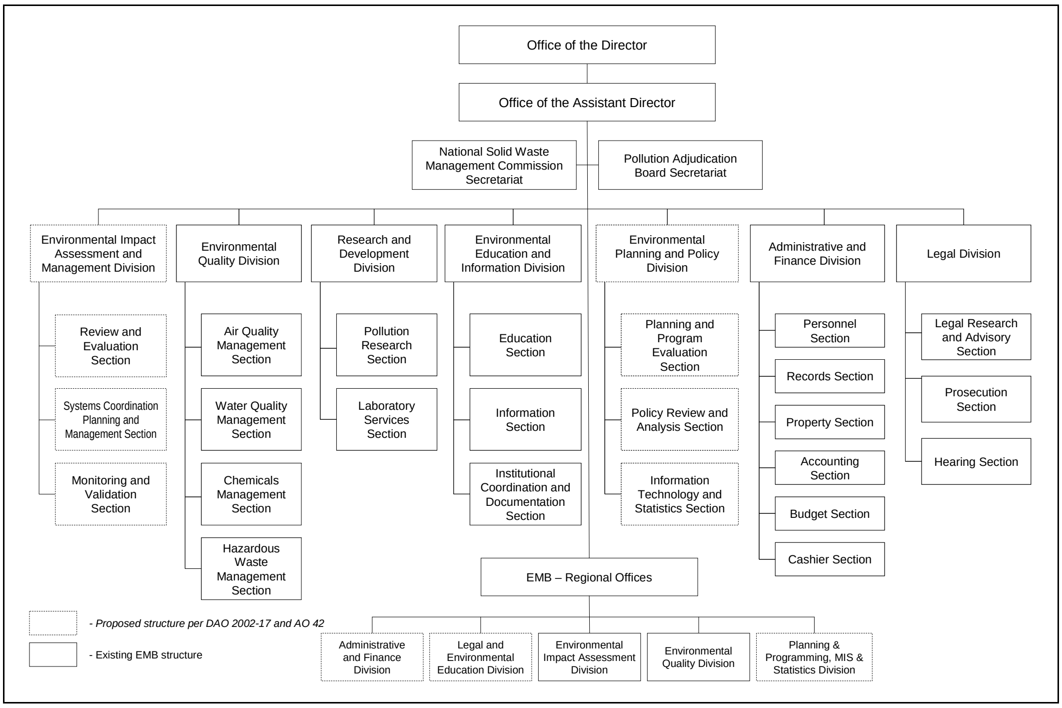
Increase the productivity of natural resources in order to meet the demands for forest, mineral, and land resources of a growing population;

Enhance the contribution of natural resources for achieving national economic and social development;

Promote equitable access to natural resources by the different sectors of the population; and

Conserve specific terrestrial and marine areas representative of the Philippine natural and cultural heritage for present and future generations.

Under the framework of PEISS, EMB is responsible for the issuance of decision making documents such as Environmental Compliance Certificate (ECC), Certificate of Non-Coverage (CNC) and Denial Letter. Also, EMB Regional Offices in respective regions are primarily responsible for the supervision of development projects and conducting consultation related to such projects.



Source: JICA Study Team (2012)

FIGURE 9.3.2-2 DENR-EMB ORGANOGRAM

9.3.2.1 EIA Proponent

The proponent agency of this Project is the Department of Public Works and Highways (DPWH). The DPWH has the responsibility for preparation and submission of the PEISS. Project Management Office–F/S (PMO-F/S) is responsible for feasibility studies and prepares the PEISS. Once the project execution starts, PMOs, such as PMO-BOT, PMO-PJHL for Yen Loan Projects, PMO-IBRD for IBRD Projects, etc. have responsibilities for implementation of environmental and social considerations such as land acquisition and resettlement in cooperation with local government units. The Environmental Social Services Office (ESSO), is responsible for supporting and supervising preparation of PEISS. Environmental and Social Services Office (ESSO) is involved in preliminary planning activities related to Environmental Impact Assessment (EIA), Social Impact Assessment (SIA), Rapid Social Assessment, Resettlement Action Plan (RAP); conduct public consultations on PPP projects; conduct Information, Education and Communication (IEC) on environment-related concerns; and compliance and effects monitoring of ECC conditions and Environmental Management Plan (EMP).

9.3.2.2 Environmental Compliance Certificate (ECC)

A certificate issued to which the Proponent conforms with, after DENR-EMB explains the *ECC conditions*. The ECC is signed by the Proponent to signify full responsibility over implementation of specified measures which are necessary to comply with existing environmental regulations.

(1) Decision Timeline

Decisions of applications are made within the prescribed timelines within the control of DENR. Otherwise, the application shall be deemed automatically approved, with the issuance of the approval document within five (5) working days from the time the prescribed period lapsed.

(2) Validity and Expiry

Once a project is implemented, the ECC remains valid and active for the lifetime of the project. ECC conditions and commitments are permanently relieved from compliance only upon validation of the EMB of the successful implementation of the Abandonment/ Rehabilitation/ Decommissioning Plan.

The ECC automatically expires if a project has not been implemented within five (5) years from ECC issuance, or if the ECC was not requested for for extension within three (3) months from the expiration of its validity

(3) Amendment of ECC for Minor Change Only

Amendment of ECC can be processed for minor alternation of the project only due to:

- Typographical error
- Extension of deadlines for submittal of post-ECC requirements
- Extension of ECC validity
- Change in company name/ ownership
- Decrease in land/project area or production capacity

Other amendments deemed “minor” at the discretion of the EMB CO/RO Director

The following steps are taken to process the request of amendment.

- Within three (3) days from ECC issuance (for projects not started) OR at any time during project implementation, the Proponent prepares and submits to the ECC-endorsing DENR-EMB Office a LETTER-REQUEST for ECC amendment, including data, information, reports or documents to substantiate the requested revisions
- The ECC-endorsing EMB office assigns a Case Handler to evaluate the request
- ECC-endorsing Authority decides on the Letter-Request, based on Case Handler recommendation.

Maximum Processing Time for Issuance of Decision is 7 workdays for both central and regional offices of EMB.

9.3.2.3 Certificate of Non-Coverage (CNC)

Certifies that based on the submitted Project Description report, the project is NOT covered by the EIS System and is not required to secure an ECC. The CNC advises the Proponent on coverage to other requirements by other DENR offices, LGUs, or other government agencies.

9.3.2.4 Denial Letter

Contains the explanation for the disapproval of the application and guidance on how the application can be improved to a level of acceptability in the next EIA process. Denial is based on unsatisfactory evaluation by the EIARC (EIA Review Committee) or EMB of the Proponent’s submitted Additional Information (AI) at the end of the review process.

9.3.3 Involuntary Resettlement and Land Acquisitions

The provision of resettlement site shall be the responsibility of the local government units (LGUs) concerned, with assistance from the concerned government agencies tasked with providing housing.

DPWH-PMO-Infrastructure Right-of-Way and Resettlement (PMO-IROWR) is tasked to consult with LGUs, local communities, project affected persons, and the designer/contractor for PPP projects; coordinate with the Presidential Commission for the Urban Poor (PCUP) and the National Housing Authority (NHA) on the relocation of squatter families; conduct census and tagging of affected lots and improvements; coordinate with the Bureau of Internal Revenue or BIR (for zonal valuation), Registry of Deeds (for titles), Assessor’s Office, and Department of Agrarian Reform or DAR (for land conversion); coordinate and negotiate with affected property owners on the sale of their properties; coordinate with the Office of the Solicitor General (OSG) for filing of expropriation proceedings; and effect payment of affected properties.

It appears that the functions and activities of the abovementioned offices pertaining to PPP overlap, and it is difficult to bring together and coordinate their activities. There is no designated single focal point or one-stop shop for PPP transactions at DPWH.

The PMO-BOT, which is supposed to handle or coordinate all PPP related activities of DPWH, from planning to implementation and operation, does not have sufficient authority and staff to fully execute its mandated functions. The preparation of PPP proposals has often been done on an ad hoc project-to-project basis with many players participating.

To streamline acquisition of needed R-O-W and at the same time be compliant with international (WB, ADB, JICA) policies on involuntary resettlement together with the DPWH’s own resettlement policy, roles, responsibilities, and efforts of key players and major stakeholders must be well coordinated. In order to achieve this, it is strongly recommended that, a Lead Inter-Agency Committee (LIAC) be organized.

The LIAC will help ensure that a common direction is being followed to achieve the ultimate goal of providing a service infrastructure that will spark development in Mega Manila. Provided below is a list of said key players and major stakeholders and their corresponding responsibilities.

9.4 JICA GUIDELINES AND PHILIPPINES' SOCIAL AND ENVIRONMENTAL CONSIDERATION

9.4.1 Compliance with JICA Guidelines

9.4.1.1 EIA Report Outlines

Outlines of EIA reports for JICA and the Philippines are compared in **Table 9.4.1-1**. EIA report (EIS in the Philippines). Legal/Policy Frame work is not stated in EIS while social development, emergency response policy and guidelines, and abandonment/decommissioning/rehabilitation policies and guidelines sections are included in JICA's EIA outline. Since EMB suggested to send an official letter requesting amendment of existing ECC and the said letter should show differences or changes made, thus a new set of EIS is not required by Philippine government, it is sufficient to satisfy JICA guidelines' requirement for this Study's purpose.

TABLE 9.4.1-1 COMPARISON OF EIA REPORT OUTLINES

Category	LATEST DENR/EMB OUTLINE	JICA OUTLINE
Executive Summary	Executive Summary	Executive Summary
	Project Fact Sheet	Significant findings
	Process Documentation	Recommendations
	Summary of Baseline Conditions	
Legal/Policy Framework	(Legal/policy framework is not required under the latest EMB EIA outline).	Legal/Policy Framework
Project Description	Project Description	Project Description
	Project Location and Area	Project location map including areas affected Description of project in terms of its geographical, ecological and temporal context.
	Environment Study Area Map	
	Geographic coordinates of Project Site	
	Rationale for selection of primary & secondary impact areas.	
	Project Rationale	
	Project Alternatives	
	Project Components	
	Major Components	
	Other Supporting Facilities	Off-site investments (i.e. access roads, pipelines, power plants, housing, raw materials, etc.)
	Pollution control devices and facilities these are serving	
	Footprint of proposed project layout	
	Process/Technology Options	
	Production Process/ construction method	
	Power generation and water supply system	
	Waste Management System	
	Project Size	
	Total project size	
	Annual Production rate & working days/hrs if process industry	
	Development plan, Description of Project Phases and Corresponding Time frame.	
	Pre-construction	
	Construction	
	Operations & Maintenance	
	Abandonment	
	Manpower	
	Manpower requirements	
	Expertise/skills required	
	Nature & Estimated number of positions for men/women/ethnic minorities	
	Indicative Project Investment Cost	
Baseline Data	Discussed in Project Description and Analysis of Environmental Impact section	Baseline Data
		Description and Assessment of environmental study area in terms of:
		Physical conditions
		Biological conditions
		Socio-economic conditions
		Cumulative impact (takes into account impact with other projects in the area not related to the project.
		Citation of information sources
Environmental Impacts and Mitigation Measures	Analysis of Environmental Impacts	Environmental Impacts
	Land	Prediction and Assessment of the project's likely:
	Land Use and Classification	Positive Impacts
	Discussion on inconsistencies and possible conflicts of project with existing land use zoning ordinance	Negative Impacts
	Discussion on potential change due to project implementation	Identifies Mitigation Measures for negative environmental impacts including those that

Category	LATEST DENR/EMB OUTLINE	JICA OUTLINE
		cannot be mitigated.
	Geology/ Geomorphology	
	Discussion on Projected change as a result of project implementation which includes:	Explores possible enhancement measures for positive impacts
	Change in surface topography	Identified and quantified the extent and quantity of available data, essential data gaps, and uncertainties associated with predictions
	Change in subsurface/ underground geomorphology	
	Inducement of subsidence/ collapse	
	Inducement of landslides or other hazards.	
		Essential gaps;
		Uncertainties with predictions
		Specifies topics that do not require further attention
	Pedology	All the environmentally and socially concerned elements are discussed in the previous Baseline data section
	Analyze project impact and provide mitigation measures for:	
	Erodability Potential	
	Bank Stability	
	Change in Soil Quantity/fertility	
	Terrestrial Biology	
	Analyze project impact and provide management measures for the following:	
	Vegetation removal and loss of habitat	
	Threat to existence of important species	
	Threat to abundance, frequency and distribution of important species.	
	Hindrance to wildlife species	
	Water	
	Hydrology/Hydrogeology	
	Analyze project's impact and provide management measures for:	
	Change in drainage morphology	
	Change in stream, lake water depth	
	Reduction in stream volumetric flow	
	Inducement of flooding	
	Water resources use and completion	
	Reduction/depletion of groundwater flow	
	Oceanography	
	Analyze project's impact and provide a management measure for:	
	Change in circulation pattern	
	Change in stream, lake water depth	
	Change in bathymetry	
	Water Quality	
	Identify specific source of pollution load	
	Discuss assimilative capacity of receiving water body	
	Include as part of Environmental Management Plan and Monitoring Plan.	
	Sampling Map	
	Freshwater or Marine Ecology	
	Identify source of threat to ecology and discuss assimilative capacity of receiving ecosystem	
	Threat to abundance, frequency and distribution of species	
	Loss of important species	
	Loss of habitat	
	Air	
	Meteorology/Climatology	
	Discuss project's possible effect on local climate	
	Discuss project's contribution to global greenhouse gas	
	Air Quality & Noise	
	Identified specific source of pollution load	
	Discussion on Assimilative capacity considering ambient air quality/noise levels in the area.	
	People	

Category	LATEST DENR/EMB OUTLINE	JICA OUTLINE
	Discussion on Project Displaced Persons	
	Discussion on migration patterns resulting from project implementation	
	Discussion on IPs and culture/ lifestyle	
	Discussion on public health issues relating to project implementation	
	Discussion on benefits of local people from the project.	
	Discussion on project impact on deliver of basic service to local people and resource completion in the area.	
	Discussion on project impact on local traffic conditions.	
	Institutional Arrangements (accountable persons/ office) for project.	
	Discussion on involuntary resettlement impacts such as:	
	Identify affected properties	
	Relocation of Displaced Persons	
	Devaluation of affected properties	
Analysis of Alternatives	Discussed in Project Description section	Analysis of Alternatives
		Comparison of alternatives to the proposed project including the "No Project" scenario in terms of:
		Potential environmental impacts
		Mitigation measures
		Cost (capital & recurring)
		Suitability
		Institutional, training and monitoring requirements
		Economic and Financial feasibility
		Basis for selection of project alignment
		Justification for recommended emission level and approaches to pollution prevention and abatement
Risk Assessment	Environment and Ecological Risk Assessment	Discussed in Environmental Impacts and Mitigation Measures section
	Identify and provide management measures for:	
	Chronic risks	
	Acute risks/ Worst case scenario	
Environmental Management Plan	Impact Management Plan	Environmental Management Plan
Public Participation	Social Development Plan and IEC	Consultation
Social Development Plan	Discussed in Environmental Management Plan	Not required
Environmental Monitoring	Environmental Compliance Monitoring	Discussed in Environmental Management Plan
Emergency Response Plan	Emergency Response Policy and Generic Guidelines	Not required
Abandonment/ Decommissioning	Abandonment / Decommissioning/ Rehabilitation Policies and Generic Guidelines	Not required
Institutional Arrangements for Project Implementation	Institutional Plan for EMP Implementation	Discussed in environmental Impacts and Mitigation Measure section

9.4.1.2 Resettlement Action Plan (RAP) Outlines

Since both countries follow the World Bank Safeguard Policy, OP 4.12-Annex A, there is no difference in the outline of Resettlement Action Plan. A typical RAP outline is shown in **Table 9.4.1-2.**

TABLE 9.4.1-2 RAP OUTLINE

Description of the project
Potential impacts
Objectives
Socioeconomic studies
Legal framework
Eligibility
Valuation of and compensation for losses
Resettlement measures
Site selection, site preparation, and relocation
Housing, infrastructure, and social services
Environmental protection and management
Integration with host populations
Community participation
Grievance procedures
Organizational responsibilities
Implementation schedule
Costs and budget
Monitoring and evaluation

9.4.2 Means to Bridge the Gaps

9.4.2.1 Resettlement and Land Acquisition Policy Framework

Since DPWH's resettlement policy has been improved to satisfy World Bank's OP4.12, which is also JICA's requirement, employing the policy frame work is appropriate for the Project. (*Land Acquisition, Resettlement, Rehabilitation, and Indigenous Peoples (LARRIP) Policy, 3rd Edition, (2007)*). If it is found necessary, DPWH-ESSO will have to amend the LARRIP to meet a specific needs and characteristic of CLLEX (Phase I) Project. **Table 9.4.2-1** shows analysis of and means to fill the gap. Detailed Relocation Policy for CALAX (Laguna Section) is discussed in Section 9.6.

TABLE 9.4.2-1 SUMMARY OF GAP ANALYSIS ON RELOCATION POLICY

JICA Guidelines	Laws and Guidelines of the Philippines	Gap relative to JICA GL	Project Policy
Involuntary resettlement and loss of means of livelihood are to be avoided when feasible by exploring all viable alternatives. (JICA GL)	Land Acquisition, Resettlement, Rehabilitation and Indigenous Peoples' Policy, 2007 (LARRIP), (=WB OP4.12)	None	Involuntary resettlement and loss of means of livelihood are to be avoided when feasible by exploring all viable alternatives.
When population displacement is unavoidable, effective measures to minimize impact and to compensate for losses should be taken. (JICA GL)	LARRIP	None	When population displacement is unavoidable, effective measures to minimize impact and to compensate for losses should be taken. (JICA GL)
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)	LARRIP	None	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
Compensation must be based on the full replacement cost as much as possible. (JICA GL)	LARRIP	Two inconsistent statements in LARRIP	Compensation must be based on the full replacement cost. <u>Compensation for Land</u> There are inconsistent statements in LARRIP. The initial offer to the PAF is the indicated price in the current zonal valuation issued by BIR for the locality where the property is located. If the offered price is not acceptable to the PAF, the second offer will be the current market value at the time of taking", based on the standards prescribed in Sections 5 and 6 of RA8974 (page 12 of LARRIP. The other is Entitlement Matrix (page 14 of LARRIP) for Land and it specifies that "PAF will be entitled to Cash Compensation for loss of land at 100% replacement cost at the informed request of PAFs". During the detailed design stage, the independent assessor should be employed to determine the replacement cost of land and 100% replacement cost shall be paid to those who lost lands.
Compensation and other kinds of assistance must be provided prior to displacement. (JICA GL)	DO#5 (2003): unless ROW is purchased project notice of award to contractor cannot be issued, i.e. all kind of compensation is paid before project is commenced	None	Compensation and other kinds of assistance must be provided prior to displacement. (JICA GL)

JICA Guidelines	Laws and Guidelines of the Philippines	Gap relative to JICA GL	Project Policy
For projects that entail large-scale involuntary resettlement, resettlement action plans must be prepared and made available to the public. (JICA GL)	LARRIP	None	For projects that entail large-scale involuntary resettlement, resettlement action plans must be prepared and made available to the public. (JICA GL)
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)	LARRIP	None	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)
When consultations are held, explanations must be given in a form, manner, and language that are understandable to the affected people. (JICA GL)	LARRIP	None	When consultations are held, explanations must be given in a form, manner, and language that are understandable to the affected people. (JICA GL)
Appropriate participation of affected people must be promoted in planning, implementation, and monitoring of resettlement action plans. (JICA GL)	LARRIP	None	Appropriate participation of affected people must be promoted in planning, implementation, and monitoring of resettlement action plans. (JICA GL)
Appropriate and accessible grievance mechanisms must be established for the affected people and their communities. (JICA GL)	LARRIP	None	Appropriate and accessible grievance mechanisms must be established for the affected people and their communities. (JICA GL)
Affected people are to be identified and recorded as early as possible in order to establish their eligibility through an initial baseline survey (including population census that serves as an eligibility cut-off date, asset inventory, and socioeconomic survey), preferably at the project identification stage, to prevent a subsequent influx of encroachers of others who wish to take advance of such benefits. (WB OP 4.12 Para. 6)	LARRIP states the cut-off date as the date of commencement of the census. Resettlement project conducted by LGUs nationwide notifies to public the last day of the census work, and use the date as the cut-off date, so that no eligible PAFs are left uncounted.	None	Affected people are to be identified and recorded as early as possible in order to establish their eligibility through an initial baseline survey (including population census that serves as an eligibility cut-off date, asset inventory, and socioeconomic survey), preferably at the project identification stage, to prevent a subsequent influx of encroachers of others who wish to take advance of such benefits. The cut-off date for this RAP is the date of commencement of the census. For those who are eligible for compensation but absent during the census work shall be encouraged to communicate with barangay captains and to attend community consultation meetings to be validated by DPWH.
Eligibility of benefits includes, the PAPs who have formal legal rights to land (including customary and traditional land rights recognized under law), the PAPs who don't have formal legal rights to land at the time of census but have a claim to such land or assets and the PAPs who have no recognizable legal right to the land they are occupying. (WB OP 4.12 Para. 15)	Professional Squatters (as defined by Republic Act 7279) applies to persons who have previously been awarded home lots or housing units by the government but who sold, leased or transferred the same to settle illegally in the same place or in another urban area, and non bona fide occupants and	Professional Squatters and Squatting Syndicates are not eligible for compensation. They may salvage the structure materials by themselves if demolition is carried out by him/herself.	All affected people (except professional squatters) will be eligible for compensation and rehabilitation assistance, regardless of tenure status, social or economic standing and any such factors that may discriminate against achievement of the objectives of JICA Guidelines. However, those who have previously been awarded home lots or housing units by the government but who sold, leased or transferred the same to settle illegally in the same place or in another urban area, and non bona

JICA Guidelines	Laws and Guidelines of the Philippines	Gap relative to JICA GL	Project Policy
	intruders of lands reserved for socialized housing. Squatting Syndicates (as defined by Republic Act 7279) refers to groups of persons who are engaged in the business of squatter housing for profit or gain. Those persons are ineligible for structure compensation, relocation, and rehabilitation/ inconvenience/ income-loss assistance in case their structures are to be demolished in resettlement project according to Republic Act 7279. This definition excludes individuals or groups who simply rent land and housing from professional squatters or squatting syndicates.		fide occupants and intruders of lands reserved for socialized housing will not be eligible for compensation.
Preference should be given to land-based resettlement strategies for displaced persons whose livelihoods are land-based. (WB OP 4.12 Para. 11)	If feasible, land for land will be provided in terms of a new parcel of land of equivalent productivity, at a location acceptable to PAFs. (LARRIP)	None	Preference should be given to land-based resettlement strategies for displaced persons whose livelihoods are land-based. (In this project, no PAFs are farmers, agricultural lesser, or fishers.)
Provide support for the transition period (between displacement and livelihood restoration). (WB OP 4. 12, para.6)	* Income Loss. For loss of business/income, the PAF will be entitled to an income rehabilitation assistance to be based on the latest copy of the PAFs' Tax record for 3 months, or not to exceed P 15,000 for severely affected structures. *Inconvenience Allowance The amount of P 10,000 shall be given to PAFs with severely affected structures, which require relocation and new construction. *Rehabilitation assistance Skills training and other development activities	Upper limit of cash disturbance compensation is limited to Php15,000 according to Philippine laws. The amount of planned Financial assistance and eligibility are explained in the community consultation, Only objection given to the Study Team was to change alignment and not to cause loss of farming lands.	Disturbance and other compensation should be assessed and determined by the Independent Assessor and incorporated in the Final RAP which shall be approved by the Secretary of DPWH. DPWH will target all PAFs for Livelihood Rehabilitation Assistance. DPWH will conduct quarterly monitoring about the change of living standard of the PAFs before and after the resettlement. When the PAF are found that their living standard worsen, or whose present means of livelihood became not-viable, DPWH, in coordination with other appropriate institutions, will provide assistances, such as skills and livelihood trainings

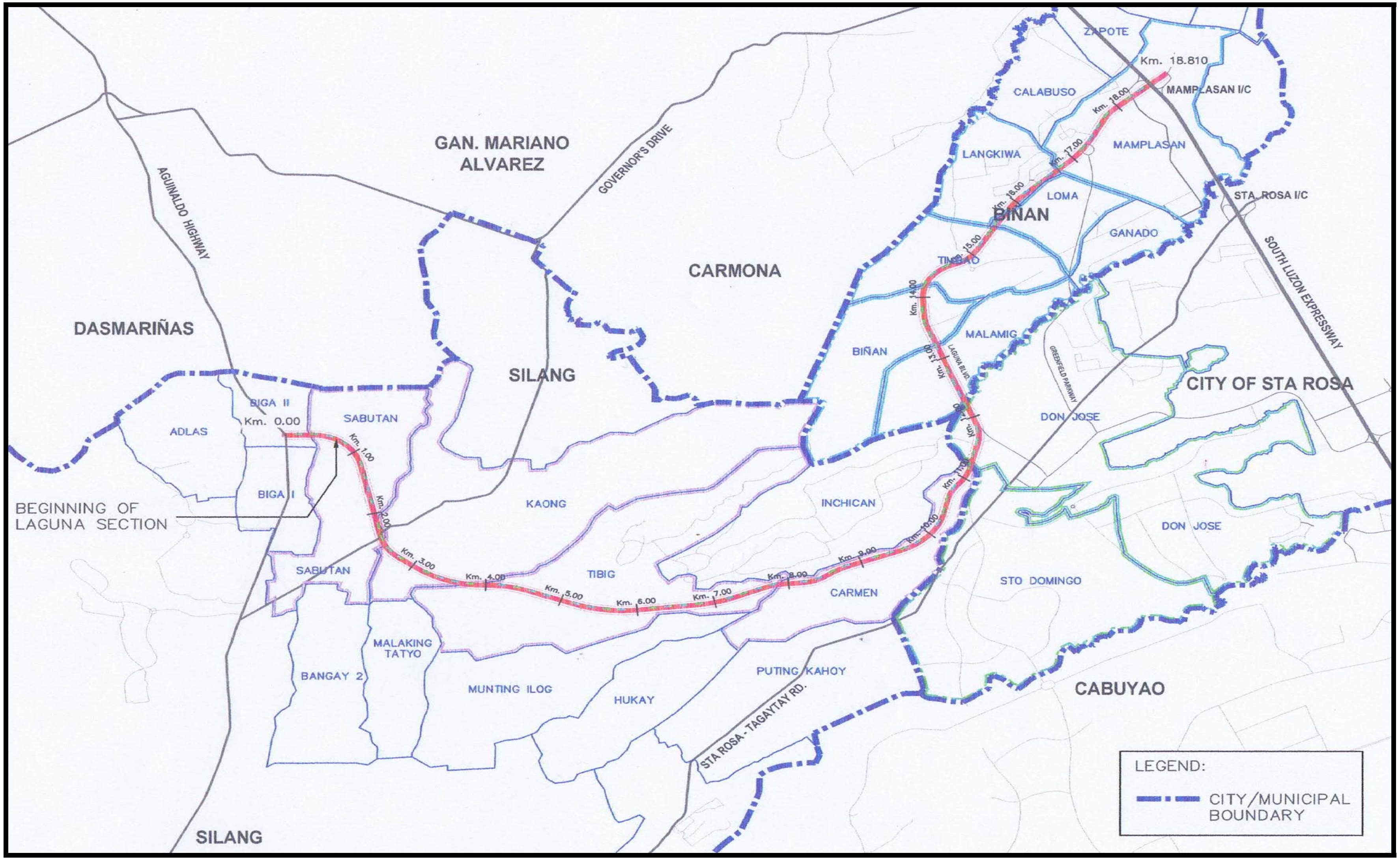
JICA Guidelines	Laws and Guidelines of the Philippines	Gap relative to JICA GL	Project Policy
	equivalent to P 15,000 per family will be provided in coordination with other government agencies, if the present means of livelihood is no longer viable and the PAF will have to engage in a new income activity. *Transportation allowance or assistance. If relocating, PAFs to be provided free transportation. Also, informal settlers in urban centers who opt to go back to their place of origin in the province or be shifted to government relocation sites will be provided free transportation. (LARRIP (April, 2007, p. 18, 19)		
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 OP 4.12 Para. 8)	LARRIP	None	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 OP 4.12 Para. 8)

Source: JICA Guidelines for Environmental and Social Considerations (2010), World Bank Operational Policy 4.12 (2001), Land Acquisition, Department of Public Works and Highways Resettlement, Rehabilitation and Indigenous Peoples' Policy (2007), Republic of the Philippines

9.5 ENVIRONMENTAL IMPACT ASSESSMENT

9.5.1 EIA Study Area

CALAX alignment and administrative boundary map is shown in **Figure 9.5.1-1**.



Source: JICA Study Team (2012)

FIGURE 9.5.1-1 PROJECT AREA AND LOCATION

9.5.2 Analysis of Alternatives

9.5.2.1 Procedure of Alternative Alignment Study

Alignment Study was undertaken in acctrdance with the following steps;

Step-1 : Selection of beginning point of Laguna Section (Connection point of Cavite and Laguna sections).

Step-2 : Selection of the end point of SLEx

Possible connection point at SLEx
- Existing Manplasan I/C
- Existing Greenfield Eton I/C
- Between Calamba I/C and Simsiman Toll Barrier
- At Calamba Toll Barrier whitch was removed at present

Step-3 : Selection of the alignment to connect the beginning point at end point. Various alternative alignments were studied.

9.5.2.2 Selection of the Beginning Point of Laguna Section (Connection Point of Cavite and Laguna Sections)

Three (3) alternative alignments were developed focusing on minimization of social impact (or dislocation of people) as shown in **Figure 9.5.2-1**.

Alternative-1 : Alignment Recommended by the 2006 FS

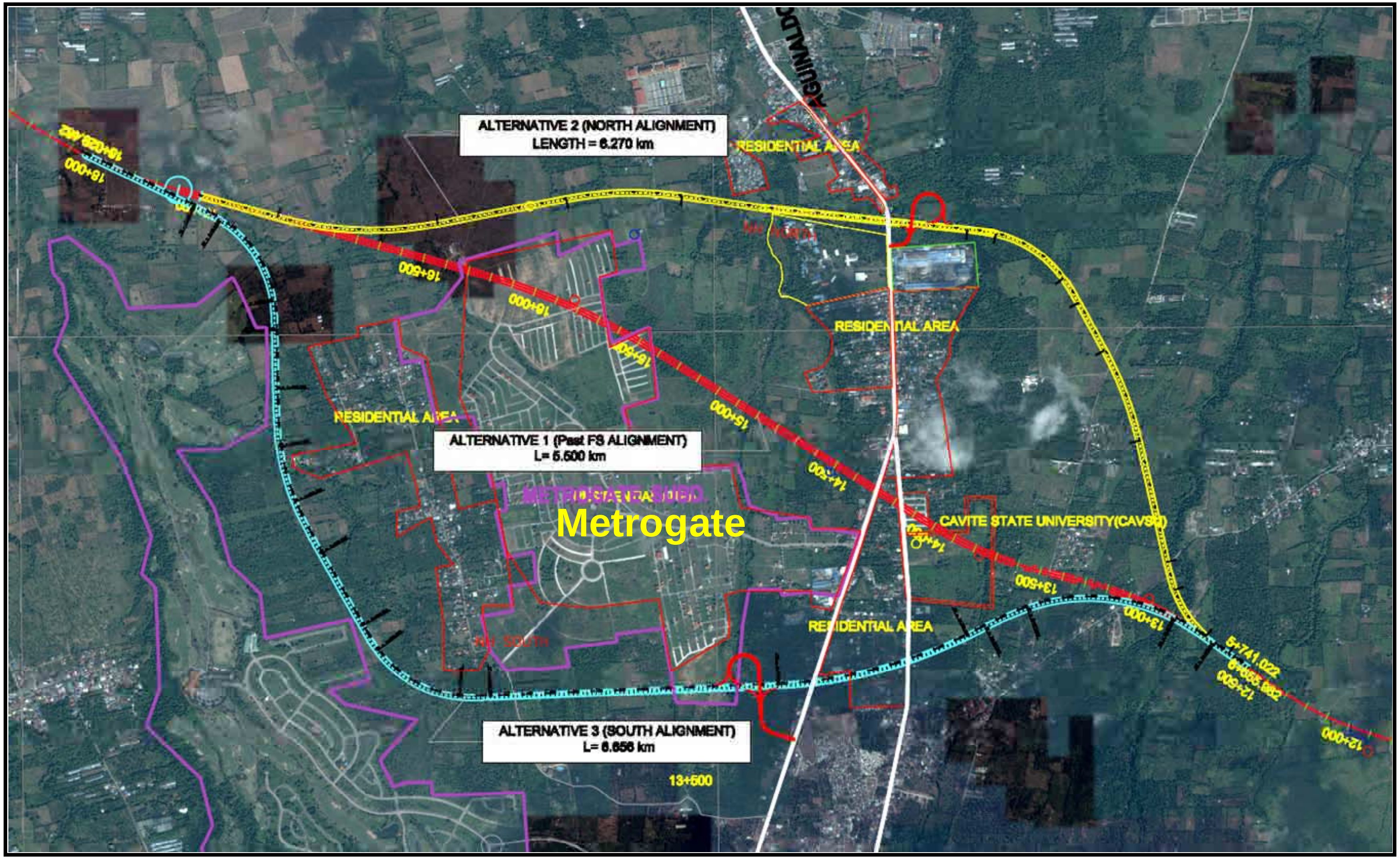
Alternative-2 : North Alignment to minimize social impact in the northern area of Silang Municipality town proper.

Alternative-3 : South Alignment to minimize social impact in the southern area of Silang Municipality town proper.

Three (3) alternative alignments were evaluated as shown in **Table 9.5.2-1** and **Alternative-2** was recommended due to the following reasons:

- Alternative-2 achieves minimum social impact; and
- Alternative-2 achieves minimum cost

As reference, **Table 9.5.2-2** shows the evaluation criteria.



Source: *JICA Study Team (2012)*

FIGURE 9.5.2-1 ALTERNATIVE ALIGNMENTS OF BEGINNING POINT OF CALA EXPRESSWAY LAGUNA SECTION

TABLE 9.5.2-1 EVALUATION OF ALTERNATIVE ALIGNMENTS AT BEGINNING POINT

Alternatives			Alternative 1		Alternative 2		Alternative 3	
Concept			Alignment proposed by 2006 FS		To minimize social impacts in the northern area of Silang Municipality.		To minimize social impacts in the southern area of Silang Municipality.	
Road Length (km)			5.50		6.27		6.66	
Evaluation	Cost (Billion Pesos)	Construction	0.798	△	0.910	○	0.966	×
		ROW	0.414		0.213		0.354	
		Total	1.212 (1.08)		1.123 (1.00)		1.320 (1.18)	
	Connection to Aguinaldo Highway		Difficult due to no appropriate area for interchange.	×	Easy to connect by trumpet type of interchange.	○	Easy to connect by trumpet type of interchange.	○
	Social Impact*	No. of Residential Houses affected	38 Cavite Section (17) Laguna Section (21)	△	17 Cavite Section (10) Laguna Section (7)	○	44 Cavite Section (32) Laguna Section (12)	×
		No. of Large Buildings affected	2 (Cavite State University)	×	0	○	0	○
	Natural Environment	Slope Cutting	• Same condition among alternatives.	△	• Same condition among alternatives.	△	• Same condition among alternatives.	△
		Tree Cutting	Shortest Route	○	No. of Trees Cutting is more than Alt. 1	△	No. of Trees Cutting is more than Alt. 1	△
		Noise and Pollusia	Residential Area	×	Agricultural Area	○	Agricultural Area	○
	Evaluation		○ 1 △ 3 × 3		○ 5 △ 2 × 0 **Recommended**		○ 3 △ 2 × 2	

Note: * No. of structure was counted from Satellite Map.

Source: JICA Study Team (2012)

TABLE 9.5.2-2 EVALUATION CRITERIA

Evaluation Iteins and Description		Relative Superity
a) Cost (Civil Work Cost + ROW Acquisition Cost) Smallen cost is better for the project. When the smallest cost is set as 1.00, increase rate of other Alternative was evaluatedas follows:		Cost Ratio 1.0 to 1.05............................ ○ 1.05 to 1.10.......................... △ Over 1.10............................ ×
b) Connection to Aquinaldo Highway		• Easy to connect by interchange .... ○ • Difficult due to appropriate space .... ×
c) Social Impact	Evaluation by the number of houses to be affected	20 or less houres.................. ○ 20 to 40 houres .... △ Over 40 houres .... ×
	Evaluation by the number of large buildings to be affected	0 (Zero)............................... ○ Over 1................................. ×
d) Natural Environment Major natural environmental impact of this section will be soil erosion loss of greenery and noise air pollution in residential area	Soil Erosion The project area is prone from slight to moderatie soil erosion, depending on the gradient of land slope. Since step cutting will affect soil erosion, this evaluation indication used is the volume of slop cutting.	A large scale of lope cut required .... × Medium .... △ Small.................................. ○
	Loss of Greenery Loss of greenery is evaluated as the quantity of cut trees.	A large number of trees are cut .... × Medium .... △ Small.................................. ○
	Noise, air pollution If alignment pass the residential area, noise and air pollution will be affected the people.	Agriculture Vacount Space .. ○ Commercial Area................. △ Residential Area................... ×

Source: JICA Study Team (2012)

9.5.2.3 Alternative Alignments

Six (**6**) alternatives were developed as shown in **Figure 9.5.2-2**.

Alternative-1

- This is the revised alignment of the 2006 FS and connected with the existing Eton/Greenfield Interchange;
- This route is the second shortest alignment among the alternatives; and
- Intended to capture generated traffic from the on-going and future development areas

Alternative-2

- End point is Mamplasan Interchange;
- Intended to utilize the existing private road of Greenfield Parkway (ROW width is 40 m.); and
- Intended to capture generated traffic from the existing, on-going and future development areas

Alternative-3

- Same concept as Alternative-2 above; and
- Intended to utilize the existing private road of Laguna Blvd. (ROW width is 60 m.)

Alternative-4

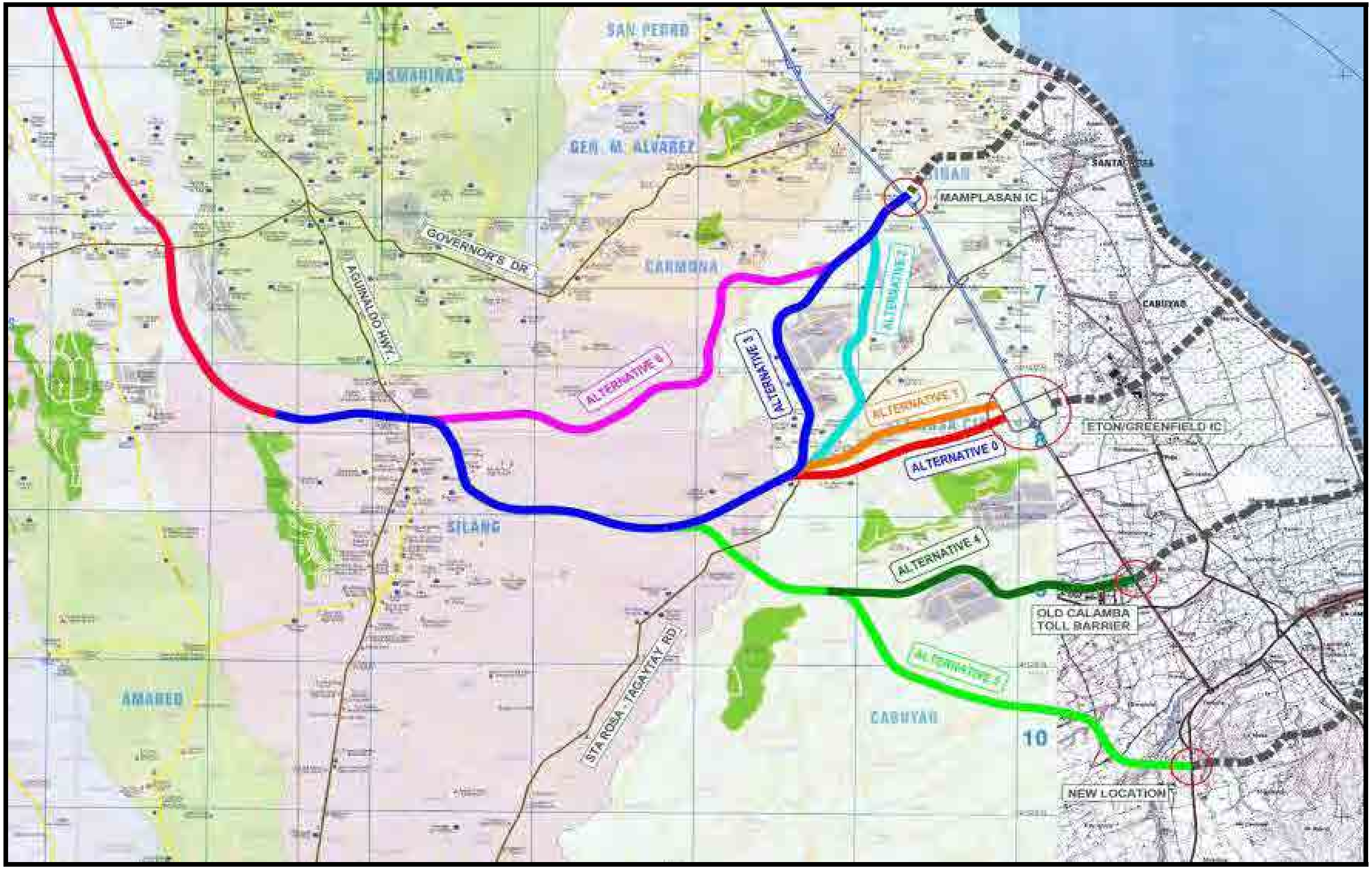
- End point is Calamba Toll Barrier which was shifted to Simsiman Toll Barrier of SLEx Extension, and new interchange is constructed; and
- Intended to capture generated traffic from the existing, on-going and future development areas.

Alternative-5

- End point is located at about the middle point between Calamba Interchange and Simsiman Toll Barrier and new interchange is constructed;
- This is the longest route among the alternatives;
- Intended to capture traffic from the existing, on-going and future development areas; and
- Generated traffic from the developing areas can utilize both CALAX and SLEX

Alternative-6

- This is the shortest route among the alternatives. However, it has to pass through steep slope areas; and
- This route functions as a bypass route of Governor’s Drive



Source: *JICA Study Team (2012)*

FIGURE 9.5.2-2 ALTERNATIVE ALIGNMENTS

Six (6) alternative alignments were evaluated as shown in **Table 9.5.2-3** and Alternative-3 was recommended due to the following reasons:

- Cost is within 10% increase compared to the minimum cost alternative (Alternative-6). (Alternative-6 attracts least traffic). Second lowest alternative (Alternative-1) and Alternative-3 is almost the same cost.
- High traffic volume is attracted. Alternative-3 attracts the 2nd highest traffic. Highest is Alternative-4 and difference is 900 vehicle per day (or 1.6% difference).
- Social impact in terms of dislocation of people is the smallest.
- Since this alternative utilizes the 60m ROW of existing private road (for about 1/3) of the total expressway length), implementation in terms of ROW acquisition is the easiest and the fastest.
- Other alternatives affect people who have newly acquired a lot from the private land developers. When they bought their lots, they were not informed that their lots will be affected in the future by this project. Therefore, their life plan will have a drastic change. On the part of DPWH, ROW acquisition negotiation will take time.

As reference, **Table 9.5.2-4** shows the evaluation criteria and characteristics of alternatives are summarized in **Table 9.5.2-5**.

Each alignment of alternatives is shown in **Figure 9.5.2-3**.

TABLE 9.5.2-3 EVALUATION OF ALTERNATIVES

Evaluation Item		**Alternatives**											
		1		**2**		**3**		**4**		**5**		**6**	
a) Contribution to improvement of accessibility		Pass through development area	○	Pass through development area	○	Pass through development area	○	Pass through development area	○	Pass through development area	○	Pass through steep slope area	×
b) Connection with SLEX		Indirect	△	Direct or indirect	△	Direct or indirect	△	Direct	○	Direct	○	Direct or indirect	△
c) Traffic Volume Attracted		48,500	△	53,900	○	57,600	○	58,500	○	52,200	○	37,100	×
d) Cost		15,359 (1.08)	○	17,171 (1.20)	×	15,662 (1.10)	○	16,903 (1.19)	△	17,333 (1.24)	×	14,260 (1.00)	○
e) Impact on Natural Environment	Slope Cutting	Medium Scale (380,000 m^3)	△	Medium Scale (380,000 m^3)	△	Medium Scale (380,000 m^3)	△	Medium Scale (380,000 m^3)	△	Medium Scale (380,000 m^3)	△	Large Scale (750,000 m^3)	×
	Tree Cutting	Medium Number	△	Medium Number	△	Medium Number	△	Medium Number	△	Medium Number	△	Large Number	×
	Noise and Air Pollution	Residential Area	×	Industrial & Residential Area	△	Industrial & Residential Area	△	Industrial & Residential Area	△	Residential (Under Development)	△	Mountainous Area	○
f) Social Impact *		20 houses	△	30 houses	△	10 houses	○	40 houses/factory	×	60 houses	×	10 houses	○
g) Cost Performance		39.7	○	31.9	△	36.8	○	34.9	△	36.3	○	30.4	△
h) Easiness of Implementation (ROW acquisition)		3.6 km	×	6.3 km	×	-	○	5.0 km	×	6.4 km	×	1.0 km	△
i) Easiness of Construction		Easy	○	Easy	○	Easy	○	Easy	○	Easy	○	Difficult	×
Evaluation		○ : 4 △ : 5 × : 2		○ : 3 △ : 6 × : 2		○ : 7 △ : 4 × : 0 [Recommended]		○ : 4 △ : 5 × : 2		○ : 5 △ : 3 × : 3		○ : 3 △ : 3 × : 5	

Note: * No. of structure was counted from Satellite Map

Source: JICA Study Team (2012)

TABLE 9.5.2-4 EVALUATION CRITERIA

Evaluation Item and Description		Relative Superity
a) Contribution to improvement of accessibility to the Project Area and Area Development Whether CALAX passes through an existing, on-going or proposed development area;		More than 70% of section.............○ 50% to 70% ....△ Less than 50%..............................×
b) Connection with SLEX		• Direct Connection........................○ • Direct Connection is possible, but quite expensive ....△
c) Traffic Volume Attracted When higher traffic is attracted, it contributes more to reduce traffic congestion of public roads and the project is economically and financially feasible, thus an alternative which attract higher traffic is evaluated better than other alternatives.		• More than 50,000 veh./day ....○ • 40,000 to 50,000 veh/day.............△ • Less than 40,000 veh/day.............×
d) Cost (Civil Work Cost + ROW Acquisition Cost) Smaller cost is better for the project. When the smallest cost is set as 1.00, increase rate of other Alternative was evaluated as follows:		Cost Ratio 1.0 to 1.10 ....○ 1.10 to 1.20 ....△ Over 1.20 ....×
e) Impact on Natural Environment Major natural environmental impact of this project will be soil erosion and loss of greenery.	e-1) Soil Erosion The project area is prone from slight to moderate soil erosion, depending on the gradient of land slope. Since slope cutting will affect soil erosion, thus evaluation indicator used is the volume of slope cutting.	Large scale of slope cut (over 500,000 m3) required...................× Medium scale of slope cut (200,000 to 500,000 m3) required △ Small scale of slope cut (less than 200,000 m3) required...................○
	e-2) Loss of Greenery Loss of greenery is evaluated as the quantity of cut trees.	A large number of trees are cut.....× Medium number of trees are cut...△ Small number of trees are cut ....○
	e-3) Noise and Air Pollution The project area is prone from noise and air pollution by expressway passing vehicles.	Residencial area ....× Commercial area / industrial area .△ Agriculture area ....○
f) Social Impact Evaluation by the number of houses to be affected.		10 or less houses ....○ 10 to 30 houses ....△ Over 30 houses ....×
g) Cost Performance Cost performance = veh.km/cost in Million Php		High Efficiency over 35............○ Medium Efficiency 30 to 35 ......△ Low Efficiency less than 30.......×
h) Easiness of Implementation (ROW Acquisition) Development status of properties of land development companies is different and can be classified as follows: (a) Lots were sold out and some people are already residing; (b) Lots are being sold; and (c) No development is made yet Those who bought a lot sold by the land development companies were not informed that an expressway will be built and their properties may be affected by the project. Therefore, it will take a longer time to negotiate with these people, and DPWH will have a hard time to acquire the road right-of-way. Evaluation was made as follows:		• Lots are not affected or land development has not started yet....○ • Some lots are being sold ....△ • Many lots have been sold out or are being sold and some people are already residing......................×
i) Easiness of Construction This was evaluated as follows:		• Wide construction space is available, existing traffic is not disturbed, access road for construction needed, but its construction is easy......................○ • Above conditions become rather severe..△ • Construction of access road itself is difficult due to terrain, and construction can start only at the beginning side and end side..........×

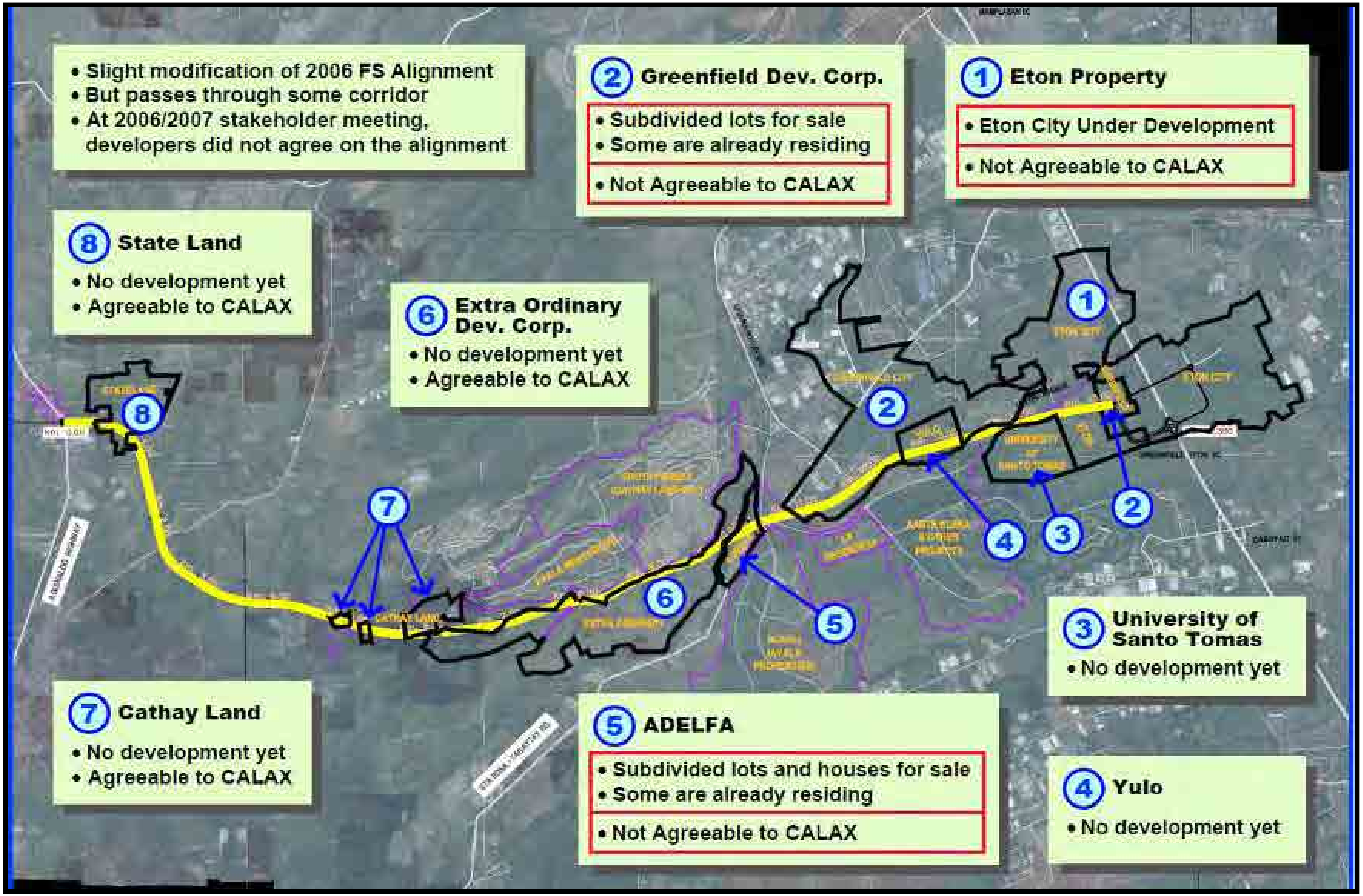
Source: JICA Study Team (2012)

TABLE 9.5.2-5 CHARACTERISTICS OF ALTERNATIVES

Alternatives		Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Expressway Distance (km)		16.4	18.6	18.6	18.4	21.6	14.8
SLEX Connection		• Greenfield/ Eton Interchange (direct or indirect connection)	• Mamplasan Interchange (direct or indirect connection)	• Existing Mamplasan Interchange (direct or indirect connection)	• New Interchange (direct connection)	• New Interchange (direct connection)	• Existing Mamplasan Interchange (direct or indirect connection)
Road Structure	Road Section	10.2 km	10.0 km	10.5 km	10.8 km	13.4 km	8.6 km
	Bridge/ Viaduct	3.3 km	6.2 km	5.9 km	6.0 km	5.2 km	4.6 km
	MSE Wall	2.9 km	2.4 km	2.2 km	1.6 km	3.0 km	1.6 km
Cost (M Php)	Civil Work	10,056	13,196	12,700	12,484	13,152	11,869
	ROW	5,303	3,975	2,962	4,419	4,581	2,391
	Total	15,359	17,171	15,662	16,903	17,733	14,260
Estimated Traffic Volume (2020)	Volume (veh/ day)	48,500	53,900	57,600	58,500	52,200	37,100
	Veh.-km.	609,100	548,100	576,800	591,300	643,200	434,200
Cost Performance		39.7	31.9	36.8	35.0	36.3	30.4
Utilization of Private Road ROW which is to be acquired by DPWH		-	Greenfield Parkway W = 40 m L = 4.4 km (1/4 of total length, but widening is required.)	Laguna Blvd. W = 60 m L = 6.2 km (1/3 of total length, and no widening is required.)	-	-	-
Residential Subdivision Affected	Already Residing	1.4 km	3.5 km (one-side) 1.8 km (both-side)	-	-	-	-
	Lots for Sale	2.2 km	-	-	2.8 km	6.2 km	1.0 km

Alternatives		Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Industrial Estate Affected	Under Operation	-	1.0 km (one-side only)	-	2.2 km	0.2 km	-
University Affected		University of Sto. Tomas (UST)	-	-	Adventist University of the Philippines (AUP)	Adventist University of the Philippines (AUP)	-
Status of Land Development of Each Developer	People already residing	• Adelfa /Fine Properties Inc.	• VALENZA • Sta. Rosa Estate • Greenfield City • Laguna Bel-Air I & II	• Ayala Land Corp. (only Private Road ROW will be utilized, thus no one will be dislocated.	-	-	• Ayala Land Corp. (only Private Road ROW will be utilized, thus no one will be dislocated.
	Lots for sale	• Greenfield Development Corp. • MESSA Homes	• Greenfield Development Corp.	-	• Ayala/Nuvali Properties Inc.	• Ayala/Nuvali Properties, Inc. • Sentosa, Inc. • Greenwood Park, Inc.	• Tamayo Property, Inc.
	No Development Yet	• Stateland, Inc. • Cathay Land, Inc. • Extraordinary Development Corporation • Eton Properties	• Stateland Inc. • Cathay Land, Inc. • Extraordinary Development Corporation • Greenfield Development Corporation	• Stateland Inc. • Cathay Land, Inc. • Extraordinary Development Corporation • Greenfield Development Corporation	• Stateland Inc. • Cathay Land, Inc. • Extraordinary Development Corporation • San Ramon Holdings, Inc.	• Stateland Inc. • Cathay Land, Inc. • Extraordinary Development Corporation • San Ramon Holdings, Inc. • Carmelray Town	• Stateland Inc. • Greenfield Development Corporation
Industrial Estate in operation			• Laguna Techno Park	• Laguna Techno Park (property is not affected)	• Silangan Industrial Park	• Filinvest Technology Park	

Source: JICA Study Team (2012)



- Slight modification of 2006 FS Alignment
- But passes through some corridor
- At 2006/2007 stakeholder meeting, developers did not agree on the alignment

② **Greenfield Dev. Corp.**

- Subdivided lots for sale
- Some are already residing
- Not Agreeable to CALAX

① **Eton Property**

- Eton City Under Development
- Not Agreeable to CALAX

⑧ **State Land**

- No development yet
- Agreeable to CALAX

⑥ **Extra Ordinary Dev. Corp.**

- No development yet
- Agreeable to CALAX

③ **University of Santo Tomas**

- No development yet

⑦ **Cathay Land**

- No development yet
- Agreeable to CALAX

⑤ **ADELFA**

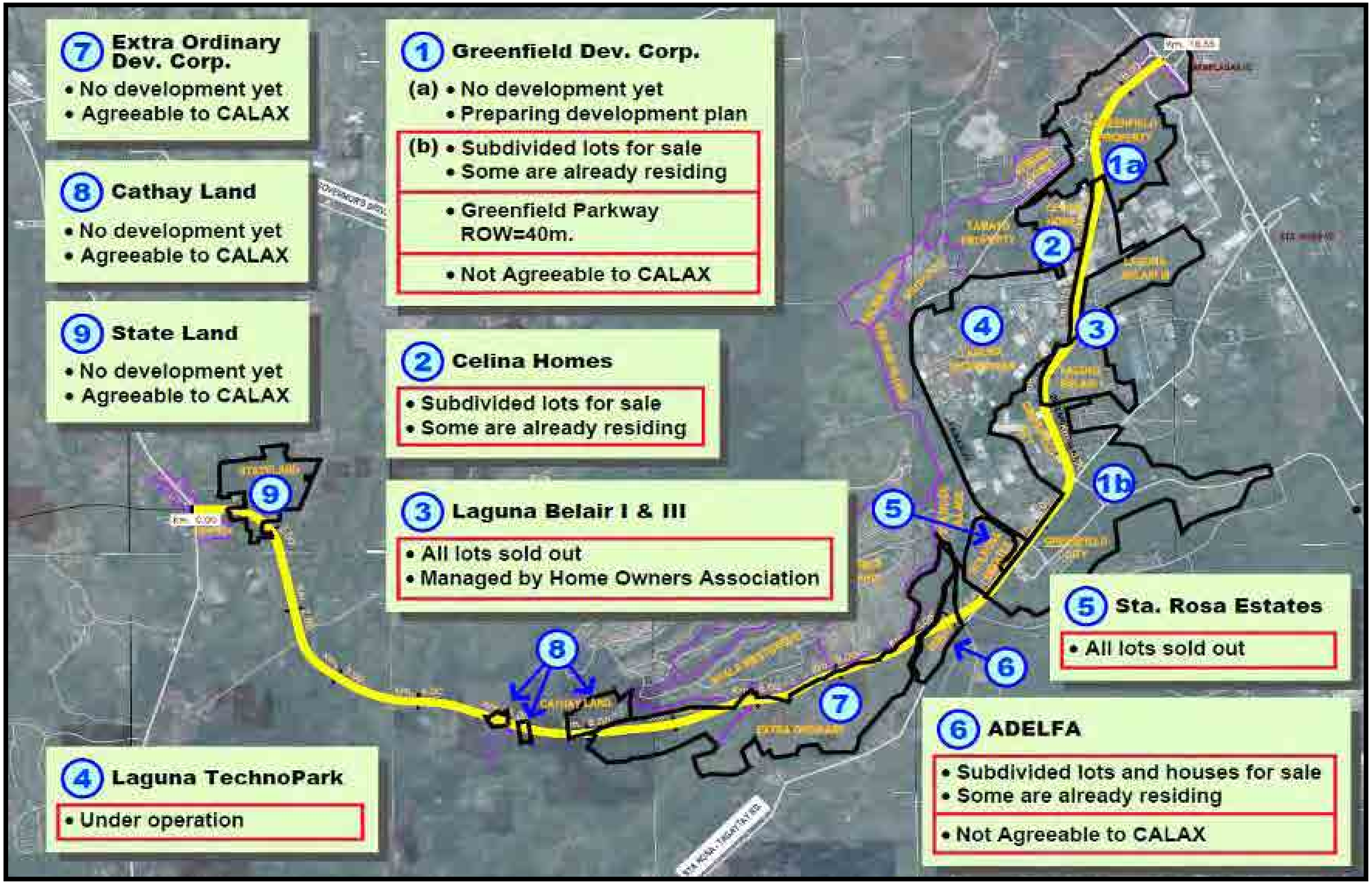
- Subdivided lots and houses for sale
- Some are already residing
- Not Agreeable to CALAX

④ **Yulo**

- No development yet

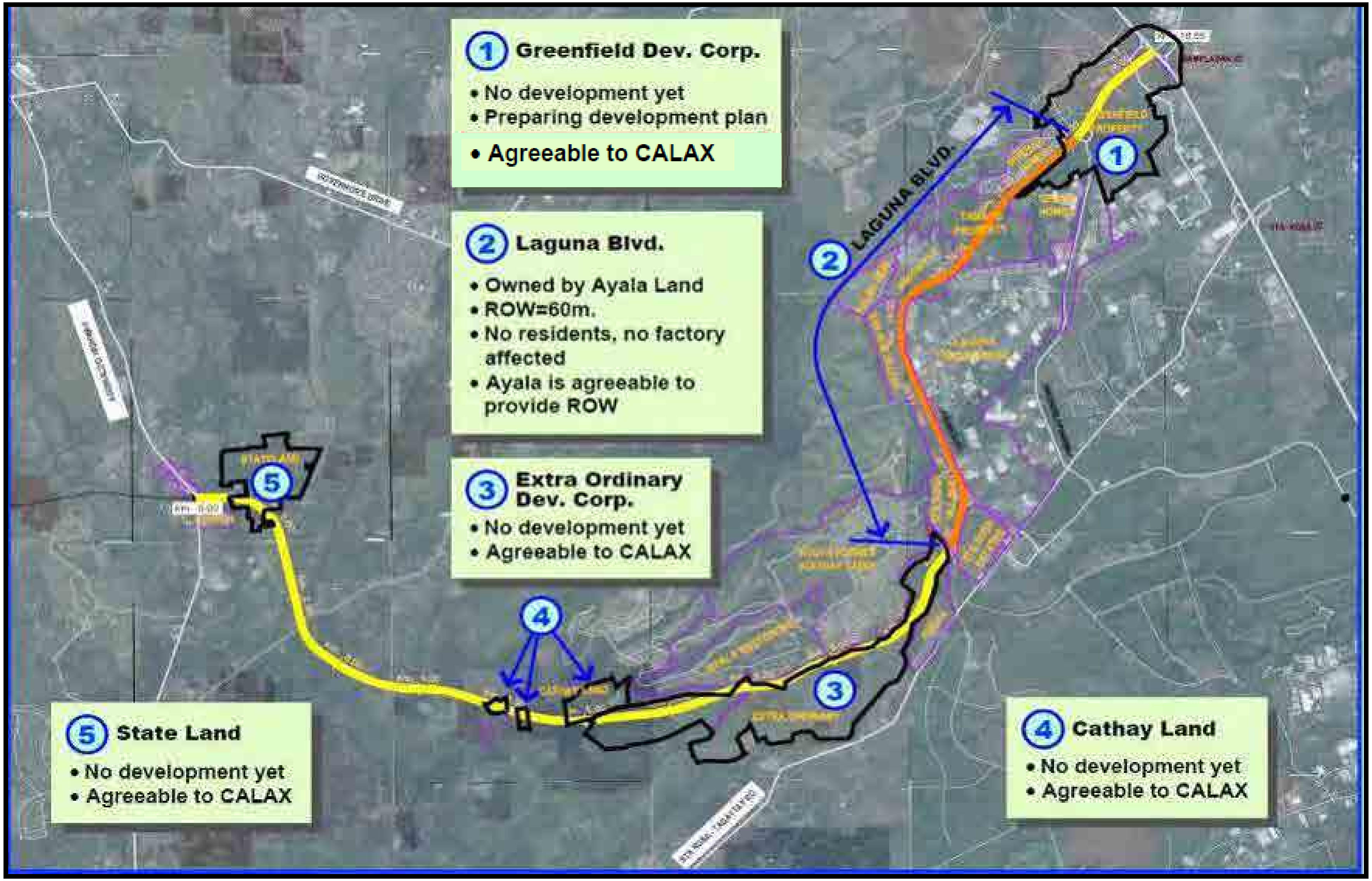
Source: JICA Study Team (2012)

FIGURE 9.5.2-3 (1) ALTERNATIVE ALIGNMENT 1



Source: JICA Study Team (2012)

FIGURE 9.5.2-3 (2) ALTERNATIVE ALIGNMENT 2



① Greenfield Dev. Corp.

- No development yet
- Preparing development plan
- Agreeable to CALAX

② Laguna Blvd.

- Owned by Ayala Land
- ROW=60m.
- No residents, no factory affected
- Ayala is agreeable to provide ROW

③ Extra Ordinary Dev. Corp.

- No development yet
- Agreeable to CALAX

④ Cathay Land

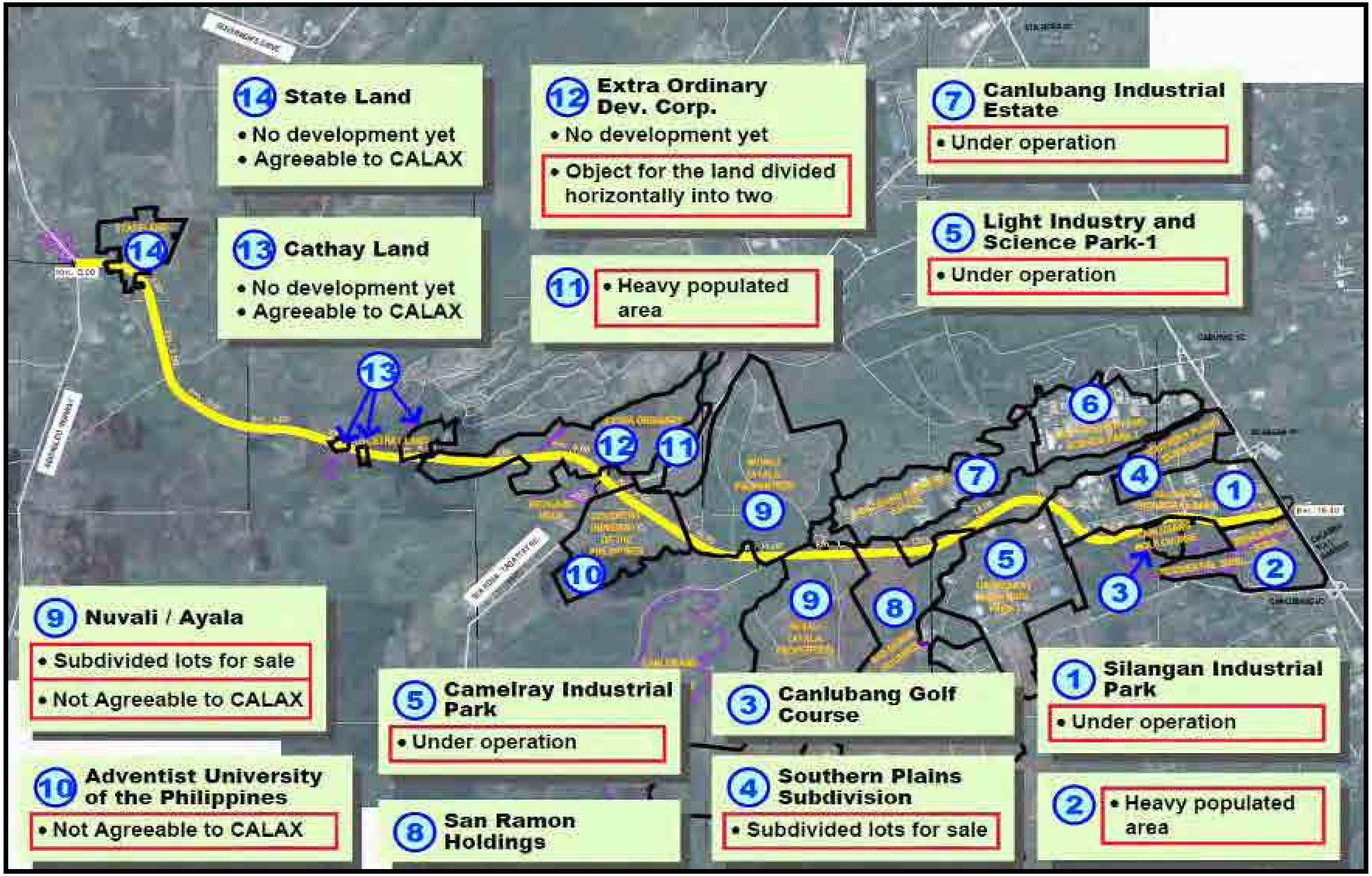
- No development yet
- Agreeable to CALAX

⑤ State Land

- No development yet
- Agreeable to CALAX

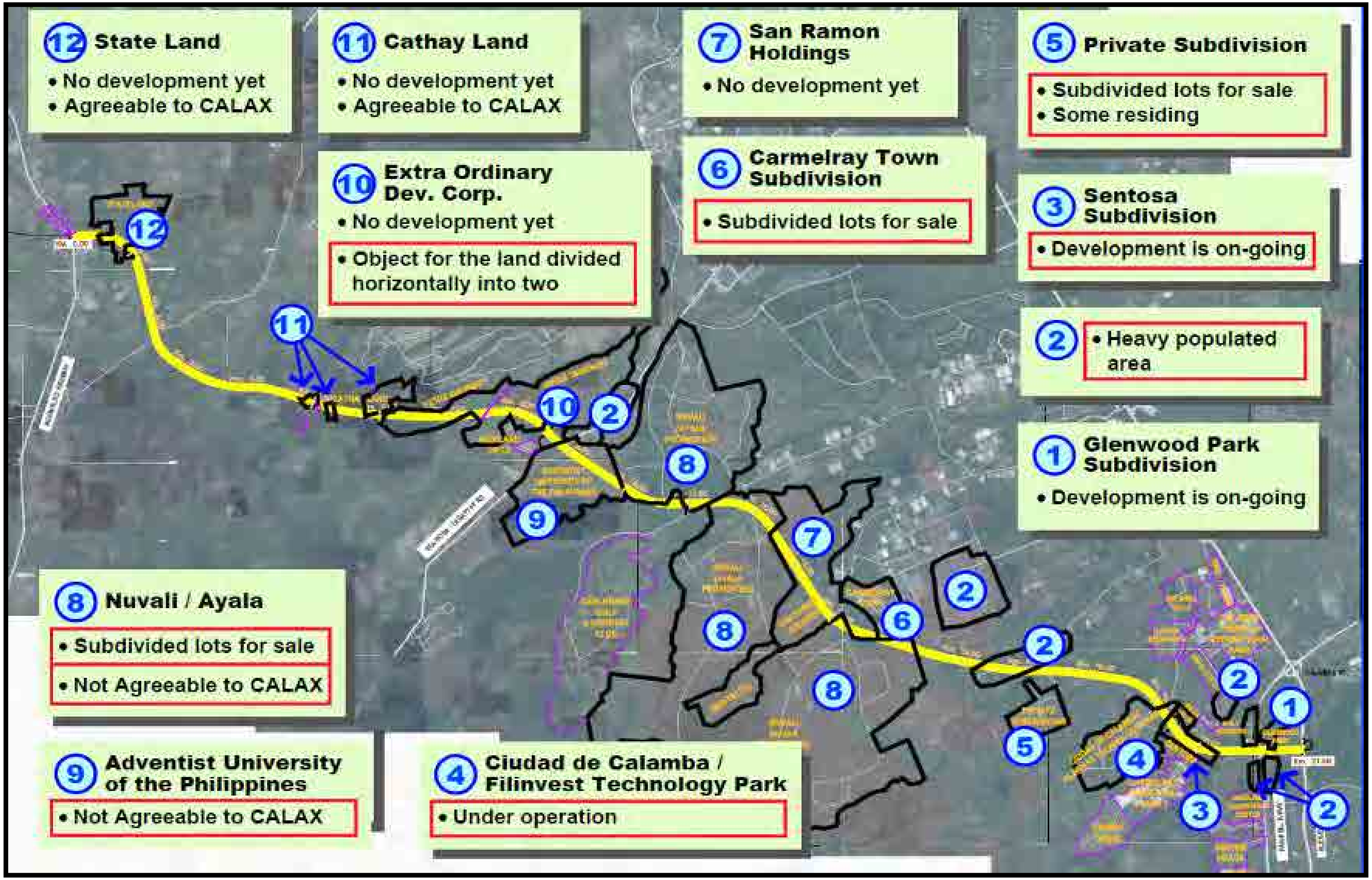
Source: JICA Study Team (2012)

FIGURE 9.5.2-3 (3) ALTERNATIVE ALIGNMENT 3



Source: *JICA Study Team (2012)*

FIGURE 9.5.2-3 (4) ALTERNATIVE ALIGNMENT 4



⑫ State Land
- No development yet
- Agreeable to CALAX

⑪ Cathay Land
- No development yet
- Agreeable to CALAX

⑦ San Ramon Holdings
- No development yet

⑤ Private Subdivision
- Subdivided lots for sale
- Some residing

⑩ Extra Ordinary Dev. Corp.
- No development yet
- Object for the land divided horizontally into two

⑥ Carmelray Town Subdivision
- Subdivided lots for sale

③ Sentosa Subdivision
- Development is on-going

②
- Heavy populated area

① Glenwood Park Subdivision
- Development is on-going

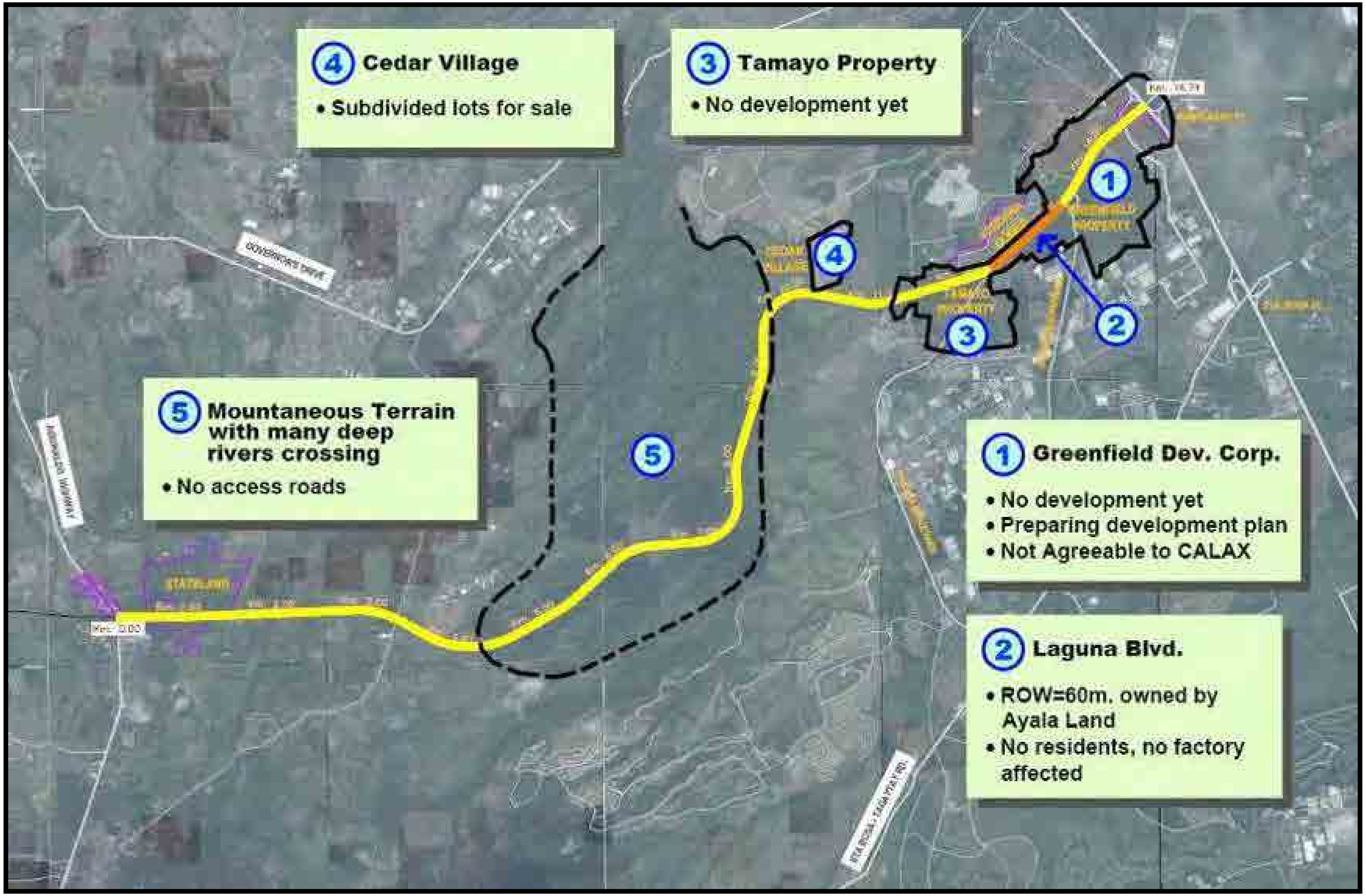
⑧ Nuvali / Ayala
- Subdivided lots for sale
- Not Agreeable to CALAX

⑨ Adventist University of the Philippines
- Not Agreeable to CALAX

④ Ciudad de Calamba / Filinvest Technology Park
- Under operation

Source: JICA Study Team (2012)

FIGURE 9.5.2-3 (5) ALTERNATIVE ALIGNMENT 5



Source: JICA Study Team (2012)

FIGURE 9.5.2-3 (6) ALTERNATIVE ALIGNMENT 6

9.5.2.4 Zero Option

Table 9.5.2-6 shows the evaluation of with project and without project.

Though Project will affect the pollution, natural environment and social environment, traffic will be drastically improved in this Area.

TABLE 9.5.2-6 EVALUATION OF WITH/WITHOUT PROJECT

Evaluation Item	Parameter	With Project (alternative-3)	Without Project	Remarks
Traffic	Total Travel Time (Y2020)	1,088,081(veh*hrs/day) O	1,180,872(veh*hrs/day) X	92,791veh*hr. saving in Cavite & Laguna Area
Pollution	Air,Noise	Air pollution and noise will occur during construction X	None O	Along CALAX area
	CO_2 (Y2020)	4,076198(ton/year) O	4,197,951(ton/year) X	121,753ton/year decrease during operation.
Natural Environment		Tree Cutting Slop cutting may occur during construction X	None O	
Social Environment		Resettlement necessary (36 structure, 50 households) X	None O	

9.5.3 Scoping Matrix

A Scoping Matrix is prepared taking into account JICA's environmental and social considerations guidelines of 2010 and WB O.P. 4.0.1- Annex B.

TABLE 9.5.3-1 SCOPING MATRIX

No.	Item	CALAX Construction	CALAX in Service	Description
1	Involuntary Relocation/ Resettlement	－A	－B	***Planning and Pre-construction Stage:*** According to the latest road alignment plan, 50 HHs (197 people) are the PAPs. RAP should be drawn up based on the discussion between agencies and PAPs. Also, the design should consider the alignment that will minimize the affected people as much as possible. 80% of target land to be acquired is owned by the land developers, where scattered farming is engaged by licensees and tenants under contract with the landowners. Once developers commence sub-division process, tenants and licensees are forced to abandon cultivation. However, in case project construction precedes developers' subdivision

No.	Item	CALAX Construction	CALAX in Service	Description
				plan, tenants/licensees/occupiers will be obliged to be displaced due to loss of means of subsistence and loss of cultivable plot. ***<u>CALAX In Service:</u>*** Chances of PAFs' degraded quality of livelihood after relocation.
2	Local Economy/ Employment and Livelihood	±B	±B	***<u>During Construction:</u>*** (-)Negative impacts on commercial farms (if any), subsistence farmers, temporal shop keepers, temporal workers, relocated residents, which activities obstructed due to construction in progress. Decrease in the number of holiday makers. (+) Increase in job opportunities for construction workers. Increased demand for local supplies of materials and goods. ***<u>CALAX In Service:</u>*** (+) Increased mobility and improved access to services will contribute to increased level of local people' economic activity and increase in LGU's revenue. (-) Changed way of life and loss of livelihood of tenant/subsistence farmers due to landuse conversion by the developers/landowners.
3	Land Use	－B	＋A	***<u>Land Use map</u>*** • *The Western Section (Brgys. Sabutan, Kaong, Tibig, Hukay and Carmen, fall under Silang Municipal jurisdiction)* **(Present) Agricultural → (Proposed) Agricultural + Built-up** • *The Eastern Section (Cities of Sta. Rosa, Biñan, Cabuyao, and Calamba)* **(Present) Residential/ Industrial/ Commercial → (Proposed) Residential + Industrial +Commercial** ***<u>During Construction:</u>*** (-) Land use conversion at several IC sites and alignments (farming/natural vegetation to public infrastructure space) compelling existing small-scale business holders to change location. Tenant and subsistence farmers to lose means of livelihood. ***<u>CALAX In Service:</u>*** (+) Increase in land price.
	Utilization of Local Resources	－B	D	***<u>During Construction:</u>*** (-) Negative impacts from volume of soil and gravel taken from borrow sites and quarry mines.
	Farm Land	－B	－B	***<u>During Construction:</u>*** (-) Farm Land acquisition and conversion to expressway to take place in the Western Section (Brgys. Kaong, Tibig, Hukay and Carmen) of the proposed alignment. Loss of agricultural production is anticipated. ***<u>CALAX In Service:</u>*** (-) Loss in agricultural production and loss of job by small-holders due to land use conversion.
4	Social Institutions, Social Infrastructure and Local Decision-making	－B	＋B	***<u>During Construction:</u>*** (-) Hindered access to market, access to job (-) Segregated transport routes to community infrastructure and services, drainage, and stream water course ***<u>CALAX In Service:</u>*** (+) Improved access to social infrastructure and social services – regional hospitals, welfare facilities, and other regional public facilities.
5	Means of livelihood (Considerations for the Poor and Socially	－B	±B	***<u>During Construction:</u>*** (-) Loss of business (stalls, sari-sari store, street vendor) due to construction work and/or relocation ***<u>CALAX In Service:</u>*** (+) With highway-driven local economy, economic spill over will

No.	Item	CALAX Construction	CALAX in Service	Description
	Vulnerable)			eventually benefit the poor. (-) Resettled PAFs needs time to recover same level of livelihood.
	Indigenous People	D	D	It has not been confirmed that indigenous people live at project area.
6	Misdistribution of benefit and damage	D	D	***<u>CALAX In Service:</u>*** (+) It is felt/perceived that new opportunities created by CALAX in operation is going to be distributed fairly. (-) It is felt/perceived that while some stakeholders (one of the interest group) will assume a good part of newly generated business opportunities from CALAX in operation, some other stakeholders seem to be losing existing business. Benefit misdistribution may occur among LGUs benefiting from an IC within its jurisdictional territory and those LGUs without an IC.
7	Cultural Heritages	D	D	Historical monuments (such as old churches, classic architecture) and/or cultural heritages do not exist in the project area.
8	Local Conflict of Interests	D	D	It is generally understood that collusive actions may take place, motivated by a pursuit of private interest, among project decision-makers (purchasers) and the goods/service providers. This may also happen more indirectly through potential linkages of service/goods suppliers' chain under the influence of kinship connection.
9	Water Usage and Water Rights	－B	D	***<u>During Construction:</u>*** (-)Proposed alignment affect twelve (12) households' well sites. No irrigation system along proposed alignment.
10	Sanitation	－B	D	***<u>CALAX during construction</u>*** (-) Health issue of construction workers on-site, Care for occupational health issue of construction workers (-) Proper handling and disposal of wastes generated by construction work (-) Health issue of residents along the construction sites
11	Risk, HIV/AIDS, Infectious disease	－B	D	***<u>CALAX during construction</u>*** (-) Proliferation of HIV/AIDS diseases among construction workers
12	Accidents	－B	－B	***<u>CALAX during construction</u>*** (-) Chances of human casualties/accidents due to construction activities, such as those caused by traffic of construction equipment, vehicles, and accidentally-fell objects. (-) Accidents by quarrying operation ***<u>CALAX in operation</u>*** (-) Accidents caused by human beings/animals trespassing the highway
13	Topography and Geographical Feature	－B	D	***<u>CALAX during construction</u>*** (-) Alteration of landform, esp. cutting hilly terrain, bridging the deep streams, in particular at Brgys. Tibig, and Carmen, which will clear land cover and removing surface soils, leading to potential soil erosion and sedimentation. (-) Increased chances of landslide and soil creep where load cuts are made at gently rolling terrain of Brgys. Hukay and Carmen.
14	Soil Erosion	－B	D	***<u>CALAX during construction</u>*** (-) The project area is prone to moderate-to-slight erosion, depending on the gradient of land slope. Land clearance by cut will form uncovered slopes, which are prone to trigger erosion and surface run-off.
15	Groundwater	－B	D	***<u>CALAX during construction</u>*** (-) Piling and excavation works for expressway foundation works do not interfere with the aquifers. Geological survey result is to be looked into to check if such incidences may occur.

No.	Item	CALAX Construction	CALAX in Service	Description
				<u>CALAX in operation</u> (+/-) No impact is anticipated.
16	Hydrology	D	D	Construction of expressway will not alter nor modify surface water runoff characteristics of the project area. The project area has a natural slope gradient that drains intense rain water and the area is free from floods.
17	Flora, Fauna and Biodiversity	－B	－B	Occurrences of rare, threatened and endangered faunal and floral species in the vicinity of the proposed alignment in the Municipalities of Silang, Santa Rosa, Biñan, and Cabuyao are not reported. The common vegetation consists of a mixture of grassland and second-growth forest in the rural section of Silang municipality, i.e. Brgys. of Kaong, Tibig, Hukay and Carmen. Removal of trees within ROW along the alignment is expected during construction. In operation, natural ecosystems will recover in adjusting of expressway alignment, which are once cleared by construction activities. However faural mitigation behavior will be disturbed. Neither IBAs (important bird area) nor KDAs (key biodiversity area) are designated in this area. Rare/threatened/ endangered avifauna species are not observed.
18	Natural Reserve, Protected Area	D	D	No protected areas exist along the proposed alignment nor its vicinity. DENR - designated IBAs, KBAs, nor any registered wetlands are found in its vicinity.
19	Landscape	－B	－B	Region IV-A has seven “Protected Landscape”, none of which appear in the area for the proposed alignment. However elevated objects, due to expressway construction, may produce visual effect against the present landscape. ***<u>CALAX during construction</u>*** (-) Constructing an elevated structure (a flyover) may have visual impact on present landscape. ***<u>CALAX in operation</u>*** (-) An elevated structure (a flyover) may alter existing residential town landscape and may have a permanent visual impact.
20	Global Warming	－B	－B	***<u>CALAX during construction</u>*** (-) Construction heavy vehicle traffic emits more volume of GHGs. CALAX in operation (-) Increased traffic over the CALA expressway emits more GHGs.
21	Air Pollution	－B	－B	***<u>CALAX during construction</u>*** (-) Deployment of heavy-duty construction machinery/equipment/ vehicles at the construction site causes pollutant gas emissions. ***<u>CALAX in operation</u>*** (-) Potentially degraded ambient air quality is expected along the expressway due to increased traffic.
22	**Water Pollution**	－B	－B	***<u>CALAX during construction</u>*** (-) Residual soil, cement, machine oil, vehicle motor oil, paints, other hazardous materials, generated/wasted by construction work, eventually find their way into adjacent surface water bodies. Eroded soil will also flow into nearby surface water bodies. (-) There will be no adverse effect to pollution of underground water. ***<u>CALAX in operation</u>*** (-) Heavy metals of exhaust gas origin, spill oil, asphalt debris may be drained from expressway surface to reach any ambient water bodies and contaminate them. (-) There will be no adverse effect to pollution of underground water.
23	Soil Contamination	－B	D	***<u>CALAX during construction</u>*** (-) Construction-site soil is going to be contaminated by the above-mentioned on-site polluted water.

No.	Item	CALAX Construction	CALAX in Service	Description
				Incidence of lubricant oil spills from soil-properties test boring, and deployed construction vehicles will affect the contamination state of surface soil.
24	Solid Waste	－B	D	***<u>CALAX during construction</u>*** (-) Residue soil from cut, debris from construction work, solid and liquid wastes from construction workers' camps are generated.
25	Noise and Vibration	－B	－B	***<u>CALAX during construction</u>*** (-) Deployment of heavy-duty equipment and machinery on-the-site, incoming/outgoing transport vehicles, earth-moving, piling will cause elevated level of noise and vibration effects perceived by residents adjacent to the construction site. ***<u>CALAX in operation</u>*** (-) Noise and vibration generated by through traffic are perceived to be annoying by adjacent residents.
26	Ground Subsidence	D	D	***<u>CALAX during construction</u>*** (-) Geological survey reveal potential occurrence of the soft ground along the proposed alignment. The survey reveal chance of incidence of localized and temporal land subsidence during piling operation using heavy-duty equipment. According to this geological survey by 2012, no soft grounds are identified. ***<u>CALAX in operation</u>*** (-/+) No impacts anticipated.
27	Offensive Odor	－B	D	***<u>CALAX during construction</u>*** (-) Temporal sources of offensive odors – outdoor toilets, garbage collection site of the construction camp and so on.
28	River-bed Sedimentation	D	D	***<u>CALAX during construction</u>*** There are least possiblities of bottom sediment deterioration due to in flow of contaminants and soil from construction site. ***<u>CALAX in operation</u>*** No impact
29	Traffic Congestion	－B	＋B	***<u>CALAX during construction</u>*** (-) Traffic jams may occur at towns due to usage of existing roads for construction purposes. ***<u>CALAX in operation</u>*** (+) Traffic will be streamlined and congestion alleviated.
30	Flood	D	D	The proposed alignment runs through well-drained upland slopes (Silang municipality), while the Eastern section of the alignment runs more-or-less urbanized residential/commercial/industrial area, where occurrences of flood is not observed with slope gradient above 1.0%. Interviews with local residents show that there have been no flood incidences. ***<u>CALAX during construction</u>*** (-) No impact. ***<u>CALAX in operation</u>*** (-) No impact

Remarks:
\+ : Positive, - : Negative
A : Serious impact is expected, B: Some impact is expected, C: Extent of impact is unknown. (Examination is needed. Impact may become clear as study progresses. D : No impact is expected, IEE or EIA is not necessary.

Source: JICA Study Team (2012)

9.5.4 Analysis of Key Environmental Aspect

Current state of natural and social environments are studied based on existing credited data and statistics, government reports, direct measurement, interview, and visual observation.

9.5.4.1 The Land

(1) Land Use and Classification

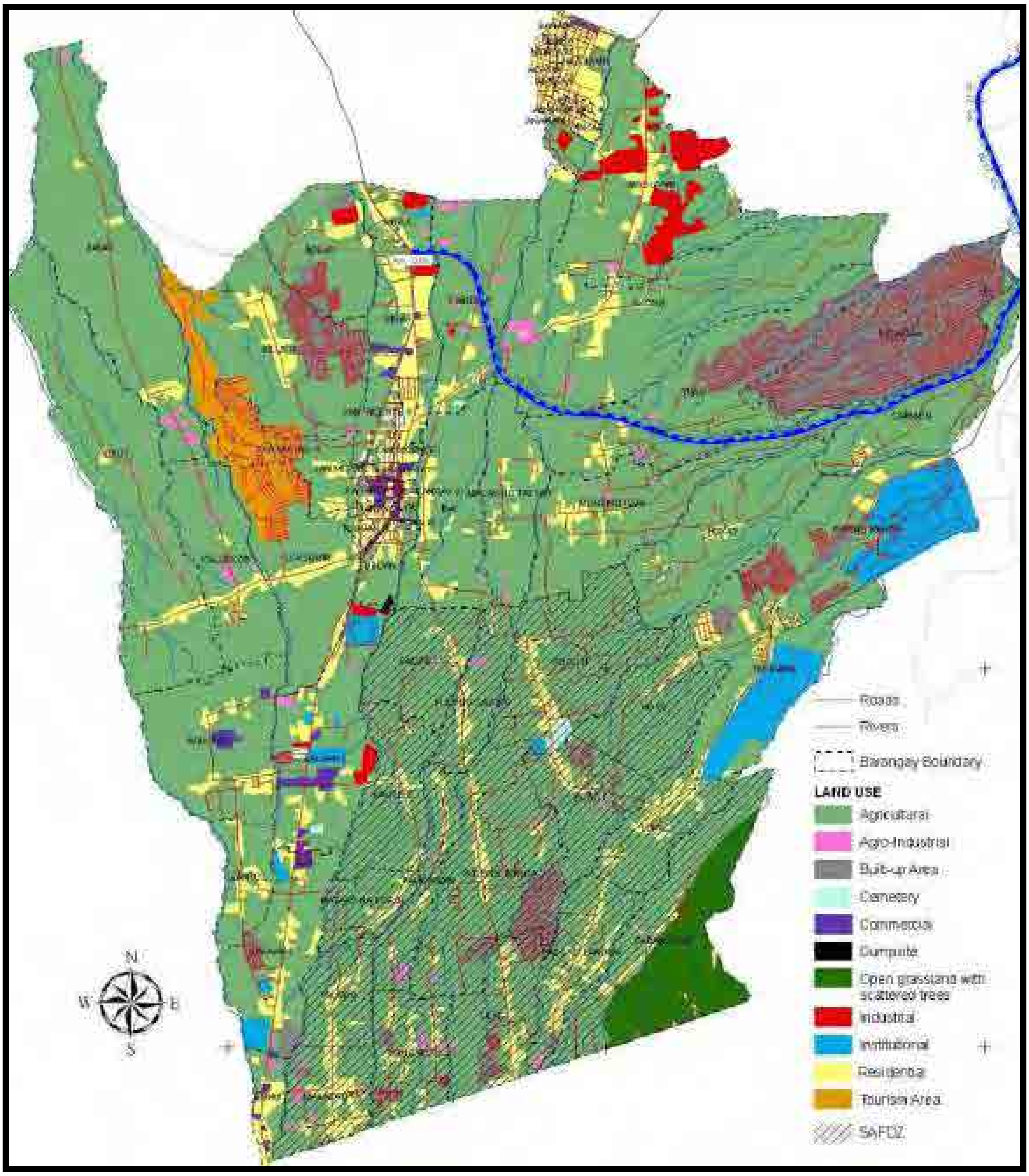
1) Silang, Cavite

The Present Land Use Map of Silang, Cavite presented in **Figure 9.5.4-1**, shows that there are **11** land use classifications identified in the Municipality of Silang, Cavite. Most recent data (Year 2009) from the Provincial Agriculturist Office (PAO) indicated that about **60.3%** or **9,431.83 ha** of Silang's total land area of **15,641 ha** are primarily intended for agricultural purposes. Being the major crops of the town, pineapple and coffee are predominantly planted to approximately **7,014.66 ha** or **74.37%** of the municipality's agricultural lands.

The remaining **6,209.17 ha** (**25.63%**) in Silang's land area is almost evenly distributed to other purposes such as residential, industrial, built-up, institutional, agro-industrial, commercial, tourism area, cemetery, open grassland with scattered trees, and dump site.

In Silang, the proposed CALA Expressway alignment will generally traverse **agricultural areas**. However, actual survey conducted revealed that most of these areas are unproductive agricultural lands which appear to have transformed into **open grassland land/wasteland** (see **Plate No. 1**) due to unavailability of irrigation system. Patches of marginal pineapple plantations and corn fields are observed in Brgy. Sabutan and Tibig (**see Plate Nos. 3** and **4**). Farther down southeast, the alignment will traverse through some coffee, banana, and coconut plantations in Brgy. Tibig.

The alignment will also cut across some residential properties of **Stateland** in Brgy. Sabutan, and **Extra Ordinary** in Brgy. Carmen. On the southeast, it will also pass along prime residential areas such as the **Ayala West Grove Heights** and **South Forbes** in Brgy. Inchican.



Source: WWF Philippines

FIGURE 9.5.4-1 PRESENT LAND USE MAP OF SILANG, CAVITE

Plate No. 1 Vast unproductive and non-irrigated agricultural land to be traversed by the CALA Expressway alignment (red line) between **Km 3+900–4+300** in Brgy. Tibig, which has evidently transformed into a open grassland/wasteland.

Plate No. 2 Patches of corn fields (encircled) in the middle of grassland areas observed in Brgy. Sabutan, Silang, Cavite between **Km 1+000–2+000**.

Plate No. 3 Marginal pineapple plantation on the southeast side of Sabutan Road, in Brgy. Sabutan, Silang, Cavite (Km 1+000–2+000).

Plate No. 4 Photo of the orchard planted to coffee, banana, and coconut owned by the Mercados between Km 4+200–4+800 in Brgy. Tibig, Silang, Cavite. The proposed CALA Expressway alignment will pass through the middle of the plantation, effectively splitting the property into two (2).

2) Santa Rosa, Laguna

Santa Rosa City's total land area of approximately **54.13 km^2** (**5,413 ha**) is divided into **11** land use classifications that includes residential, agricultural, industrial, built-up, agro-industrial, commercial, tourism area, institutional, cemetery, mud/sand, and open grasslands. Among these classifications, large portions of the City's land area are almost equally subdivided to residential, industrial, and agricultural purposes.

The extensive industrial estates of the Santa Rosa City as shown in the Present Land Use Map presented in **Figure 9.5.4-2** are virtually concentrated on the western sector of the City. It accommodates the Laguna Techno Park, the largest bottling plant of Coca Cola Company in the Philippines, the assembly plant of Isuzu Philippines Corporation, Toyota Motors Corporation Philippines manufacturing plant, Nissan Motors Philippines, and other recognized industries such as Common Image Generator Interface (CIGI) and Filsyn. Food giant Monde Nissin Corporation's **14-hectare** manufacturing plant (Lucky Me noodles and Monde biscuits) is also located in the City's industrial zone. The western sector of Santa Rosa is likewise characterized by the presence of prime residential subdivisions, Paseo Mall, hotel establishments, as well as the eco zone areas of Nuvali.

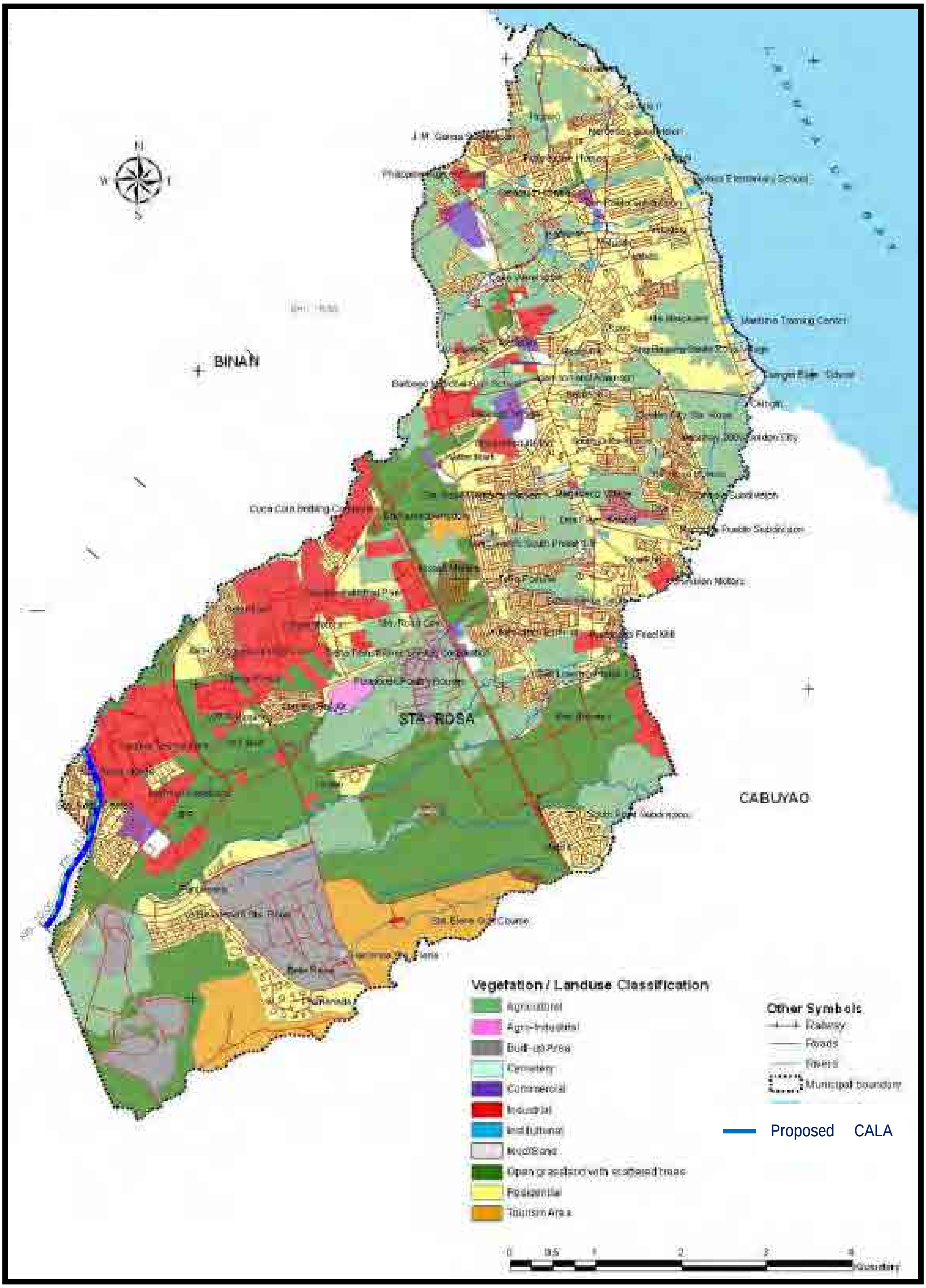
From Brgy. Carmen, Silang Cavite, the alignment will enter Sta. Rosa City through Brgy. Don Jose. The alignment will connect to the existing Nuvali Spine Road and will pass by the residential developments of **Sta. Rosa Village** on the northeast and the Sta. Rosa Estates on the southeast. To the east of the proposed alignment is the Laguna Techno Park, Sta. Rosa City side.

3) Biñan City, Laguna

Biñan City has a total land area of 4,350 ha, which represents 2.5% of the entire Laguna area. Of the 11 land use classifications illustrated in **Figure 9.5.4-3**, a large portion of the City's land area is dedicated for residential purposes. Open grasslands with scattered trees also represent a substantial space in the City. The built-up, agricultural, and industrial uses nearly secure equal shares of Biñan's land areas. The remaining portions of the City are subdivided to other utilizations such as agro-industrial, commercial, institutional, cemetery, mud/sand, and tourism area

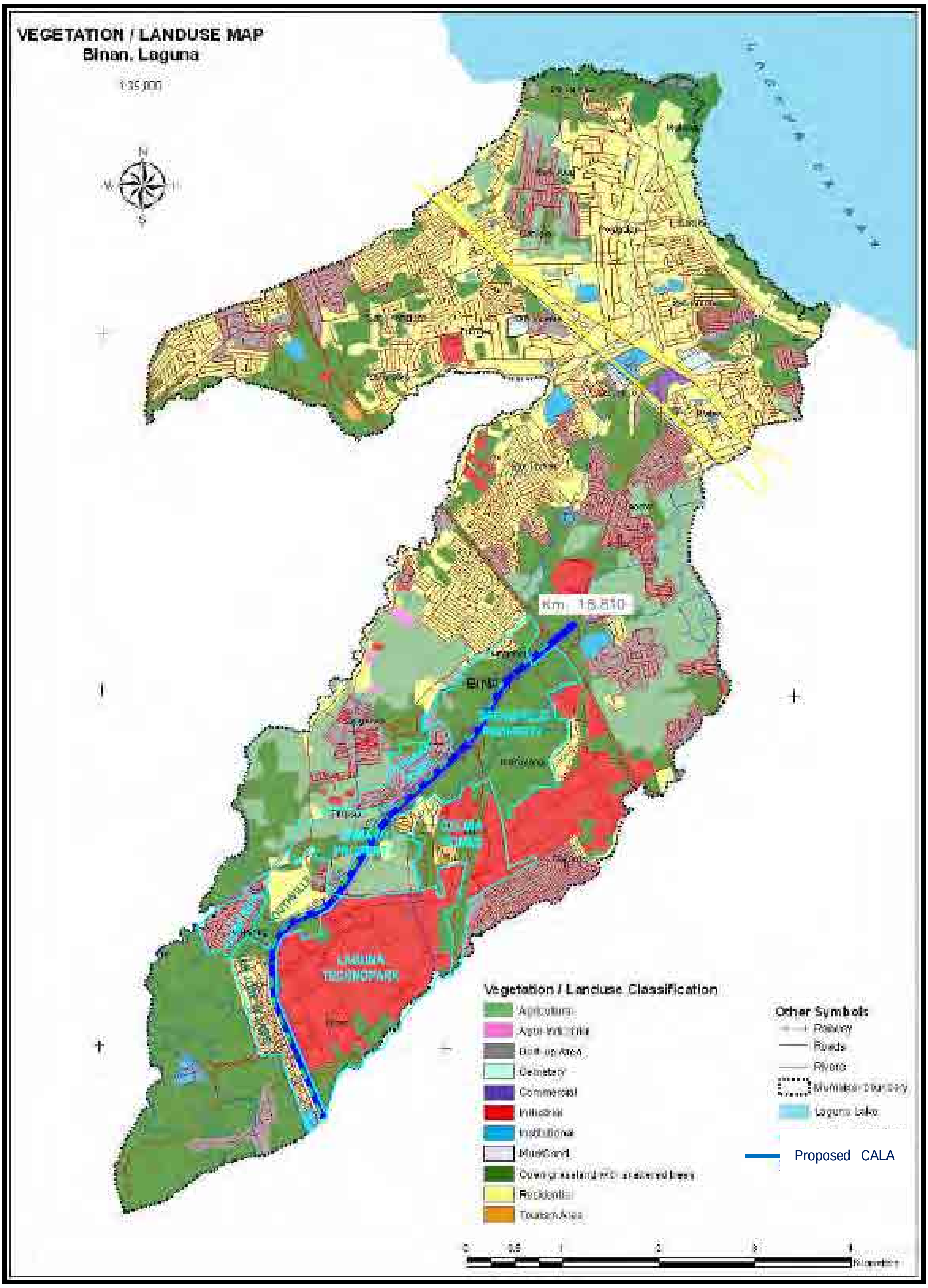
The alignment from the Nuvali Spine Road in Brgy. Don Jose, Santa Rosa City, will then follow the existing Laguna Boulevard in Brgy. Biñan, Biñan City, passing by the Laguna Techno Park on the east, and Sta. Rosa Village and San Jose Village on the west. As the alignment continues to follow the existing road towards northeast, it will pass by Southvillle in Brgy. Malamig before cutting across the Tamayo Property in Brgy. Timbao.

It will then follow the existing Nuvali passing by the Verdana Homes on the northwest and Celina Homes on the east. Towards its terminus, the alignment immediately after Celina Homes will pass along the Greenfields Property at Km 16+150. The proposed CALA Expressway will eventually cut across the Greenfields Property approximately at Km 16+950 and will continue to traverse the said property until it reaches its end section at Km 18+010 in Brgy. Mamplasan.



Source: Sta. Rosa City, Planning Division

FIGURE 9.5.4-2 PRESENT LAND USE MAP OF STA. ROSA CITY, LAGUNA



Source: *Binan City, Planning Division*

FIGURE 9.5.4-3 PRESENT LAND USE MAP OF BIÑAN CITY, LAGUNA

Plate No. 5 Photo taken along the Greenfield Parkway- Mamplasan Overpass Road inside the Greenfields property between Km 17+000–18+000. Both sides of the road are open grassland areas with patches of trees.

Plate No. 6 Photo taken along the Nuvali Road. The properties on both sides of the road are owned by the Greenfields.

Plate No. 7 Photo of the existing Nuvali Road, Brgy. Malamig, section. On the southeast side of the road is the Laguna Techno Park, Biñan side.

Plate No. 8 Photo taken at the northwest side of the roundabout in Brgy. Mamplasan, Biñan City.

(2) Geomorphology

Out of **four** (**4**) major landscapes in the Cavite-Laguna area, only **two** (**2**) of these are found in the Project area. These are: (i) alluvial lowlands, and (ii) hills and mountains. The study area is characterized by alluvial lowlands, piedmont plains and foothills, and hills and mountains.

1) Alluvial Lowlands

The alluvial lowlands are those nearly flat to gently sloping alluvial plains formed from lateral erosion or soil deposition of running streams or rivers. In Cavite, broad and minor alluvial plains form the transition area between the strip of coastal landscapes and the piedmont plains and foothills. These have slopes ranging from 0% to 5%. Approximately 75% are flat, 20% are gently sloping and 5% are levee.

In Laguna, the alluvial lowland is basically an extension of the minor alluvial plain in Taguig and Muntinlupa. It covers the low depressed areas of the towns bordering the western and southern shores of Laguna de Bay. Slope ranges from 0% to 3%. These are mostly found in the eastern portions of the alignment (Biñan and Sta. Rosa)

2) Hills and Mountains

These are the areas at very high elevations with slopes over 18% and include higher hills and mountains. In the Project area, these are mostly found in the western portions (Silang).

(3) Geology

1) Geological Faults in the Philippines

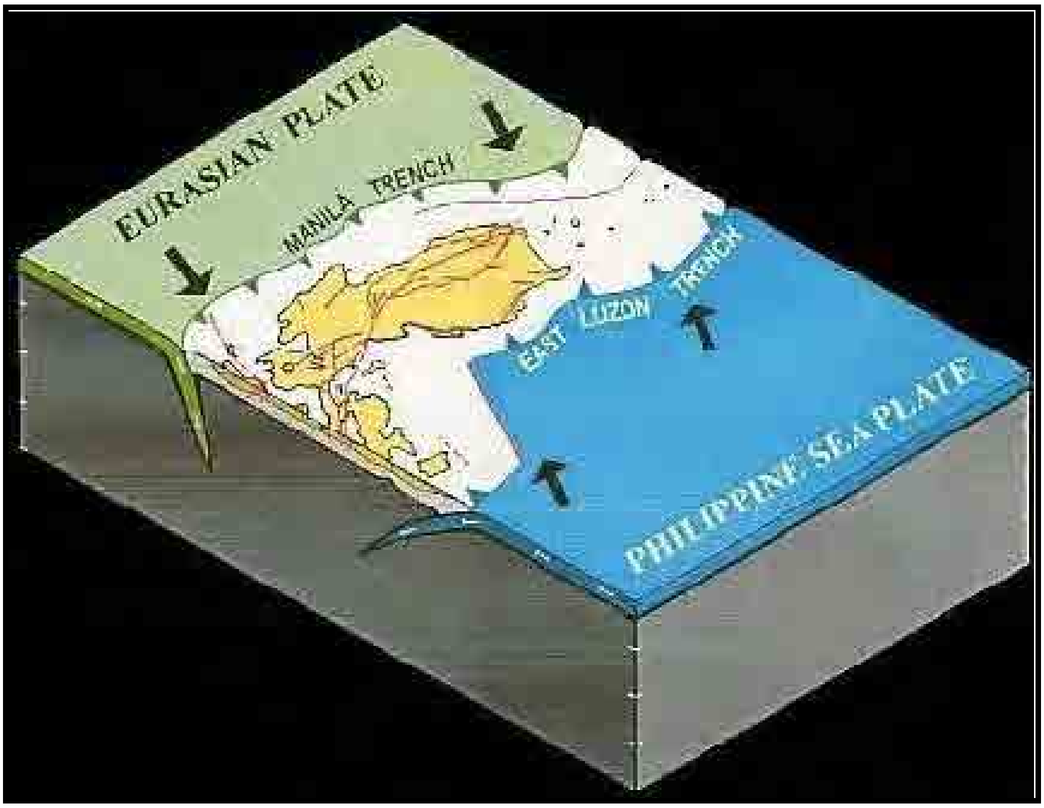
The Philippines is located in latitude 5° to 19°45' N and longitude 116° to 128° E. The Cavite-Laguna area is located in southern Luzon Island, bounded by Manila Bay on the west, which extends to the South China Sea, and Laguna de Bay on the east. Many earthquake generators are distributed all over the country as shown in **Figure 9.5.4-4**.

Source: JICA, MMDA, PHIVOLCS, Earthquake Impact Reduction Study, Metro Manila, Republic of the Philippines, 2004

FIGURE 9.5.4-4 GEOLOGICAL FAULTS IN THE PHILIPPINES

2) Earthquake Generators

The Eurasian Plate (or South China Plate) subducts eastward beneath Luzon Island along the Manila Trench, and the Philippine Sea Plate subducts westward along the East Luzon Trench simultaneously as shown in **Figure 9.5.4-5**.



Source: JICA, MMDA, PHIVOLCS, Earthquake Impact Reduction Study, Metro Manila, Republic of the Philippines. 2004)

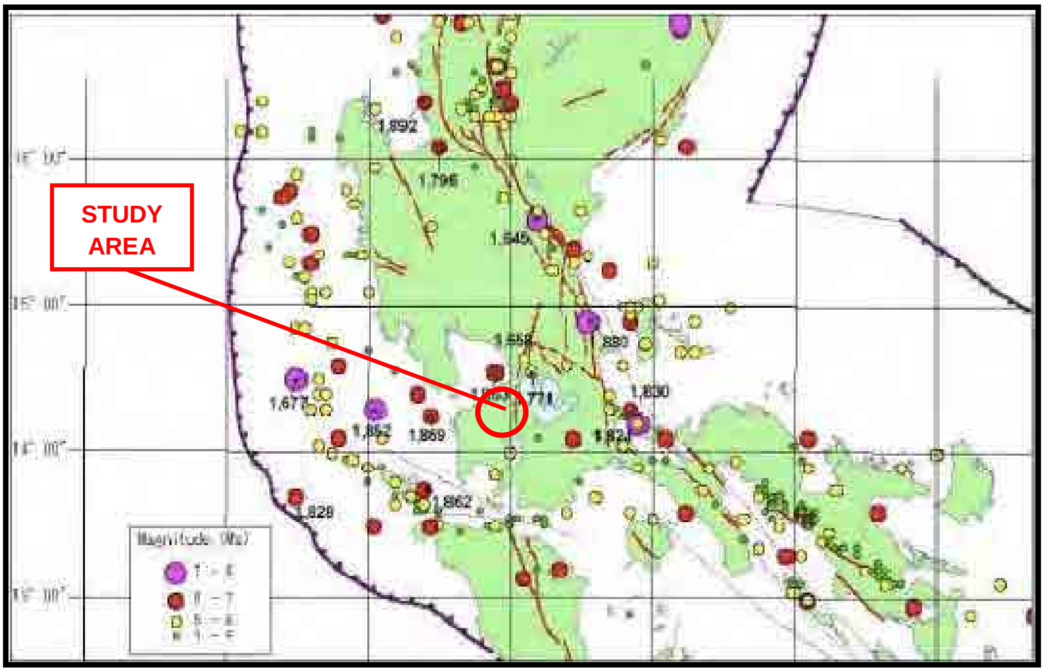
FIGURE 9.5.4-5 SUBDUCTING PLATES UNDER LUZON ISLAND

Because of this complex tectonic setting, Luzon Island shows high seismic activity. The Philippine Islands are sandwiched between two (2) opposite subduction zones. A long inland Philippine Fault Zone (PFZ) lies parallel to the subduction trenches. The PFZ is assumed to release the shear stress caused by the oblique subduction of the ocean plates. Many faults are identified around the project area. The West Valley Fault (WVF) and the East Valley Fault (EVF) which run north to south along the west and east edge of the Marikina Valley are considered to pose the greatest threat to the National Capital Region (NCR) and other parts of Southern Luzon due to their proximity.

Results of several trenching excavation surveys at WVF and EVF indicate that at least two or perhaps four large surface-rupturing events have occurred since AD 600. Therefore, the recurrence interval of the earthquakes generated is less than 500 years. Bautista (*2000*) has suggested that the 1658 and 1771 earthquakes could be candidate events for the EVF. However, no event along the WVF is known. If no earthquake had occurred at the WVF after the 16th century, then the earthquake occurrence along the WVF becomes a serious threat.

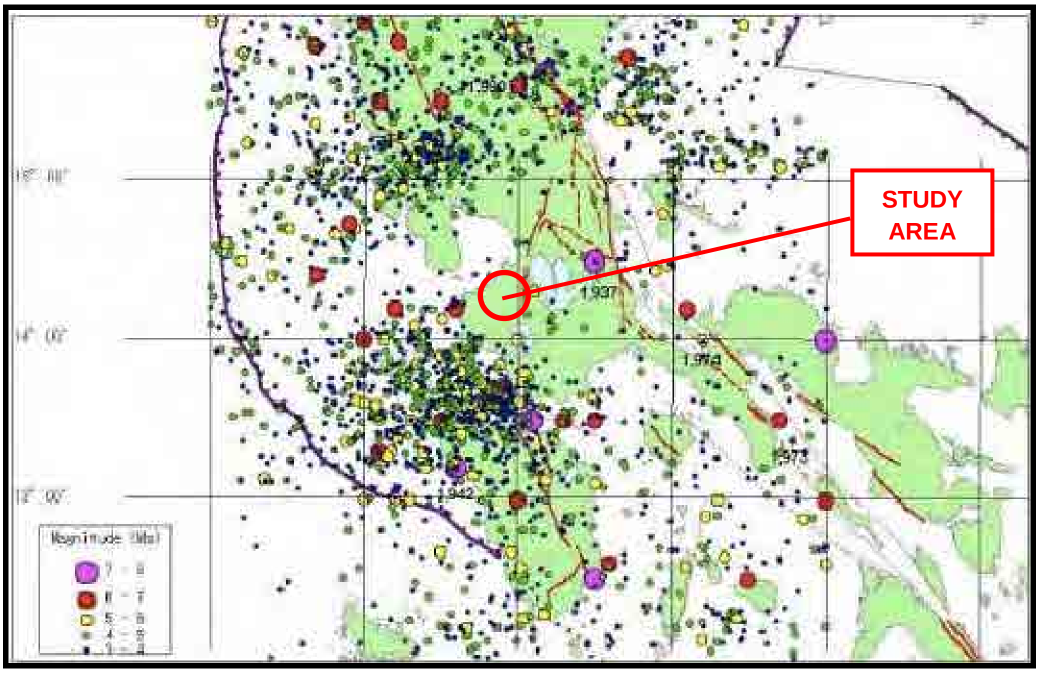
Historical Earthquakes

The earthquakes that occurred before the start of instrumental seismic observation are called historical earthquakes. As interpreted in the distribution of collected historical earthquakes presented as **Figure 9.5.4-6**, the highest magnitude for historical earthquake recorded in sites nearest to the study area is **6-7**. On the other hand, the instrumentally recorded earthquakes after 20th century depicted in **Figure 9.5.4-7** shows a **5-6 magnitude** earthquake occurrence for areas southeast of the project area.



Source: JICA Study Team (2012)

FIGURE 9.5.4-6 DISTRIBUTION OF HISTORICAL EARTHQUAKES FROM 1608 TO 1895



Source: M. L. P. Bautista and Oike K. 2000

FIGURE 9.5.4-7 DISTRIBUTION OF INSTRUMENTALLY RECORDED EARTHQUAKES FROM 1907 TO 2002

3) Regional Geology

The Cavite-Laguna area is situated in a volcanic region referred to as the Southwest Luzon Uplands. It is bounded by three (3) major offshore and two (2) major onshore structures. The offshore structures include the eastward-dipping Manila trench on the west, the westward-dipping east Luzon trench along the east and the active Lubang Fault to the southwest. On shore structures include the West Marikina Valley Fault System to the east and the 1,300 km-long Philippine Fault farther east.

The project area is characterized by a gently sloping terrain, which grades towards Manila Bay and dissected by a sub parallel network of streams emanating from the northern edge of the Tagaytay highlands. It is bounded to the east by the Laguna- de-Bay and to the south by the Tagaytay escarpment and farther south by Taal Lake.

The underlying geologic materials include weathered pyroclastics, which have adequate capacity to support the proposed road structures. The project area is subjected to the natural processes of erosion, siltation, mass movement, flooding, volcanic and seismic related hazards. With the exception of ground shaking generated by the seismic activities of the major geologic structures in the region, most of these processes are local and do not significantly affect the project area.

Geologic Condition Along the CALA Expressway Alignment

The study area is underlain by rocks of various origins and characteristics consisting primarily of QAL and Tuff as described in **Table 9.5.4-1**.

TABLE 9.5.4-1 GEOLOGIC CONDITION IN THE STUDY AREA

Symbols	Description	Area (Ha)	Percentage %
QAL	Quaternary Alluvium: Unconsolidated deposits of silt, sand and gravel along valleys and coastal plains	16,758	21%
Tuff	Taal Tuff: Thin to medium- bedded, fine grained vitric tuffs, welded volcanic breccias with conglomerate, tuffaceous sandstone and shale.	62, 995	79%
	TOTAL	79,753	100%

Source: Bureau of Soils and Water Management, Department of Agriculture, 2011

(4) Pedology

Summarized in **Table 9.5.4-2** are the soil characteristics in the study area.

TABLE 9.5.4-2 SOIL CHARACTERISTICS IN THE STUDY AREA

Feature	Coastal Landscapes	Alluvial Lowlands	Piedmont Plains and Foothills	Hills and Mountains
Effective Soil Depth	Shallow to moderately deep	Shallow moderately deep	Shallow to Deep	Hills and Mountains
Composition	Organic	Organic	Non-organic	Non-organic
Soil plasticity	Very high	Very high	Low	Low
Soil drainage	moderate	moderate	good	good
Note: Color-shaded columns are the type of soils found in the study area				

Source: Bureau of Soils and Water Management, Department of Agriculture

1) Alluvial Lowlands

In Cavite, parent soil material is largely fine clay that is poorly drained in flat to nearly flat areas and moderately drained in gently sloping areas. Fine loam is found in the levee areas. As such, soil varies from sandy to silty clay loam to clay and is somewhat poorly drained.

The area possesses potentials for high yielding wells.

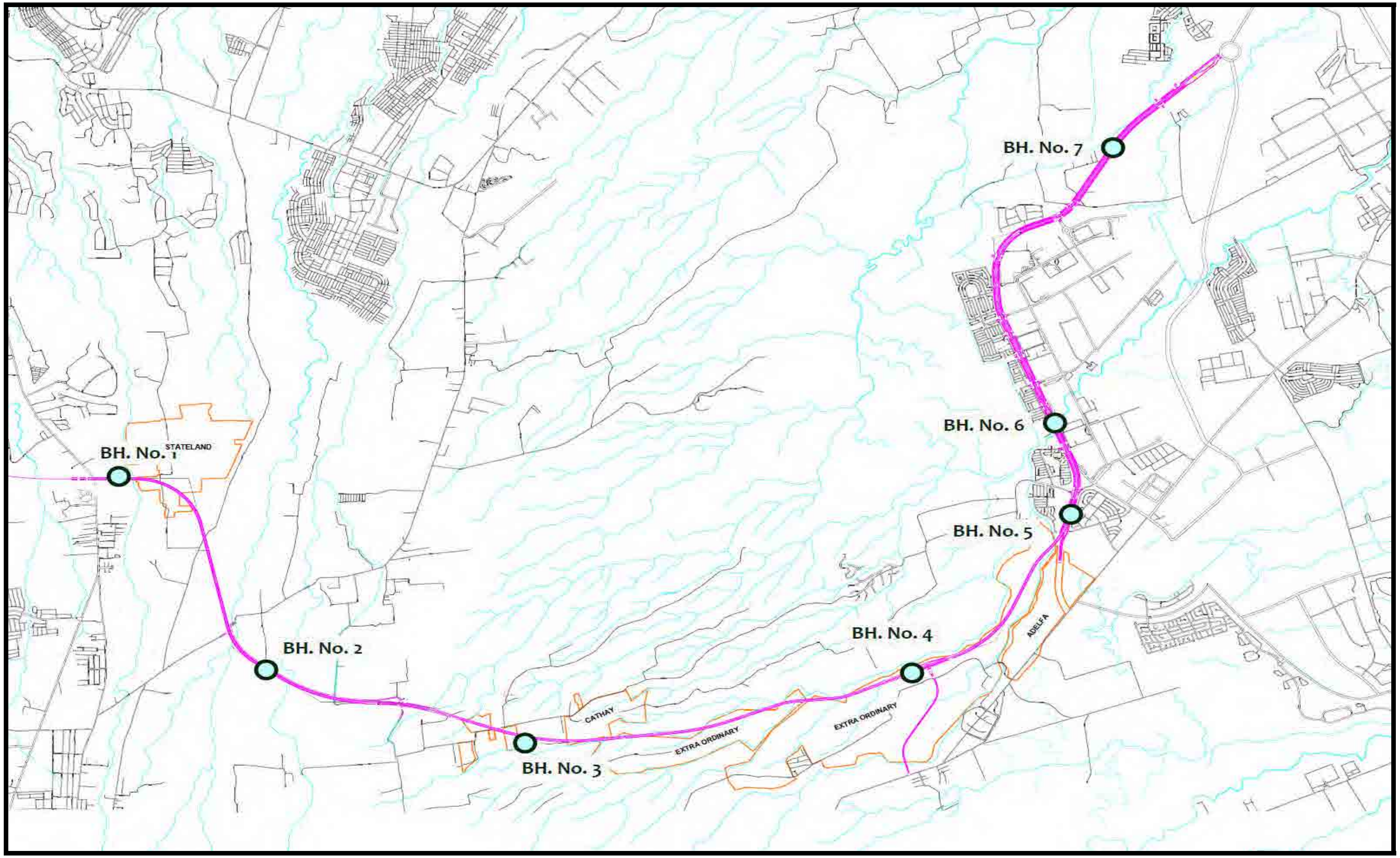
2) Hills and Mountains

Parent soil material is sandy loam or loam that is drained well. Effective soil depth varies from very shallow to deep.

3) Borehole Data

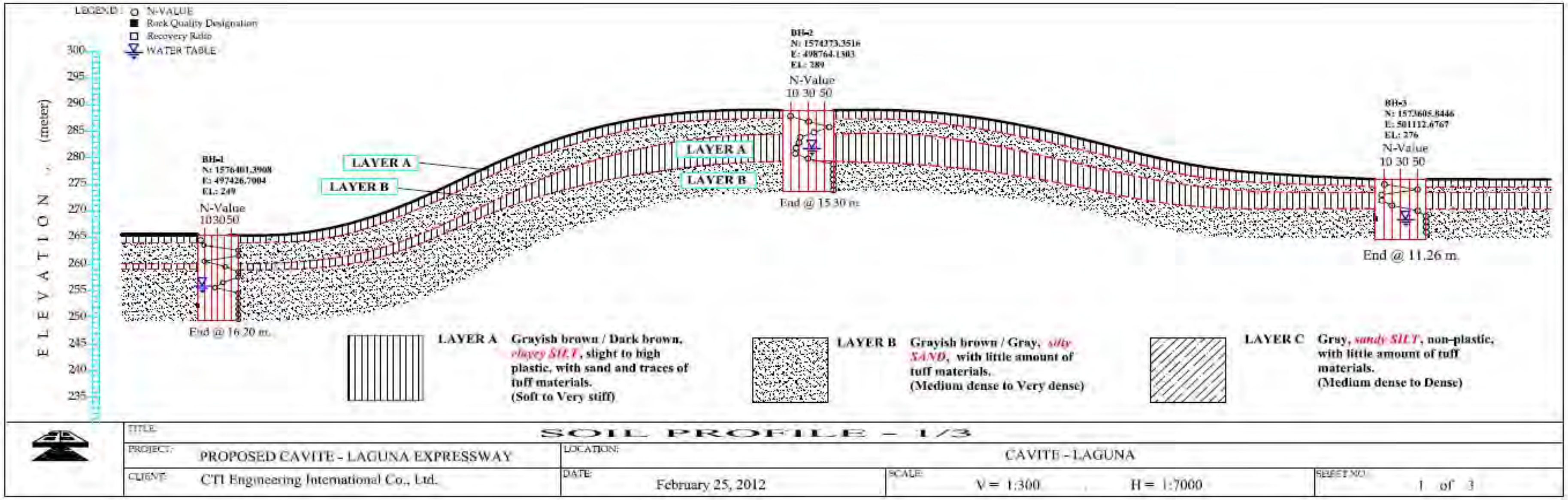
Figure 9.5.4-8 presents the location of bore hole tested along the recommended CALA Expressway alignment. As can be discerned from the soil profile illustrated in **Figure 9.5.4-9**. **Layer A** corresponds to soil materials that are characteristic of coastal landscapes and **alluvial plains**, being slightly to highly plastic, due to considerable amount of clay materials.

Layer B, which is described as grayish brown/gray silty sand with little amount of tuff materials, and **Layer C**, which are non-plastic sandy silts are characteristic of soils found in **hilly and mountainous landscapes**, as presented in the previous section.



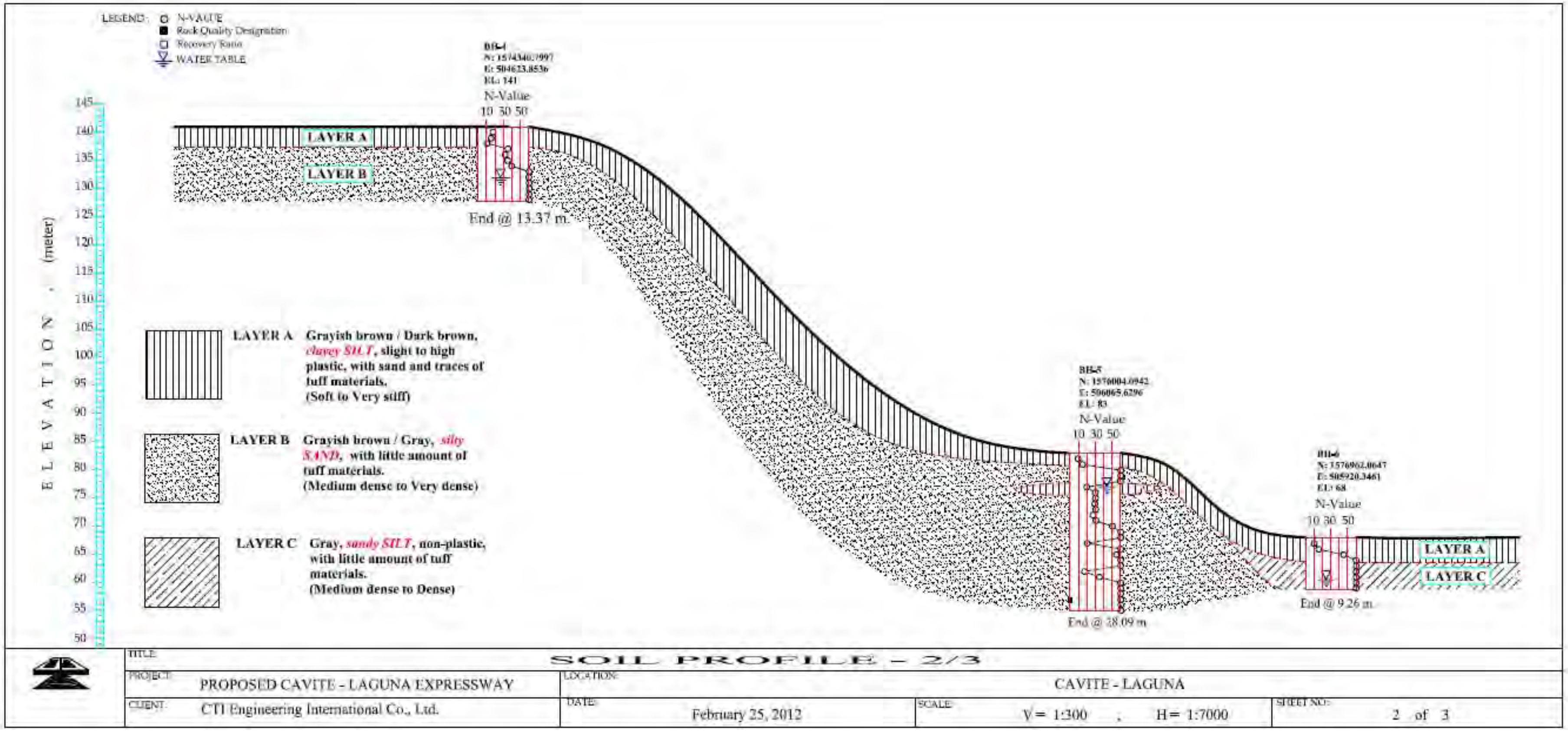
Source: JICA Study Team (2012)

FIGURE 9.5.4-8 LOCATION OF BOREHOLES ALONG THE CALA EXPRESSWAY ALIGNMENT



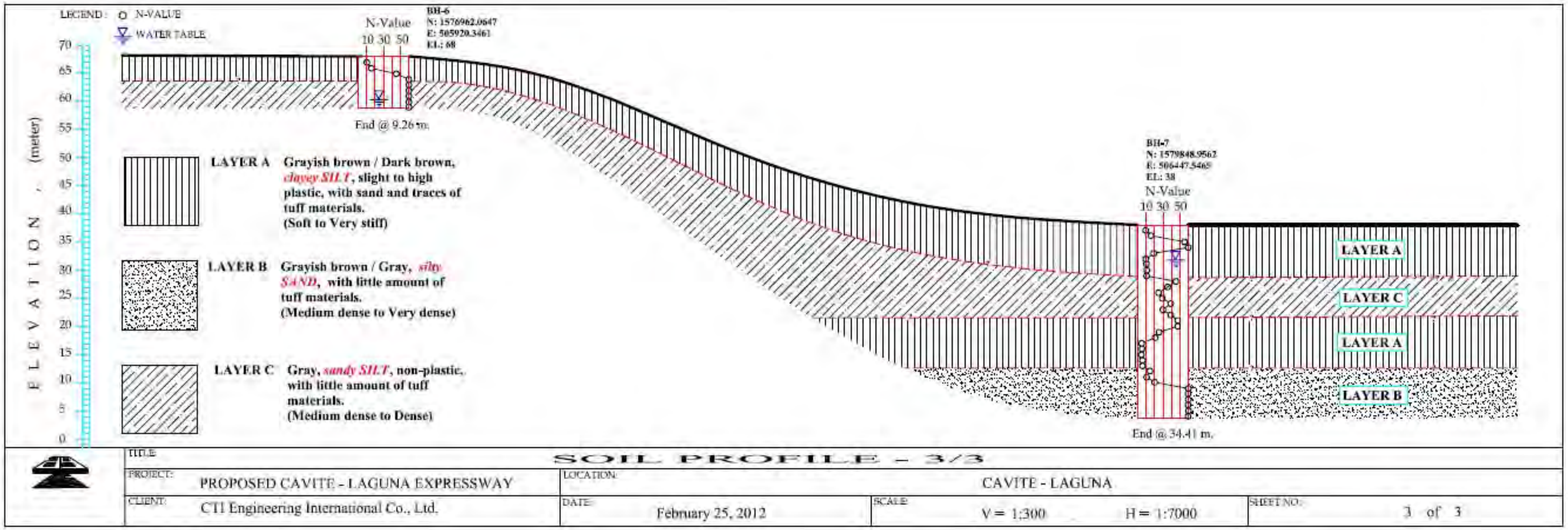
Source: JICA Study Team (2012)

FIGURE 9.5.4-9 (1) SOIL PROFILE – 1/3



Source: JICA Study Team (2012)

FIGURE 9.5.4-9 (2) SOIL PROFILE – 2/3



Source: JICA Study Team (2012)

FIGURE 9.5.4-9 (3) SOIL PROFILE – 3/3

(5) Terrestrial Biology

1) Terrestrial Flora

The vegetation cover along the areas traversed by the proposed CALA Expressway alignment can be classified into **two** (**2**) major types, the **Natural Vegetation**, and the **Cultivated Vegetation**. The **Natural Type** primarily consists of Secondary Growth and Lowland Grassland/Wasteland, while the **Cultivated Type** on the other hand is subdivided into Agricultural and Built-Up.

<u>*Natural Vegetation Type*</u>

Secondary Growth

In some cases, the formation of varied vegetative patterns in certain areas is controlled by edaphic (i.e. related to soils) factor, as is the salty muds where mangroves thrive. Climatic condition also pose a big influence in vegetation formations in misty mountains where elfin forest type is found or areas where seasonally wet and dry monsoon forests occur.

In the study area, there is no primary forest growth observed. The sparsely vegetated landscape serves as a reminder of the past human activities that have dictated the formation of a distinct flora community. Regenerations of tree species typical of a *secondary forest* are very evident along gullies and edges of rivers and creeks. Mixed growths of mature and juvenile *Ficus nota* (tibig), *Macaranga tanarius* (binunga), *Anthocephalus cadamba* (kaatoang bangkal), *Trema orientalis* (anabiong), *Antidesma bunius* (bignai) is common. It is balanced well by the growths of associated species like *Mallotus multiglandosus* (alim), *Vitex negundo* (lagundi), *Ficus odorata* (pakiling), *Macaranga grandifolia* (takip-asin), and *Artocarpus communis* (rimas/kamansi). Proliferations of *Leucaena leucocephala* (ipil-ipil) strongly indicate previous slash and burn farming activities in the study area.

It is important to note that endangered and/or rare flora species were not encountered in the study area. Given in **Table 9.5.4-3** is the list of tree species identified in the study area.

TABLE 9.5.4-3 LIST OF SECONDARY FOREST PLANT SPECIES FOUND IN THE STUDY AREA

Common Name	***Scientific Name***	**Family Name**
Achuete	*Bixa Orellana*	Bixaceae
Alibangbang	*Bauhinia monandra*	Leguminosae
Alim	*Mallotus multiglandosus*	Euphorbiaceae
Anabiong	*Trema orientalis*	Ulmaceae
Anahaw	*Livistona rotundifolia*	Palmae/Arecaceae
Antipolo	*Artocarpus blancoi*	Moraceae
Balanti	*Homallanthus sp*	Euphorbiaceae
Banaba	*Lagerstroema speciosa*	Lythraceae
Banato	*Mallotus philipensis*	Euphorbiaceae
Bangkal	*Nauclea sp.*	Rubiaceae
Bignai	*Antidesma bunius*	Euphorbiaceae
Binayuyu	*Antidesma ghaesembilla*	Euphorbiaceae
Binunga	*Macanranga tanarius*	Euphorbiaceae
Bunga	*Areca Catechu*	Palmaceae
Buri	*Corypha elata*	Palmae
Dao	*Dracontomelon dao*	Anacardiaceae
Dita	*Alstonia scholaris*	Apocynaceae
Hamindang	*Macaranga bicolor*	Euphorbiaceae
Hauili	*Ficus septica*	Moraceae
Hinlaumo	*Mallotus ricinoides*	Euphorbiaceae
Igot	*Syzygium escritorii*	*Myrtaceae*
Ilang ilang	*Cananga odorata*	Annonaceae
Ipil-ipil	*Leucaena leucocephala*	Leguminosae
Kaatoang-bangkal	*Anthocephalus cadamba*	Rubiaceae
Kalios	*Streblus asper*	Moraceae
Kamagong/mabolo	*Diospyros philipensis*	Ebenaceae
Kapok	*Ceiba pentandra*	Bombacaceae
Kauayan	*Bambusa sp.*	Gramineae
Lagundi	*Vitex negundo*	Verbenaceae
Libas	*Spondias pinnata*	Anacardiaceae
Lumbang	*Aleurites moluccana*	Euphorbiaceae
Madre cacao	*Gliricida sepium*	Leguminosae
Malapapaya	*Polyscias nodosa*	Araliaceae
Molave	*Vitex parviflora*	Verbenaceae
Pakiling	*Ficus odorata*	Moraceae
Rimas	*Artocarphus communis*	Moraceae
Takipan	*Caryota Rumphiana*	Palmaceae
Talisay	*Terminalia catappa*	Combretaceae
Tanglin	*Adenanthera intermedia*	Leguminosae
Tibig	*Ficus nota*	Moraceae
Tubang-bakod	*Jatropha curcas*	Euphorbiaceae

Source: As Observed by the EIA Study Team during Field Survey

Plate No. 9 Mixed stands of secondary forest tree species such as F. nota, T. orientalis, A. cadamba, M. philipinensis, M. tanarius, and A. bunius observed along the gullies bordering Malaking Ilog River in Bgry. Sabutan.

Plate No. 10 Scattered trees observed at the beginning section of the alignment in Brgy. Biga II, Silang, Cavite.

Lowland Grassland and Wasteland

"Kaingin" or slash and burn farming is the oldest method of agricultural practice known to man since the early years of the 20th century. Undeniably, it has greatly influenced the formation of vegetative cover not only in the study area, but in the entire country as well. Due to the enormity of the converted forest areas, farmers are unable to till every corner of the expanse, which leads to the evolution of another vegetation community, called the *Lowland Grassland*.

Similar to other grassland, vegetation growth in the study area is dictated mainly by **two** (**2**) grass species – *Saccharum spontaneum* (talahib) and *Imperata cylindrica* (cogon). Although *I. cylindrica* is the more aggressive species of the two, grassland areas traversed by the alignment are dominated by the much taller and coarser *S. spontaneum*. Mixed growths of various grass, shrub, and herb species such as *Axonopus compressus* (carabao grass), *Lantana camara* (coronitas), *Amaranthus spinosus* (colitis), *Chromolaena odorata* (hagonoy), *Clitorea ternatea* (pukinggan), *Peperomia pellucida* (pansit-pansitan/olasiman-ihalas), *Eclipta alba* (tinta-tintahan), *Paspalum conjugatum* (laau-laau/T-grass) are also common.

Densely covering the wastelands are *Murdannia nudiflora* (alikbangon-lalaki), *Mimosa pudica* (makahiya), *Urena lobata* (kulut-kulutan), *Aneilema malabaricus* (bangal), *Alocasia macrorhiza* (biga/elephant's ear), *Chloris barbata* (koroskorosan), and *Hyptis capital* (botonesan).

Enumerated in **Table 9.5.4-4** are the various grass, weeds, shrubs, and herbs species encountered in the study area.

TABLE 9.5.4-4 LIST OF SHRUB, HERB, GRASS, AND SEDGE SPECIES IDENTIFIED IN THE STUDY AREA

Common Name	Scientific Name	Family Name	Habit
Alikbangon-lalaki	*Murdannia nudiflora*	Commelinaceae	Herb
Alinang	*Cyperus iria*	Cyperaceae	Sedge
Apuy-apuyan	*Cleome gynandra*	Capparidaceae	Herb
Baki-Baki	*Cyperus difflormis*	Cyperaceae	Sedge
Bakwit	*Eriochloa procera*	Gramineae	Grass
Bangal	*Aneilema malabaricum*	Commelinaceae	Herb
Botonesan	*Hyptis capitana*	Labiatae	Herb
Botonsilyo or Borobotones	*Cyperus kyllingia*	Cyperaceae	Sedge
Botonsilyong Gapang	*Gomphrena celosioides*	Amaranthaceae	Herb
Bulang	*Echinochloa colonum*	Gramineae	Grass
Buntot pusa	*Pennisetum polystachyon*	Gramineae	Grass
Coronitas	*Lantana camara*	Verbenaceae	Shrub
Dampalit	*Sesuvium portulacastrum*	Aizoaceae	Herb
Dawa-Dawa	*Dawa-Dawa*	Gramineae	Grass
Golasiman	*Portulaca oleracea*	Portulacaceae	Herb
Hagonoy	*Chromolaena odorata*	Asteraceae	Shrub
Hangod	*Achyranthes aspera*	Amaranthaceae	Herb
Kalog-Kalog	*Crotalaria retusa*	Leguminasae	Shrub
Kastuli	*Abelmoschus moschatus*	Malvaceae	Herb
Kogon	*Imperata cylindrica*	Gramineae	Grass
Korokorosan	*Chloris barbata*	Gramineae	Grass
Kulut-kulutan	*Triumfetta bartramia*	Tiliaceae	Herb
Laau-Laau	*Paspalum conjugatum*	Gramineae	Grass
Lapnis	*Malachra capitata*	Malvaceae	Shrub
Makahiya	*Mimosa pudica*	Leguminosae	Herb
Makahiyang lalake	*Aeschynomene amerikana*	Leguminosae	Herb
Malbas	*Abutilon indicum*	Malvaceae	Shrub
Maraotong	*Acalypha indica*	Euphorbiaceae	Herb
Mutha	*Cyperus rotunda*	Cyperaceae	Sedge
Olasiman-Ihalas	*Peperomia pellucida*	Piperaceae	Herb
Nguad	*Bidens pilosa*	Compositae	Herb
Olasiman-Ihalas	*Peperomia pellucida*	Piperaceae	Herb
Polytrias	*Polytrias praemorsa*	Gramineae	Grass
Pukinggan	*Clitorea ternatea*	FAbaceae	Vine
Putokan	*Crotalaria quinquefolia*	Leguminosae	Herb
Sabilaw	*Cyanotis axillaris*	Commelinaceae	Herb
Sambong	*Blumea balsamifera*	Compositae	Shrub
Sampa-sampalukan	*Phyllanthus niruri*	Euphorbiaceae	Herb

Common Name	Scientific Name	Family Name	Habit
Seru walai	*Cleome rutidusperma*	Capparidaceae	Herb
Talahib	*Saccharum spontaneum*	Gramineae	Grass
Tayum	*Indigofera suffruticosa*	Leguminosae	Herb
Tayuman	*Indigofera hirsuta*	Leguminosae	Herb
Tikog	*Fimbrystilis globulosa*	Cyperaceae	Sedge
Tintatintahan	*Eclipta alba*	Compositae	Herb
Titonia or Tithonia	*Tithonia diversifolia*	Compositae	Shrub
Uray	*Amaranthus spinosus*	Amaranthaceae	Herb
Walis-walisan	*Sida acuta*	Malvaceae	Shrub

Source: As Observed by the EIA Study Team during Field Survey

Plate No. 11 An extensive grassland area to be traversed by the CALA Expressway alignment between Km 3+600–4+200 in Brgy. Tibig, Silang, Cavite.

Plate No. 12 Grasslands predominated by S. spontaneum (talahib) observed on both sides of Nuvali Road, Brgy. Timbao, Biñan City.

Cultivated Vegetation Type

Agricultural Type

Among the affected areas, Silang, Cavite represents the biggest agricultural expanse. The town is famous for producing the very sweet medium-sized **pineapple** (*Ananas comosus*) and the best tasting **robusta coffee** (*Coffea canephora*) in the whole Province of Cavite. Yellow and green corn (*Zea mays*) varieties are extensively cultivated in Silang, while palay (*Oryza sativa*) is planted merely in upland areas due to unavailability of irrigated farmlands. Yellow corn variety is the main raw material for animal feeds.

Commercial fruit trees such as papaya (*Carica papaya*), mango (*Mangifera indica*), banana (*Musa sapientum/Musa paradisiaca*), lanzones (*Lansium domesticum*), jackfruit (*Arthocarpus heterophylla*), rambutan (*Nephelium lappaceum*), and coconut (*Cocos nucifera*) are widely grown in the study area. C. papaya is widely grown in backyards and broader farmlands as it is considered as a profitable enterprise used in cosmetics and food preparation.

Root crops such as kamote/sweet potato (*Ipomea batatas*), kamoteng kahoy (*Manihot esculenta*), patatas (*Solanum tuberosum*), and peanut (*Atachis hypogaea*) are also cultivated in Silang. According to local accounts, *A. hypogaea* is planted in between cropping seasons to recover soil fertility.

Vegetables grown include okra (*Abelmoschus esculentus*), lettuce (*Lactuca sativa*), eggplant (*Solamun melongena*), tomato (*Lycopersicon esculentum*), and black pepper (*Piper nigrum*).

Cutflowers and ornamentals are generally grown throughout the Silang aside from agricultural produce. Anthurium (*Anthurium andraeanum*) and orchids (*Dendrobium sp.*) are the main cutflowers propagated.

Presented in **Table 9.5.4-5** is the list of fruit bearing trees identified in the study area.

TABLE 9.5.4-5 LIST OF FRUIT BEARING TREES IDENTIFIED IN THE STUDY AREA

Common Name	***Scientific Name***	**Family Name**
Anonang	*Cordia dichotoma*	Ehretiaceae
Aratiles	*Muntingia calabura*	Tiliaceae
Atis	*Annona squamosa*	Annonaceae
Avocado	*Persea americana*	Lauraceae
Balimbing	*Averrhoa caranbola*	Oxalidaceae
Bayabas	*Psidium Guajaba*	Myrtaceae
Cacao	*Theobroma cacao*	Sterculiaceae
Calamansi	*Citrus microcarpa*	Rutaceae
Camachile	*Pithecellobium dulce*	Leguminosae
Chestnut	*Castanea sp.*	Fagaceae
Chico	*Manilkara sapota*	Sapotaceae
Coconut/niyog	*Cocos nucifera*	Palmae
Dalandan	*Citrus aurantium*	Rutaceae
Duhat	*Sizigium Cumini*	Myrtaceae
Durian	*Durio zibethinus*	Malvaceae
Granda	*Punica granatum*	Punicaceae
Guyabano	*Annona muricata*	Annonaceae
Jackfruit	*Arthocarpus heterophylla*	Moraceae
Kaimito	*Chrysophyllum cainito*	Sapotaceae
Kamias	*Averrhoa bilimbi*	Oxalidaceae
Kasoi	*Anacardium occidantale*	Anacardiaceae
Lansones	*Lansium domesticum*	Meliaceae
Makopa	*Sizigium Samarangense*	Myrtaceae
Mandarin	*Citrus reticulata*	Rutaceae
Manga	*Mangiferia indica*	Anacardiaceae
Papaya	*Carica papaya*	Caricaceae

Common Name	*Scientific Name*	Family Name
Pomelo	*Citrus aurantium*	Rutaceae
Rambutan	*Nephelium lappaceum*	Rutaceae
Saging	*Musa coccinea*	Musaceae
Sampalok	*Tamarindus indica*	Leguminosae
Santol	*Sandoricum koetjape*	Meliaceae
Sineguelas	*Spondias purpurea*	Anacardiaceae
Tiesa	*Pouteria campechiana*	Sapotaceae

Source: As Observed by the EIA Study Team during Field Survey

Built-Up Type

Essentially, built-up vegetation as the term suggests is comprised mainly of ornamental plant species propagated in urban and settlement areas. Ornamental plants largely correspond to “garden plants” which are usually cultivated in gardens, front yards and backyards, and landscaping areas. Most commonly, ornamental garden plants are grown for the display of aesthetic features enjoyed by visitors and the public.

Characteristic of the built up vegetation in the study area is described by a wide variety of ornamental plants species. The landscaped frontages and periphery of the exclusive residential subdivisions along the proposed alignment augments the myriad of plants species present.

Vitex parviflora (molave) is fast becoming a popular ornamental tree. It is abundantly cultivated at the landscaped area of Verdana Homes alongside *Plumeria rubra* (white calachuchi) and *Jatropha pandurifolia* (Shanghai beauty). Accentuating the frontage area are *Sanseviera cylindrica* (spear plant), *Sanseviera trifasciata* (bow string hemp), *Cracaena reflex* (Song of India), and *Dracaena reflex* (Song Thailand). Well-trimmed *Cynodon dactylon* (bermuda grass) covers the ground like a carpet.

Mature stands of *Samanea saman* (acacia) lining the Nuvali Road in Brgy. Malamig, provide shade and relief from the scorching heat of the sun to the walking public in front of the Laguna Techno Park. Mixed stands of *Swietenia macrophylla* (large-leaved mahogany), *Swietenia mahogani* (common mahogany), and *Pterocarpus indicus subsp. indicus* (narra) were also observed.

Table 9.5.4-6 shows the list of ornamental plants observed in built up areas traversed by the alignment, while **Table 9.5.4-7** enumerates the ornamental trees identified.

TABLE 9.5.4-6 LIST OF ORNAMENTAL PLANTS SPECIES IDENTIFIED IN THE STUDY AREA (1/2)

Common Name	***Scientific Name***	**Family Name**	**Habit**
Adelfa	*Nerium oleander*	Apocynaceae	Shrub
Agave	*Agave franzosinii*	Agavaceae	Herb
Alocasia	*Alocasia sp.*	Araceae	Herb
Asparagus plant	*Asparagus densiflorus*	Liliaceae	Herb
Bandera Española	*Cannax generalis*	Cannaceae	Herb
Baston de San Jose	*Cordyline fruticosa*	Agavaceae	Shrub
Begonia	*Begonia coccinea*	Begoniaceae	Herb
Bignonia	*Tecoma stans*	Bignoniaceae	Shrub
Blood leaf	*Iresine herbstii*	Amaranthaceae	Herb
Blood lily	*Haemanthus multiflorus*	Amaryllidaceae	Herb
Bougainvillea	*Boungainvillea spectabilis*	Nyctaginaceae	Vine
Buntot tigre	*Sanseviera trifasciata*	Agavaceae	Herb
Calico plant	*Althernanthera ficoidea*	Amaranthaceae	Herb
Common dischidia	*Dischidia oiantha*	Asclepiadaceae	Shrub
Common spear plant	*Sanseviera cylindrica*	Agavaceae	Shrub
Corazon de Maria	*Caladium bicolor*	Araceae	Herb
Cucharita	*Althernanthera ficoidea*	Amaranthaceae	Herb
Dama de noche	*Cestrum nocturnun*	Solanaceae	Shrub
Dama de noche	*Cestrum nocturnun*	Solanaceae	Shrub
Dieffenbachia	*Dieffenbachia maculata*	Araceae	Herb
Doña Aurora	*Mussaenda Doña Aurora*	Rubiaceae	Shrub
Episcia	*Episcia cupreata*	Gesneriaceae	Shrub
False birds of paradise	*Heliconia bihai*	Heliconiaceae	Herb
False sisal	*Agave decipiens*	Agavaceae	Herb
Five fingers	*Schefflera odorata*	Araliaceae	Vine
Fortune plant	*Dracaena fragrans*	Agavaceae	Shrub
Gumamela	*Hibiscus rosa-sinensis*	Malvaceae	Shrub
Lobster claw	*Vriessea carinata*	Bromeliaceae	Herb
Lollipop plant	*Pachystachys lutea*	Acanthaceae	Shrub
Mauritius hemp	*Furcrarea foetida*	Agavaceae	Shrub
Mayana	*Coleus Blumei*	Labiatae/Lamiaceae	Herb
Monstera	*Monstera deliciosa*	Araceae	Vine
Moradong dilaw	*Pseuderanthemum reticulatom*	Acanthaceae	Shrub

Source: As Observed by the EIA Study Team during Field Survey

TABLE 9.5.4-6 LIST OF ORNAMENTAL PLANTS SPECIES IDENTIFIED IN THE STUDY AREA (2/2)

Common Name	***Scientific Name***	**Family Name**	**Habit**
Orchids	*Dendrobium sp.*	Orchidaceae	Herb
Painted drop-tongue	*Aglaonema crispum*	Araceae	Herb
Palawan	*Cyrtosperma merkusli*	Araceae	Herb
Panama hat plant	*Carludovica palmata*	Cyclanthaceae	Shrub
Pigeon berry/golden bush	*Duranta repens*	Verbenaceae	Shrub
Purple false eranthemum	*Pseuderanthemum atropurpureun*	Acanthaceae	Shrub
Rose	*Rosa*	Rosaceae	Herb
Sampaguita	*Jasmimum bifarium*	Oleaceae	Vine
San Francisco sp.	*Codiaeum variegatum*	Euphorbiaceae	Herb
Sanchezia	*Sanchezia speciosa*	Acanthaceae	Shrub
Santan	*Ixora chinensis*	Rubiaceae	Shrub
Sedang dahon	*Aglaonema commutatum*	Araceae	Shrub
Shrimp plant	*Justicia brandegeana*	Acanthaceae	Shrub
Song of India	*Cracaena reflex*	Agavaceae	Herb
Song of Jamaica	*Dracaena reflexa*	Agavaceae	Herb
Song of Thailand	*Dracaena reflexa*	Agavaceae	Herb
Spanish bayonet	*Yucca aloifolia*	Agavaceae	Shrub
Spider lily	*Crinum amabile*	Amaryllidaceae	Herb
Toothed philodendron	*Philodendron lacerum*	Araceae	Vine
Umbrella plant	*Cyperus alternifolius*	Cyperaceae	Shrub
Yellow-margined century plant	*Agave americana*	Agavaceae	Herb

Source: As Observed by the EIA Study Team during Field Survey

TABLE 9.5.4-7 LIST OF ORNAMENTAL TREES OBSERVED

Common Name	Scientific Name	Family Name
Acacia	*Samanea saman*	Leguminosae
Adelfa	*Nerium oleander*	Apocynaceae
African tulip	*Spathodea campanulata*	Bignoniacea
Agoho	*Casuarina equisetifolia*	Casuarinaceae
Banyan tree	*Ficus retusa*	Moraceae
Baobab	*Adansonia digitata*	Bombacaceae
Beach pandan	*Pandanus tectorius*	Pandanaceae
Begonia	*Begonia coccinea*	Begoniaceae
Benjamin's fig	*Ficus benjamin*	Moraceae
Bignonia	*Tecoma stans*	Bignoniaceae
Bo tree	*Ficus religiosa*	Moraceae
Bunga de China sp.	*Veitchia merrillii*	Palmae/Arecaceae
Caballero	*Caesalpinia pulcherrima*	Leguminosae
Campanilla	*Allamandra cathartica*	Apocynaceae
Caña fistula	*Cassia fistula*	Leguminosae
Common mahogany	*Swietenia mahogani*	Meliaceae
Dapdap	*Erythrina variegata*	Leguminosae
Dracaena	*Dracaena multiflora*	Agavaceae
Eucalyptus/blue gum tree	*Eucalyptus Blobulus*	Myrtaceae
Fire tree	*Delonix regia*	Leguminosae
Giant dracaena	*Cordyline australis*	Agavaceae
Indian tree	*Polyalthia longifolia*	Annonaceae
Japanese acacia	*Acacia auriculiformis*	Leguminosae
Juniper	*Junniperus communis*	Cuppressaceae
Kalatsutsing-puti	*Plumeria obtusa*	Apocynaceae
Karmay	*Phyllanthus acidus*	Euphorbiaceae
Large-leaved mahogany	*Swietenia macrophylla*	Meliaceae
Licuala	*Licuala spinosa*	Palmae
Lipstick palm	*Cyrtostachys renda*	Palmae/Arecaceae
Mac Arthurs' palm	*Ptychosperma macarthur*	Palmae/Arecaceae
Maluko	*Pisonia alba*	Nyctaginaceae
Mangium	*Acacia mangium*	Leguminosae
Narra	*Pterocarpus indicus subsp. indicus*	Leguminosae
Neem tree	*Azidarachta indica*	Meliaceae
Octopus tree	*Brassaia actinophylla*	Araliaceae
Oliva	*Cycas revoluta*	Cycacaceae
Panama rubber tree	*Castilla elastica*	Moraceae
Pitogo	*Cycas circinalis*	Cycadaceae
Rainbow tree	*Dracaena margarita*	Agavaceae
Shanghai beauty	*Jatropha pandurifolia*	Euphorbiaceae
Thailand shower/Siamese acacia	*Cassia siamea*	Leguminoseae
Traveler's tree	*Ravenala madagascariensis*	Sterculiaceae
Yellow bell	*Allamanda cathartica*	Apocynaceae

Source: As Observed by the EIA Study Team during Field Survey

2) Terrestrial Wildlife Fauna (Animals)

The existing terrestrial fauna in the area is classified into **two** (**2**) major groups, **Avifauna** (birds) and **domesticated animals**. Further discussion on the fauna groups is presented in the succeeding section.

Avifauna (Birds)

The study area is typical of a disturbed wildlife habitat. Forest areas that will provide habitat to fauna species no longer exist. As discussed previously, species diversity of the remaining vegetation covers which are commonly converged on ravines and edges of rivers and creeks or in scattered patches is poor.

This being the case, comprehensive study on the existing terrestrial fauna was not undertaken. Instead, documentation of the wildlife fauna was based primarily on actual sightings, focusing mainly on avifauna (birds), since this is the only fauna group most likely to be affected by the project. Species encountered were identified and validated using descriptive and photographic handbook guide on Philippine birds.

Majority of the birds encountered are species commonly found in urban, agricultural, and grassland areas, the most common of which is the Eurasian tree sparrow (*Passer montanus*). This species is believed to have been introduced to the country from China during the 1930s. Species associated with *P. montanus* that were identified in the area include yellow-vented bulbul (*Pycnonotus goiavier*), long-tailed shrike (*Lanius schach*), glossy swiftlet (*Collocalia esculenta*), and pied fantail (*Rhipidura javanica*).

Other birds species observed are zebra dove (*Geopelia striata*), barred-button quail (*Turnix suscitator*), barred rail (*Gallirallus torquatus*), lesser coucal (*Centropus bengalensis*), brown shrike (*Lanius cristatus*), chestnut munia (*Lonchura malacca*), white-breasted wood swallow (*Artamus leucorynchus*), cattle egret (*Bubulcus ibis*), and striated grassbird (*Megalurus palustris*).

Sighting of olive-backed sunbird (*Cinnyris jugularis*), crested myna (*Acridotheres cristatellus*), white-collared kingfisher (*Halcyon chloris*), black-naped oriole (*Oriolus chinensis*), large-billed crow (*Corvus macrorhychos*) were likewise documented.
Interview with the locals revealed that **two** (**2**) species of owls are present in the study area. These are the Philippine endemic scops owl (*Otus megalotis*) and grass owl (*Tyto longimembris*).

It was not established if significant bird activities such as mating, roosting, and nesting are performed in the study area. Evidently, the existing flora species do not offer sufficient food value to the birds keeping the diversity range at the minimum. Thus, bird species from nearby protected forest areas like the Mt. Makiling National Park is

not expected to migrate in the study area.

During the field survey, there are no threatened, endangered, and/or vulnerable species encountered.

<u>*Domesticated Animals*</u>

Perhaps, dog (*Canis lupus familiaris*) is the first animal to be domesticated and has been the most widely kept working, hunting, and companion animal in human history. It is also considered to be the most popular pet in the world. Like the dog, domestic cats or house cats (*Felis silvestris catus*) are highly valued by humans for companionship. Its ability to hunt vermin such as rats, mice, and cockroaches make these small furry felines a more beneficial household pet.

Cattles or more popularly known as cows (*Bos primigenus*) are merely left to graze in open wastelands and are not bred for its commercial livestock value and dairy products but to assist farmers in agricultural works. Carabao (*Bubalus bubalis carabanesis*) which is one of the popular members of the farm animals is a great help to farmers in pulling both a plow and the cart used to haul produce.

Chicken (*Gallus gallus domesticus*) is one of the common and widespread domestic animals raised in the area aside from pig/hog (*Sus domesticus*). Small scale poultry farming is seen in Brgy. Sabutan and Tibig in Silang, Cavite. Chickens are raised not only as a source of meat but also of eggs. Backyard gamecocks or fighting cocks breeding is also observed.

Roosters and hens (*Gallus gallus*) are often seen wandering around scrabbling for food even after the owners have just fed them. As a member of farm animals, native hens (female) in the area are bred for sustenance, whose meat has been known to be tastier than the commercial breed.

Domestic goat (*Capra aegagrus hircus*) is a subspecies of goat domesticated from the wild goat of southwest Asia and Eastern Europe. It is a member of the family Bovidae and is closely related to the sheep as both are in the goat-antelope subfamily Caprinae. In the project area, goats are usually kept for sustenance or up to some extent for commercial purposes.

Pigeon fanciers in the area keep domestic pigeons simply for recreation. Though pigeon flying is not a popular sport, breeding of pigeons (*Columba livia f. domestica*) merely provide the breeders with some form of enjoyment. Trained domestic pigeons which are common in the study area are able to return to their home loft if released at a location that they have never visited before and that may be up to 1,000 km away.

(6) Loss of Green (Planting Trees to Offset GHG Emissions from the CALAX Expressway Construction)

Baseline and the assumptions employed

Proposed alignment has a length of 17km, and traverses an area of mixed land use - agricultural ecosystems, industrial commercial/residential development and underdeveloped barren land. In view of standing stocks (biomass) and associated carbon-sequestration capacities, the alignment's environment is characterized by four unique sections as shown below **Table 9.5.4-8**.

TABLE 9.5.4-8 A BASELINE BIOMASS STOCK AND GHG (CO2) REMOVAL BY SECTIONS

Section (Distance from Silang) West-to-east	A. Types of Vegetation - Biomass Stock	B. Average Above-ground Existing Carbon Stock		C. Average Annual GHG (CO2) Removal Capacity (ton-dry matter/ha/Year)
		ton-dry matter/ha	ton-Carbon/ ha	
0 km -6 km	Agricultural Ecosystems – Cultivating Crops	32	14	3.0
6 km- 11 km	Shrubs along the banks of steep-slope creeks	65	29	3.0
11 km- 15 km	Built-up Area	0	0	0.0
15 km -17 km	Shrubs and grassland	29	13	1.0

Source: Lasco, R.D. and F.B. Pulhin, 2003: Philippine forest ecosystems and climate change: Carbon stocks, rate of sequestration and the Kyoto Protocol. Annals of Tropical Research, 25(2), 37-51.

Since this exercise is not intended to pursue rigorous A/R – CDM type of carbon credit, but to obtain a rudimentary assessment to see necessary acreages of planting trees to offset carbon sequestration loss due to CALAX expressway construction. For the sake of simplicity in obtaining first-hand assessment, the carbon stock of below-ground nor leakage effects are not counted.

For the purpose of estimating the spatial extent of natural green cover lost permanently by CALAX construction, it is assumed that only a space of 17km length by 20 m width is to be occupied by the structure of expressway and its peripheral supporting facilities including pavement surface, viaducts and drains. Therefore, a strip of 34 ha (20 m x 17,000 m) along the whole length of the alignment is assumed to lose its green cover, including the existing above-ground biomass of standing stock (column B in the above **Table 9.5.4-8**), and expected annual photo synthesis capacity (column C in the above **Table 9.5.4-8**), over the assessment period.

The carbon-offset assessment was conducted upto the 14th year since initial seedling, when net cumulative GHG removal more than offsets the cumulative annual loss in GHG sequestration. In our case, it is supposed to be the 8th year since initial seedling is planted.

Firstly, the loss of standing stock (biomass), above-the-ground, is estimated by applying section-wise carbon stock (column B) by identified types of land cover (column A), multiplied by the length of section (leftmost column) in the above table. The one-time loss of biomass is estimated to be 510 t-Carbon or 1,866 t-CO2 for the entire strip of 34 ha, due to construction and occupation by expressway and its peripheral supporting infrastructure.

Secondly, it is estimated that the loss of carbon absorption capacity, or GHG removal, to be expected if photosynthesis plants are alive, amounts to 115 t-CO2 annually, derived from carbon sequestration capacity (column C) of respective vegetation types of the **Table 9.5.4-8**.

In sum, the annual carbon sequestration loss thus estimated is shown in the columns B1 and B2 in the **Table 9.5.4-9**. These data serves as the baseline in assessing net GHG removal by compensation planting.

Necessary Years and Required Planting Area for Carbon Offset

In choosing most relevant and trustworthy data of carbon sequestration by plant species, indigenous to the Southern Luzon, a reference is made to the Laguna Lake Development Authority (LLDA)'s pilot small-scale carbon-shed scheme (a type of "A/R CDM"), experimented to recover forest at degraded grasslands in the Laguna lake Basin. The scheme is implemented in compliance with the "Revised Simplified Baseline and Monitoring Methodologies for Selected Small-Scale Afforestation and Reforestation Project Activities under the Clean Development Mechanism. AR-AMS0001/Version 04" of IPCC GPG for LULUCF.

The above LLDA's carbonshed experiment gives a relationship of plant growth rate versus elapsed years since initial planting seedlings, showing Mean Annual Increments (MAI) over the years in terms of t-CO2/ha. The figures in the column A of **Table 9.5.4-9** are adopted from the above LLDA carbonshed experiment. They represent a composite of carbon sequestration capacity of various Luzon indigenous species – counting more than 30 such species, including Narra (Pterocarpus indicus), Dao (Dracontomelon dao), and Ipil (Instia bijuga) - deployed by the scheme implemented by LLDA at the Laguna Province.

Two cases of different acreage of planting trees – 34ha (C: the Base case) and 20 ha (D: Reduced Planting Area Case) - respectively are selected to see relative efficacy of planting trees in offsetting lost amount of carbon sequestration. The results are shown in the columns C and D of **Table 9.5.4-9.** It is observed, while the Base case C gives a shorter period of 4 years to offset, the **Case D with a narrower planting area** gives longer years of 8 years to achieve similar amount of GHG removal.

TABLE 9.5.4-9 ESTIMATED NET GHG (CO_2) REMOVALS BY PLANTING FAST-GROWING LUZON-ENDEMIC SPECIES

Years lapsed since planting seedlings	**A.** Trend of Mean Annual Increments (tonnes of CO2/ha) by planting a mix of indigenous plant species over a period of seedling to maturity Source: Annual estimation of net anthropogenic GHG removals by sinks, the Laguna de Bay Community Carbon Finance Project (LCCFP), an initiative by LLDA, Philippines (CDM-SSC-AR-PDD) Version 4- in effect as of 2007 (t-CO2/ha)	**B1.** Loss of the above-ground Biomass by the expressway and peripheral infrastructure. In equivalent of t-CO2	**B2.** Loss of potential CO2 absorption capacity due to lost green cover of 34 ha by constructing an expressway and peripheral infrastructure, transforming an area of 17km x 20m into an non-vegetated space (t-CO2 /year)	**C.** Base Case (Planting Trees: 34 ha)			**D.** Case (Planting Trees: 20 ha)	
				C1 = A x 34	**C2** = C1 - B	**C3 = ∑C2**	**D2**	**D3 = ∑C2**
				C1. CO2 Absorption by planting trees over an area of 34ha (t-CO2/Year)	**C2.** Net Annual CO2 Removal (t-CO2/Year)	**C3.** Cumulative CO2 Absorption (t-CO2)	**D2.** Net Annual CO2 Absorption (t-CO2/Year)	**D3.** Cumulative Net CO2 Absorption (t-CO2)
The 1st year	0	1,866	115	0	-1,866	-1,866	-1,866	-1,866
The 2nd year	11.2	0	115	381	266	-1,600	109	-1,757
The 3rd year	21.3	0	115	724	609	-991	311	-1,446
The 4th year	21.3	0	115	724	609	-382	311	-1,135
The 5th year	21.3	0	115	724	609	227	311	-824
The 6th year	21.3	0	115	724	609	837	311	-513
The 7th year	21.3	0	115	724	609	1,446	311	-202
The 8th year	21.3	0	115	724	609	2,055	311	109
The 9th year	21.3	0	115	724	609	2,664	311	420
The 10th year	21.3	0	115	724	609	3,273	311	731
The 11th year	21.3	0	115	724	609	3,883	311	1,042
The 12th year	21.3	0	115	724	609	4,492	311	1,353
The 13th year	21.3	0	115	724	609	5,101	311	1,664
The 14th year	21.3	0	115	724	609	5,710	311	1,975

Note: Green shade indicates commencing years when net cumulative GHG (CO2) removal turns positive.

9.5.4.2 The Water

(1) River Systems

There are three (3) main river systems draining the area traversed by the alignment. These are the: (i) *Malaking Ilog River*, (ii) *Lumbia River*, and (iii) *Malindig River*. Malaking Ilog is an almost N-S trending, steeply incised river with upstream portions draining the Tagaytay highlands, into the downstream catchment areas in GMA, Cavite. Lumbia and Malindig are being fed by numerous tributaries, and drain the hilly areas of Silang from the southwest, into the lowland areas of Sta. Rosa and Biñan, on the northeast.

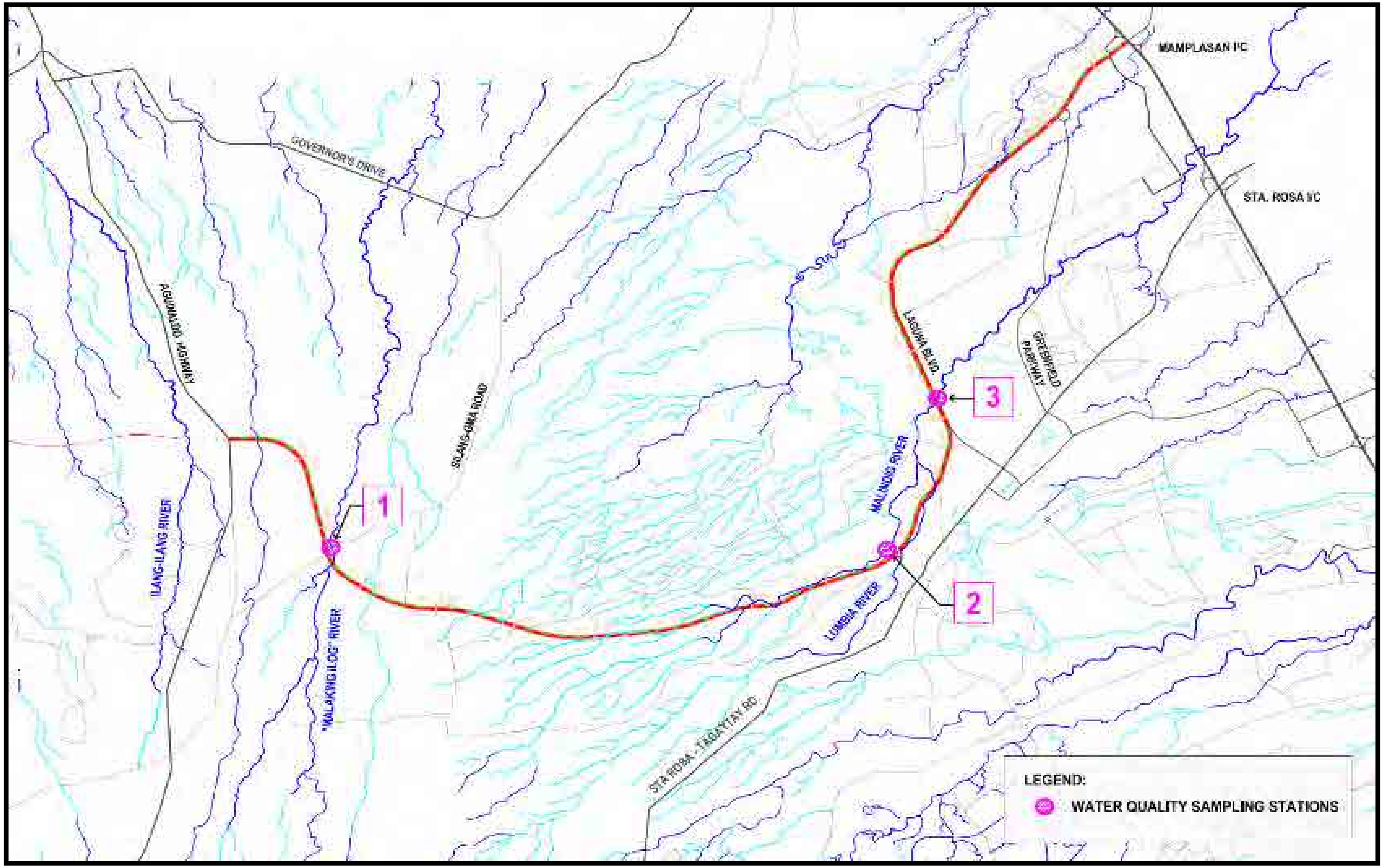
(2) Water Quality

Baseline water quality sampling was undertaken at **three** (**3**) selected rivers crossed by the proposed CALA Expressway alignment to establish the physico- chemical properties of the waterways that may be affected by the project. Water sampling Sta. 1, Malaking Ilog River is located in Brgy. Sabutan, silang, Cavite. Sampling Sta. 2, Lumbia River is located in Santo Domingo, Santa Rosa City, Laguna, and the third sampling station, Sta. 3 Malindig River is sited in under the bridge along Laguna Blvd. separating the Cities of Santa Rosa and Biñan. **Figure 9.5.4-10** shows the location of the water sampling sites.

Laboratory results showed in **Table 9.5.4-10** that the detected Total Coliform content from **all water samples exceeded** the DENR Standard of **5,000 MPN/100 ml**. Among the samples, the one obtained from the Malindig River exhibits the highest coliform content of **160,000 MPN/100 ml**. This followed by the sample from Lumbia River with **24, 000 MPN/100 ml**. The least amount was measured from the sample collected from Malaking Ilog River (**17, 000 MPN/100 ml**). Some of the known sources of coliform bacteria include agricultural run-off, effluent from septic systems sewage discharge, and infiltration of domestic animal fecal matter.

All water samples contain the same amount of lead. The value detected is **less than 0.01 mg/L**, and is well within standard limit of **not more than 0.05 mg/L**. Dissolved oxygen (DO) levels measured ranged from **6.2-7.7 mg/L**. These values are within the required DENR Standard of not less than **5.0 mg/L**. The observed total suspended solids (TSS) levels of the samples is between **4.5-10.2 mg/L**, while the 5-day day BOD range is **1.1-2.2 mg/L**. Conductivity at 25°C varies between **314 µ/cm** to **370 µ/cm**.

Physically, the rivers are clear and water is freely flowing. The pH level range is between **6.9-8.0**, which is within the desirable limit to provide protection for the life of freshwater fish and bottom dwelling invertebrates. Water temperature of Lumbia River (**28°C**) is relatively warmer compared to the Malaking Ilog and Lumbia Rivers (**23°C** and **24°C**, respectively). The disparity is probably due to the difference in the time of sampling.



Source: JICA Study Team (2012)

FIGURE 9.5.4-10 WATER QUALITY SAMPLING SITES ALONG THE PROPOSED CALA EXPRESSWAY ALIGNMENT

TABLE 9.5.4-10 PHYSICO-CHEMICAL PROPERTIES OF SELECTED WATERWAYS ALONG THE PROPOSED CALA EXPRESSWAY

Sampling Station & Location	**Date & Time of Sampling**	**Geographic Coordinates**	**Parameters**								
			pH	**Temp (°C)**	**Turbidity**	**TSS (mg/L)**	**Lead (mg/L)**	**Total Coliform**	**Dissolved Oxygen**	**5-Day 20°C BOD**	**Conductivity @ 25°C**
Sta.1 Malaking Ilog River, (Brgy. Kaong, Silang, Cavite)	19 Jan. 2012 11:58	N 14°14’35” E120°59’09.5”	8.0	23	Clear	4.5	< 0.01	**17,000 MPN/ 100 mL**	7.7 mg/L	1.1 mg/L	314 μs/cm
Sta. 2 Lumbia River (Brgy. Sto. Domingo, Sta. Rosa City, Laguna)	19 Jan. 2012 13:49	N 14°14’20.3” E120°02’59.9”	7.6	28	Clear	10.2	< 0.01	**24,000 MPN/ 100 mL**	7.3 mg/L	1.3 mg/L	356 μ/cm
Sta.3 Malindig River (Bridge along Laguna Blvd. Boundary of Biñan & Sta. Rosa Cities)	27 Jan. 2012 10:40	N 14°15’45.6” E121°03’17.2”	6.9	24	Clear	9.8	< 0.01	**160,000 MPN/ 100 mL**	6.2 mg/L	2.2 mg/L	370 μ/cm
DENR Standards for Class “C” Waters			**6.5 - 8.5**	**Max. 3°C increase**		**Not more than 30 mg/L increase**	**0.05**	**5,000 MPN/ 100 mL**	**Not less than 5.0 mg/L**	**Not more than 20 mg/L increase**	**–**

☐ Exceeds DENR Standard (DAO 34)

(3) River Resort Areas Along the Project Area

There are three (3) river resort areas and one hotel along the project area as shown in **Figure 9.5.4-11** and **Figure 9.5.4-13**.

Impact of CALAX construction can be summarized as follows;

1) Malaking Ilog Resort

This resort is operated during dry (summer)seasons. Access to the site is made through gravel road which branches off from Silang-GMA/Carmona Road and a foot path. Eventhough CALAX is constructed, access is still maintained as is at present.

Construction of CALAX should be carefully done to minimize excavated soils and other materials to fall into the river and not to aggravate water quality.

2) Fresh Water Resort

This resort is operated during dry (summer) seasons. Access to the site is made through a foot path from Silang-GMA/Carmona Road. Eventhough CALAX is constructed, access is still maintained as is at present.

Construction of CALAX should be carefully done to minimize excavated soils and other materials to fall into the river and not to aggravate water quality.

3) Carmen Resort

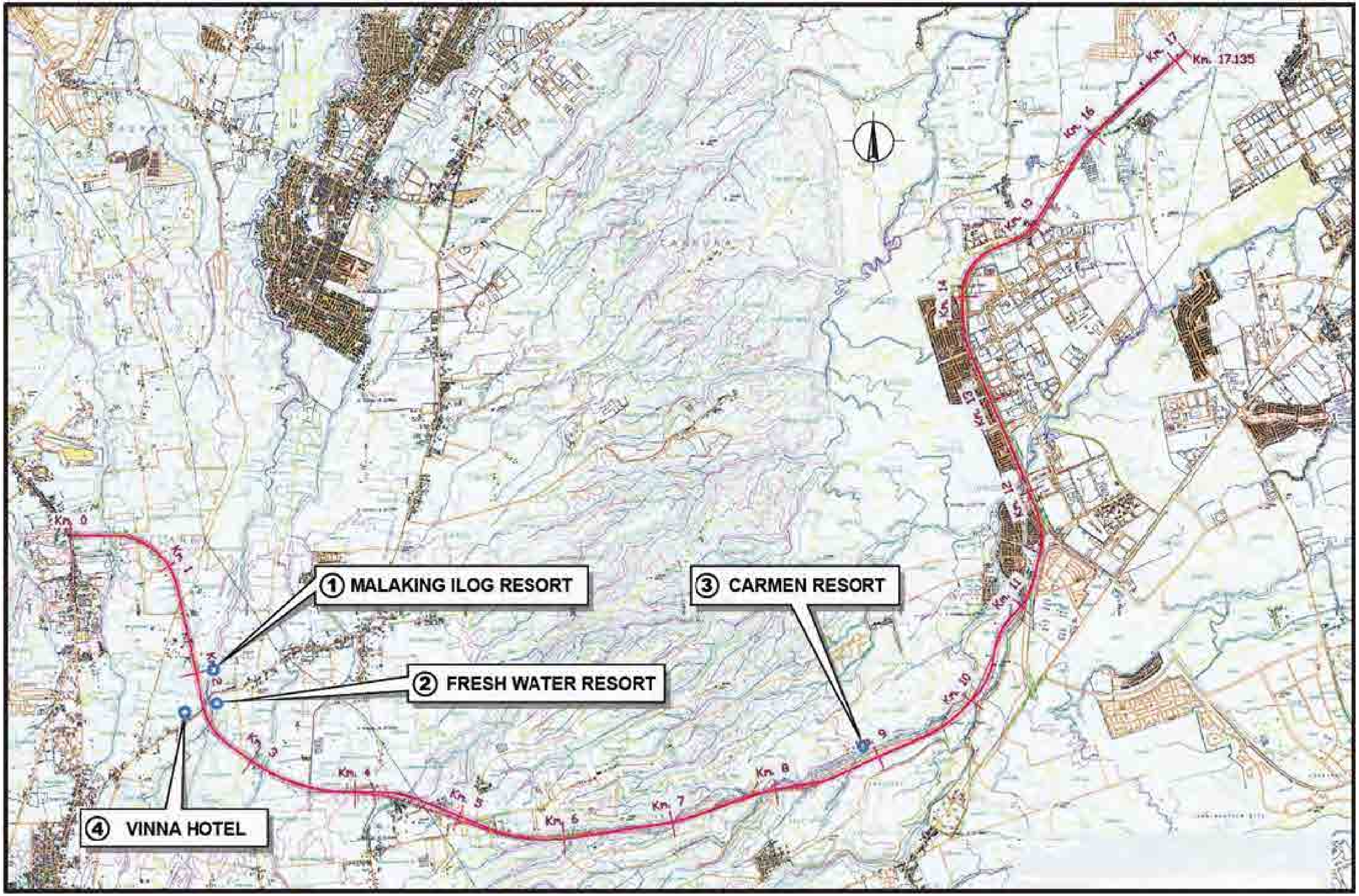
This resort is operated during dry (summer) seasons. Access is made from the existing gravel barangay road by walking on the corn field.

To maintain the same level of accessibility as today, Box Culvert should be constructed under CALAX.

Although the location is far from the expressway, construction of CALAX should be carefully done to minimize excavated soils and other materials to fall into the river and not to aggravatewater quality.

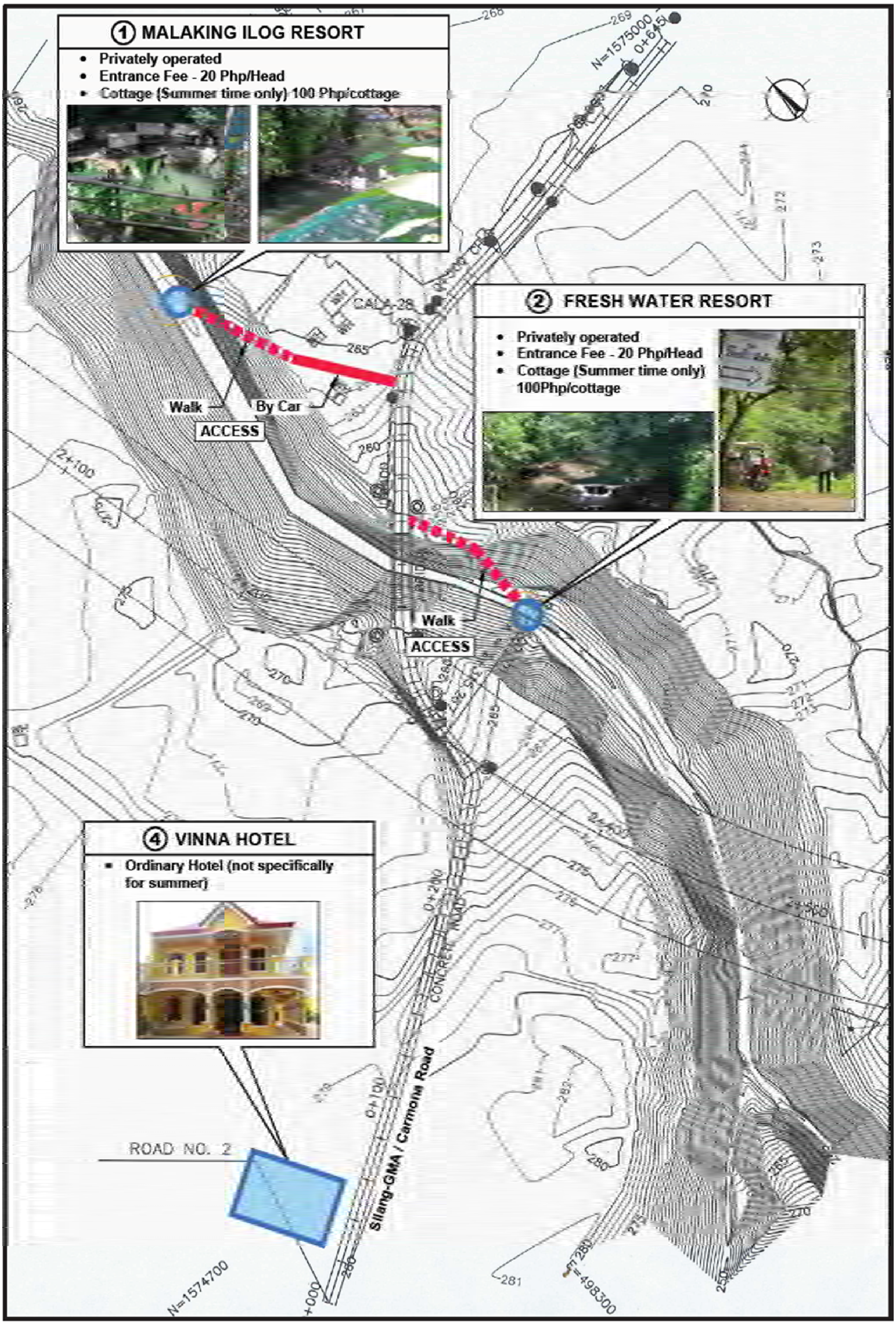
4) Vinna Hotel

This is an ordinary hotel and not specifically used for summer resort. It is located along Silang-GMA/Carmona Road and about 250 meters away from CALAX.



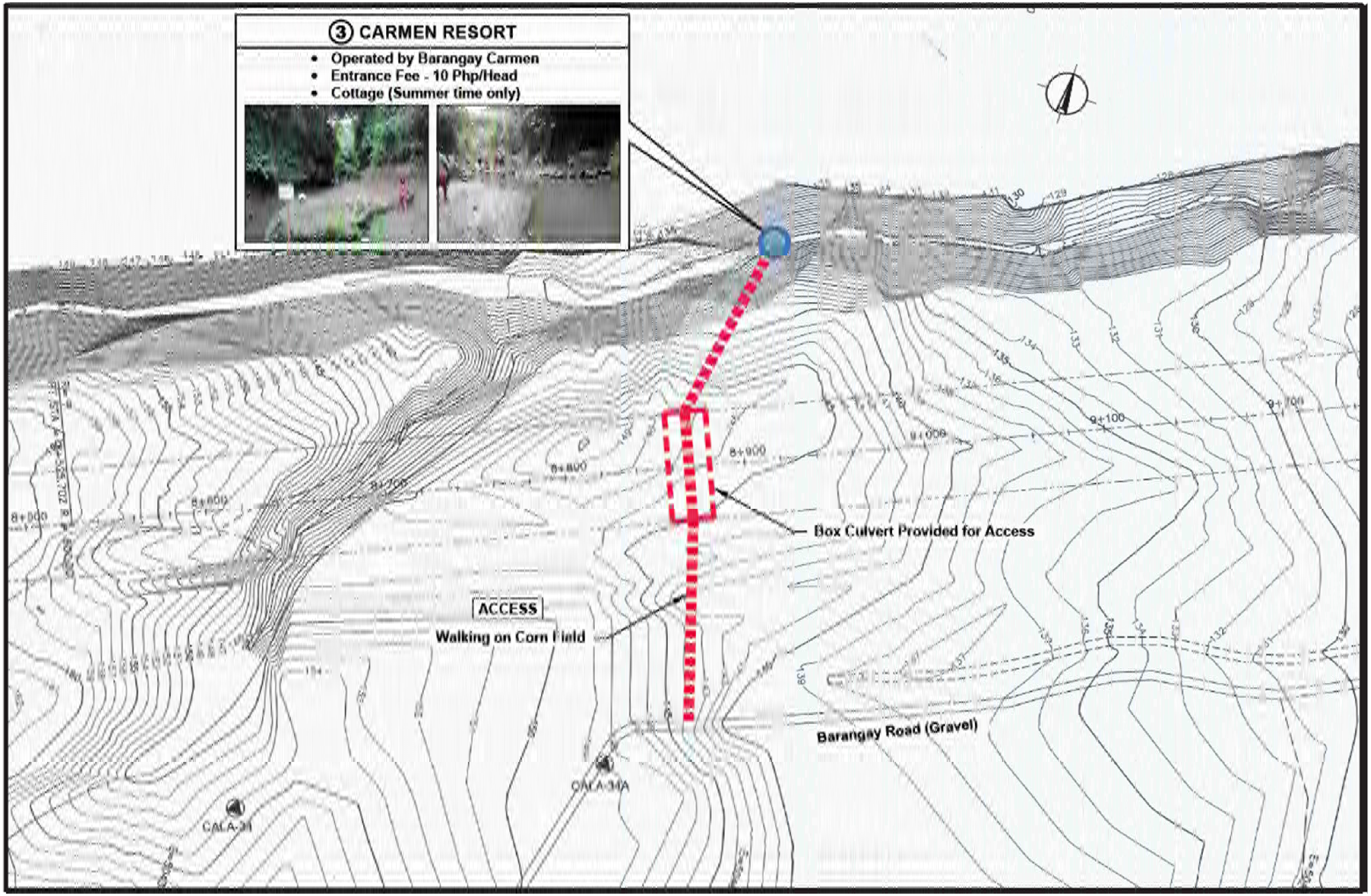
Source: JICA Study Team (2012)

FIGURE 9.5.4-11 LOCATION OF RIVER RESORT AREAS



Source: JICA Study Team (2012)

FIGURE 9.5.4-12 DETAILED LOCATION OF RIVER RESORT AREA



Source: JICA Study Team (2012)

FIGURE 9.5.4-13 LOCATION OF RIVER RESORT AREAS

(4) River Use

To determine the stakeholders' dependency on rivers found in the project area, several questions were included in the survey of **195** stakeholders[1]. Specifically they were asked the following questions:

- If they wash their clothes in the river;
- If they have laundry business utilizing the river;
- If they bathe in the river; and
- If they engage in fishing in the river

Presented in **Table 9.5.4-11** are the results of the survey pertaining to river use. As shown in **Table 9.5.4-12**, only **22 out of 195**, or **11%** are using the river for washing clothes.

TABLE 9.5.4-11 USE OF RIVER FOR WASHING CLOTHES (1 OF 2)

City/Municipality/Barangay/Respondents			**Yes**	**No**	**Total**
Type A Respondents – Residential Sector					
Silang, Cavite	Sabutan		6	8	14
	Kaong		0	2	2
	Tibig		6	5	11
Binan, Laguna	Timbao		0	5	5
Total Type A Respondents – Residential Sector		Count	12	20	32
		% for Type A Respondents	38%	63%	100%
Type B Respondents – Agricultural Farmland Sector					
Silang, Cavite	Sabutan		1	5	6
	Kaong		0	2	2
	Tibig		0	7	7
	Carmen		1	15	16
Total Type B Respondents – Agricultural Farmland Sector		Count	2	29	31
		% for Type B Respondents	6%	94%	100%

Source: JICA Study Team (2012)

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[1] Interviewed stakeholders consist of: (i) **32** Type A respondents (residential structure owners); (ii) **31** Type B respondents (PAPs at farm lands); and (iii) **132** Type C respondents (indirectly affected respondents from residential, business, youth, transportation, senior, NGO/POs sectors)

TABLE 9.5.4-12 USE OF RIVER FOR WASHING CLOTHES (2 OF 2)

City/Municipality/Barangay/Respondents		Yes	No	Total
Type C Respondents - Secondary Impact Areas				
Type of Respondent	Residential Sector	0	35	35
	Business Sector	4	25	29
	Youth Sector	1	18	19
	Transportation Sector	1	20	21
	Aged Sector	2	19	21
	NGO/PO/ Homeowners Association/Agricultural Cooperative	0	10	10
Total Type C Respondents - Secondary Impact Areas	Count	8	124	132
	% within Type of Respondent	6%	94%	100%
Grand Total of Type A, B & C	**Count**	**22**	**173**	**195**
	% to Total	**11%**	**89%**	**100%**

Source: JICA Study Team (2012)

It can be discerned from **Table 9.5.4-13** that in terms of use of the river for laundry business, only **10 out of 195**, or **10%** are using the river for their laundry business.

TABLE 9.5.4-13 USE OF RIVER FOR LAUNDRY BUSINESS (1 OF 2)

CityMunicipality/Barangay/Respondents		Yes	No	Total
Type A Respondents - Residential Sector				
Silang, Cavite	Sabutan	4	10	14
	Kaong	0	2	2
	Tibig	4	7	11
Binan, Laguna	Timbao	0	5	5
Total Type A	Count	8	24	32
	% within Barangay	25%	75%	100%
Type B Respondents - Agricultural Farmland Sector				
Silang, Cavite	Sabutan	1	5	6
	Kaong	0	2	2
	Tibig	0	7	7
	Carmen	0	16	16
Total Type B Respondents - Agricultural Farmland Sector	Count	1	30	31
	% within Barangay	3%	97%	100%

Source: JICA Study Team (2012)

TABLE 9.5.4-14 USE OF RIVER FOR LAUNDRY BUSINESS (2 OF 2)

CityMunicipality/Barangay/Respondents			Yes	No	Total
Type C Respondents - Secondary Impact Areas					
Type of Respondent	Residential Sector		0	35	35
	Business Sector		1	28	29
	Youth Sector		0	19	19
	Transportation Sector		0	21	21
	Aged Sector		0	21	21
	NGO/PO/Homeowners Association/Agricultural Cooperative		0	10	10
Total Type C Respondents - Secondary Impact Areas		Count	1	131	132
		% within Type of Respondent	1%	99%	100%
Grand Total of Type A, B and C		**Count**	**10**	**185**	**195**
		% to Total	**5%**	**95%**	**100%**

Source: JICA Study Team (2012)

When asked if they bathe in the river, **28 out of 195**, or **14%** said “Yes”. It is interesting to note that majority of these are those from Type A (Residential Sector) respondents, particularly from Brgy. Sabutan (Please refer to **Table 9.5.4-15**).

TABLE 9.5.4-15 USE OF RIVER FOR BATHING (1 OF 2)

CityMunicipality/Barangay/Respondents			Yes	No	Total
Type A Respondents - Residential Sector					
Silang, Cavite	Sabutan		9	5	14
	Kaong		0	2	2
	Tibig		4	7	11
Binan, Laguna	Timbao		0	5	5
Total Type A		Count	13	19	32
		% within Barangay	41%	59%	100%
Type B Respondents - Agricultural Farmland Sector					
Silang, Cavite	Sabutan		1	5	6
	Kaong		0	2	2
	Tibig		2	5	7
	Carmen		6	10	16
Total Type B Respondents - Agricultural Farmland Sector		Count	9	22	31
		% within Barangay	29%	71%	100%

Source: JICA Study Team (2012)

TABLE 9.5.4-16 USE OF RIVER FOR BATHING (2 OF 2)

CityMunicipality/Barangay/Respondents		**Yes**	**No**	**Total**
Type C Respondents - Secondary Impact Areas				
Type of Respondent	Residential Sector	0	35	35
	Business Sector	3	26	29
	Youth Sector	0	19	19
	Transportation Sector	2	19	21
	Aged Sector	1	20	21
	NGO/PO/Homeowners Association/Agricultural Cooperative	0	10	10
Total Type C Respondents - Secondary Impact Areas	Count	6	126	132
	% within Type of Respondent	4%	96%	100%
Grand Total of Type A, B and C	**Count**	**28**	**167**	**195**
	% to Total	**14%**	**86%**	**100%**

Source: JICA Study Team (2012)

Table 9.5.4-17 shows that among all the respondents, the directly impacted show higher percentage of people fishing on the river with **28%** (9 out of 32) and **26%** (8 out of 31)for **Type A** and **Type B**, respectively, compared to only **4%** (6 out of 132) of those who are indirectly affected, **Type C.**

TABLE 9.5.4-17 USE OF RIVER FOR FISHING (1 OF 2)

City/Municipality/Barangay/Respondents		**Yes**	**No**	**Total**
Type A Respondents - Residential Sector				
Silang, Cavite	Sabutan	5	9	14
	Kaong	0	2	2
	Tibig	4	7	11
Binan, Laguna	Timbao	0	5	5
Total Type A Respondents - Residential Sector	Count	9	23	32
	% within Barangay	28%	72%	100%
Type B Respondents – Agricultural Farmland Sector				
Barangay	Sabutan	1	5	6
	Kaong	0	2	2
	Tibig	2	5	7
	Carmen	5	11	16
Total Type B Respondents - Agricultural Farmland Sector	Count	8	23	31
	% within Barangay	26%	74%	100%

Source: JICA Study Team (2012)

TABLE 9.5.4-18 USE OF RIVER FOR FISHING (2 OF 2)

City/Municipality/Barangay/Respondents		Yes	No	Total
Type C Respondents - Secondary Impact Areas				
Type of Respondent	Residential Sector	2	33	35
	Business Sector	1	28	29
	Youth Sector	0	19	19
	Transportation Sector	2	19	21
	Aged Sector	0	21	21
	NGO/PO/Homeowners Association/Agricultural Cooperative	1	9	10
Total Type C Respondents - Secondary Impact Areas	Count	6	126	132
	% within Type of Respondent	4%	96%	100%
Grand Total of Type A, B and C	**Count**	**23**	**172**	**195**
	%	**12%**	**88%**	**100%**

Source: JICA Study Team (2012)

When asked if they utilize the river for crossing from one bank to the other side, all respondents replied “No”. Please refer to **Table 9.5.4-19** below for details.

TABLE 9.5.4-19 USE OF RIVER FOR CROSSING TO OTHER SIDE (1 OF 2)

City/Municipality/Barangay/Respondents		Yes	No	Total
Type A Respondents - Residential Sector				
Silang, Cavite	Sabutan	0	14	14
	Kaong	0	2	2
	Tibig	0	11	11
Binan, Laguna	Timbao	0	5	5
Total Type A Respondents - Residential Sector	Count	0	32	32
	% within Barangay	0%	100%	100%
Type B Respondents – Agricultural Farmland Sector				
Barangay	Sabutan	0	6	6
	Kaong	0	2	2
	Tibig	0	7	7
	Carmen	0	16	16
Total Type B Respondents - Agricultural Farmland Sector	Count	0	31	31
	% within Barangay	0%	100%	100%

Source: JICA Study Team (2012)

TABLE 9.5.4-20 USE OF RIVER FOR CROSSING TO OTHER SIDE (2 OF 2)

City/Municipality/Barangay/Respondents		Yes	No	Total
Type C Respondents - Secondary Impact Areas				
Type of Respondent	Residential Sector	0	35	35
	Business Sector	0	29	29
	Youth Sector	0	19	19
	Transportation Sector	0	21	21
	Aged Sector	0	21	21
	NGO/PO/Homeowners Association/Agricultural Cooperative	0	10	10
Total Type C Respondents - Secondary Impact Areas	Count	0	132	132
	% within Type of Respondent	0%	100%	100%
Grand Total of Type A, B and C	**Count**	**0**	**195**	**195**
	%	**0%**	**100%**	**100%**

Source: JICA Study Team (2012)

(5) Effect of Urbanization on Water Quality

Two-thirds (2/3) of the section or 12 km section along CALAX have been already urbanized by prominent land developers. They sell a house and lot with septic tanks installed, or when they sell a parcel of land, they require the families who bought the land to install septic tanks within the developed subdivision. Land developers provide excellent condition of subdivision by planting many trees, flowering plants and with paved road to attract many buyers. Therefore, effects of urbanization to water quality, flora and fauna are minimal.

The remaining one-third (1/3) section or 6 km section is at present farm lands, however, it is expected that these area will also be urbanized in the near future. In order to maintain good water quality and natural conditions, the respective LGU should issue “Building Permit” only when a land owner adopts the same standard as the prominent land developer’s standards.

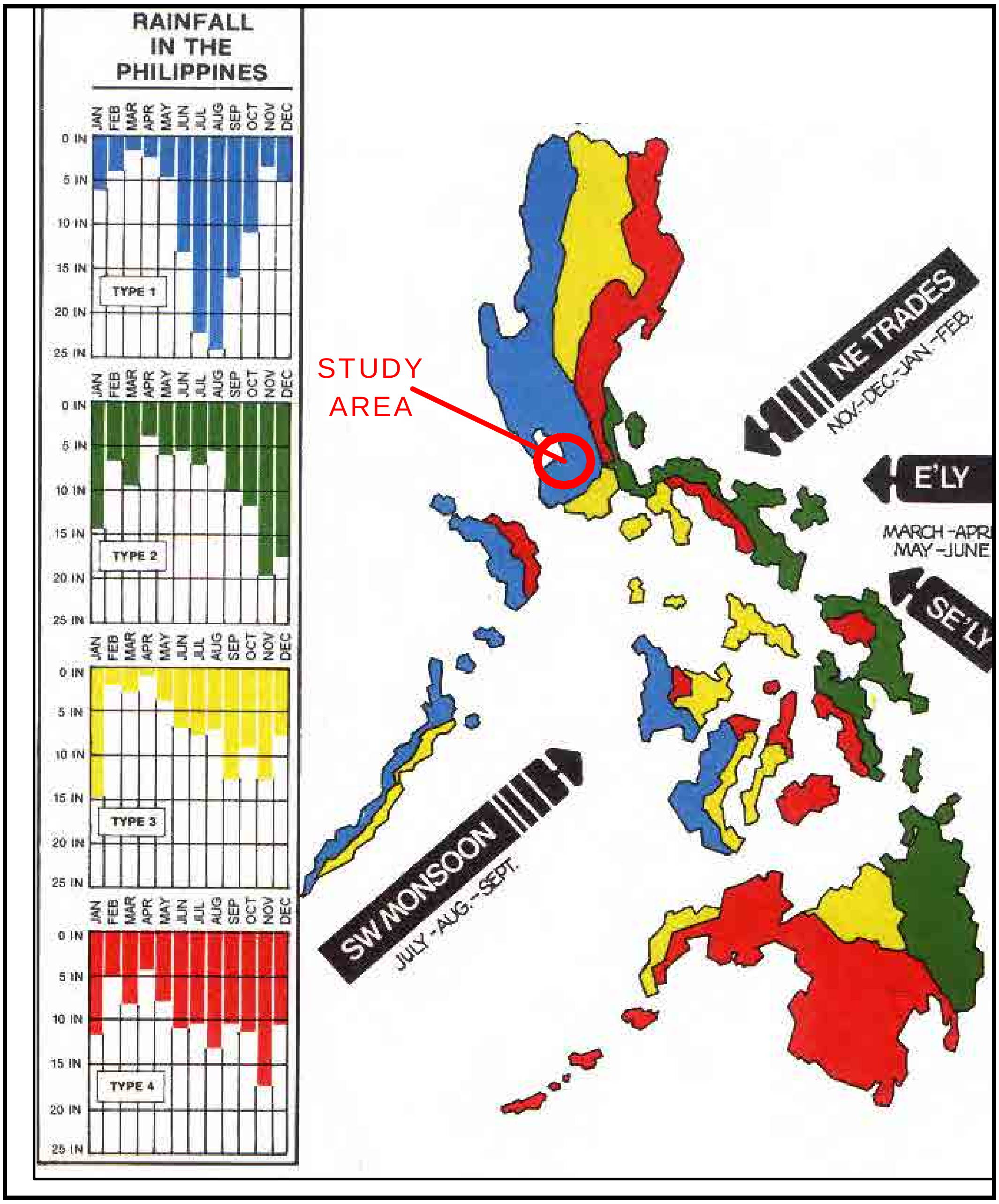
9.5.4.3 The Air

(1) Meteorology

The nearest synoptic meteorological stations in the study area are **NAS UPLB Los Baños, Laguna**, on the north and **Sangley Point, Cavite City** on the south.

The Philippines has **four** (**4**) recognized climate types which are based on rainfall distribution. According to the Modified Corona Classification, climate pattern in the study area belongs to **Type 1**. This climate type is characterized by **two** (**2**) distinct seasons: dry from November to April, and wet during the rest of the year. Maximum rain period is expected from June to September.

Figure 9.5.2.3-1 presents the climate map of the Philippines.



Source: PAGSA

FIGURE 9.5.4-14 CLIMATE MAP OF THE PHILIPPINES

Type I:	There are two pronounced seasons: The dry season (from November to April) and wet season (rest of the year).
Type II:	There is no dry season under this classification, with a very pronounced rainfall from November to January.
Type III:	Seasons are not very pronounced. It is relatively dry from November to April, and wet during the rest of the year.
Type IV:	Rainfall is more or less evenly distributed throughout the year under this classification.

Rainfall

The summer monsoon brings heavy rains in the study area from May to October. Monsoon rains, although hard and drenching, are not normally associated with high winds and waves. The annual rainfall can be highly attributed to tropical cyclones that enter the Philippine Area of Responsibility (PAR) – the designated area assigned to the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) to monitor during weather disturbances

The climatological normal values presented in **Table 9.5.4-21** show that the Municipality of Silang and the entire Province of Cavite receive an annual rainfall of **2078.4 mm**. During the rainy months of June to October, the average rainfall recorded is **342.1 mm**. The month of August recorded the highest amount of rainfall of **457.2 mm** and the most number of rainy days of **21**. Occasional shower is also experienced during the summer month of March. The amount of rainfall recorded is during this time is **9.4 mm**.

As can be deciphered from **Table 9.5.4-22**, the recorded average rainfall from June to November in the Cities of Santa Rosa and Biñan, Laguna is **257.6 mm**. The month of October yields the highest amount of rainfall of **321.4 mm**, while the most number of rainy days was recorded in July, with **21 days**. During the month of March, the western part of Laguna experiences very few rainy days of **6**. Minimal amount of rainfall of **26.3 mm** is recorded during the heart month of February.

Temperature

Moderately warm temperature is felt in in Santa Rosa and Biñan Cities from March to November. The weather station located at NAS UPLB, Los Baños, Laguna measured that the maximum temperature felt in both cities ranged from **30.8^{o}C** to **34.5^{o}C**, while the minimum temperature recorded ranged between **22.0^{o}C** to **24.1^{o}C**. During the summer months of March to May in Silang, from a cool **24.6^{o}C** the temperature can heat up to a scorching **34.4^{o}C**. From March to November the maximum temperature range is between **31.1°C** to **34.4°C**.

The study area will take a break from the warm weather and experience cooler temperature when the easterly winds begin to blow starting from December and lasting up to February. The recorded average mean temperature between these months in Silang is **26.9^{o}C**, while the Cities of Santa Rosa and Biñan is **25.7^{o}C**. Comparatively, cooler weather is felt in Santa Rosa and Biñan tah in Silang during From March to November.

Relative Humidity

Moisture content of the atmosphere in the whole study area is at its highest in the months of

August and December, with **83%** and **84%**, respectively. On the contrary, Silang experiences a low humidity of **71%** in April. Similarly, Santa Rosa and Biñan Cities have a low humidity of **76%** in April and May. The annual relative humidity in the Cavite area is **78%**, while Santa Rosa and Biñan have an annual relative humidity of **81%**.

Tropical Cyclones (Typhoons)

The Philippines sit astride the typhoon belt, and the country suffers an annual onslaught of dangerous storms from July through October. These are especially hazardous for northern and eastern Luzon and the Bicol and Eastern Visayas regions, but Manila gets devastated periodically as well.

Typhoon is locally termed as "*Bagyo*". Statistics from PAGASA showed that from 1948 to 2004, around an average of **20** storms and/or typhoons per year enter the PAR. In 1993, a record 19 typhoons made landfall in the country making it the most in one year. Historically, the deadliest tropical cyclone to impact the Philippines was "Uring" (Tropical Storm Thelma) which caused floods that killed thousands of people in 1991.

Typhoons are categorized into four (4) types according to its wind speed by the PAGASA. All tropical cyclones, regardless of strength, are named by PAGASA.

- Tropical Depressions have maximum sustained winds of between 55 kilometres per hour (30 kn) and 64 kilometres per hour (35 kn) near its center;
- Tropical Storms have maximum sustained winds of 65 kilometres per hour (35 kn) and 119 kilometres per hour (64 kn);
- Typhoons achieve maximum sustained winds of 120 kilometres per hour (65 kn) to 185 kilometres per hour (100 kn); and
- Super typhoons having maximum winds exceeding 185 kilometres per hour (100 kn)

Wind

East Southeasterly (ESE) winds prevail in the Province of Cavite during the months of October through June. It has a recorded wind speed of **3 m/s**. Westerly winds on the other hand prevail from July to September.

In Laguna, the northeasterly winds prevail from November through May with a measured wind speed of 2 m/s. The easterly winds meanwhile prevail during the months of June through October.

TABLE 9.5.4-21 CLIMATOLOGICAL NORMAL VALUES

Station Name: **Sangley Point, Cavite City**
Period: **1981-2010**
Latitude: **14.5 N**
Longitude: **120.9 E**
Elevation: **3.0 m**

MONTH	RAINFALL		TEMPERATURE						Vapor Pressure (MBS)	Relative Humidity (%)	Mean Sea Level Pres (mbs)	WIND		Cloud Amount (okta)	Number of Days with	
	Amount (mm)	No. Of RD	Maximum (°C)	Minimum (°C)	Mean (°C)	Dry Bulb (°C)	Wet Bulb (°C)	Dew Point (°C)				Direction (16 pt)	Speed (mps)		Thunder storm	Light-ning
JAN	16.9	4	30.0	23.3	26.6	26.8	23.9	22.8	27.7	79	1012.5	ESE	3	5	0	0
FEB	11.1	2	30.8	23.6	27.2	27.4	24.1	22.9	27.7	76	1012.7	ESE	3	5	0	0
MAR	9.4	2	32.7	24.6	28.6	28.7	25.0	23.7	29.1	74	1012.1	ESE	3	4	1	1
APR	18.5	2	34.4	25.9	30.1	30.3	26.0	24.6	30.6	71	1010.5	ESE	3	4	2	5
MAY	139.1	9	34.1	26.1	30.1	30.3	26.5	25.3	32.0	74	1008.8	ESE	3	5	11	16
JUNE	264.5	15	32.8	25.8	29.3	29.5	26.4	25.4	32.3	78	1008.4	ESE	3	6	14	18
JULY	422.4	20	31.7	25.3	28.5	28.6	26.0	25.1	31.8	81	1008.0	W	3	6	16	17
AUG	457.2	21	31.3	25.2	28.3	28.2	25.8	25.0	31.5	83	1007.6	SW	3	7	13	14
SEP	341.8	19	31.4	25.2	28.3	28.4	25.9	25.1	31.7	82	1008.4	W	3	6	15	16
OCT	224.3	15	31.4	25.3	28.4	28.4	25.8	24.9	31.4	81	1009.3	ESE	3	6	9	14
NOV	110.5	11	31.1	25.0	28.1	28.1	25.3	24.3	30.3	80	1010.4	ESE	3	6	4	5
DEC	62.7	7	30.0	23.9	27.0	27.1	24.3	23.3	28.4	79	1011.9	ESE	3	5	1	1
ANNUAL	**2078.4**	**127**	**31.8**	**24.9**	**28.4**	**28.5**	**25.4**	**24.4**	**30.4**	**78**	**1010.1**	**ESE**	**3**	**5**	**86**	**107**

Source: PAGASA, 2012

TABLE 9.5.4-22 NORMAL VALUES

Station Name: NAS, UPLB, LOS BANOS, LAGUNA
Period: 1977-2003
Latitude: 14°17’ N
Longitude: 121°25’ E
Elevation: m

MONTH	RAINFALL		TEMPERATURE						Vapor Pressure (MBS)	Relative Humidity (%)	Mean Sea Level Pres (mbs)	WIND		Cloud Amount (okta)	Number of Days with	
	Amount (mm)	No. Of RD	Maximum (°C)	Minimum (°C)	Mean (°C)	Dry Bulb (°C)	Wet Bulb (°C)	Dew Point (°C)				Direction (16 pt)	Speed (mps)		Thunder storm	Light-ning
JAN	39.0	11	29.6	21.3	25.5	24.9	22.7	21.8	26.3	83	N.A.	E	2	5	N.A.	N.A.
FEB	26.3	7	30.6	21.2	25.9	25.3	22.9	21.9	26.4	81	N.A.	NE	2	5	N.A.	N.A.
MAR	38.8	6	32.3	22.0	27.1	26.8	23.8	22.7	27.6	78	N.A.	NE	2	4	N.A.	N.A.
APR	41.8	7	34.2	23.3	28.8	26.8	25.1	24.0	29.8	76	N.A.	NE	2	4	N.A.	N.A.
MAY	125.8	12	34.5	24.1	29.3	29.4	26	24.9	31.5	76	N.A.	NE	2	4	N.A.	N.A.
JUNE	212.4	18	33.4	24.0	28.7	28.6	25.9	25.0	31.8	81	N.A.	E	2	5	N.A.	N.A.
JULY	308.0	21	32.4	23.6	28.0	27.8	25.5	24.7	31.2	83	N.A.	E	2	6	N.A.	N.A.
AUG	250.7	19	32.3	23.7	28.0	27.8	25.4	24.5	30.8	82	N.A.	SW	3	6	N.A.	N.A.
SEP	228.3	19	32.2	23.5	27.8	27.7	25.4	24.6	30.9	83	N.A.	E	2	6	N.A.	N.A.
OCT	321.4	20	31.6	23.4	27.5	27.2	25.0	24.2	30.3	83	N.A.	E	2	6	N.A.	N.A.
NOV	224.7	20	30.8	23.1	26.9	26.7	24.5	23.7	29.4	83	N.A.	NE	2	6	N.A.	N.A.
DEC	153.0	16	29.4	22.1	25.8	25.4	23.2	22.4	27.2	84	N.A.	NE	2	6	N.A.	N.A.
ANNUAL	**1970.0**	**176**	**32.0**	**23.0**	**27.5**	**27.2**	**24.7**	**23.8**	**29.5**	**81**	N.A.	**NE**	**2**	**5**	N.A.	N.A.

Source: PAGASA, 2012

(2) Air Quality

Ambient air quality sampling in the study area was conducted at **six** (**6**) selected sites to establish the existing level of air pollutants that may be influenced by the proposed CALA Expressway project. The sites chosen are those adjacent to air pollution sensitive receptor areas. Sampling was undertaken twice in a day to determine the pollutant levels during the morning and afternoon period. The sampling was done in conformity with the National Ambient Air Quality Standards (NAAQS) of the Department of Environment and Natural Resources (DENR). Locations of the air quality sampling stations are presented in **Figure 9.5.4-15**.

TABLE 9.5.4-23 BASELINE AIR QUALITY SAMPLING FOR THE CALA EXPRESSWAY

Station	Time and Date	Parameters (Concentration in μg/Ncm)		
		TSP	SO_2	NO_2
AQL1 Aguinaldo Highway Brgy. Biga II, Silang Cavite	0830-0930H 23 Dec 2011	64	29	9
	1335-1435H 22 Dec 2011	72	27	11
AQL2 Along Silang-GMA Road Brgy Sabutan, Silang, Cavite	0655-0755H 23 Dec 2011	118	31	10
	1402-1502H 22 Dec 2011	95	30	11
AQL3 Along Sabutan-Tibig Barangay Road Brgy. Tibig, Silang, Cavite	0948-1048H 23 Dec 2011	20	19	4
	1647-1747H 22 Dec 2011	51	19	3
AQL4 Nuvali-Laguna Blvd Near Entrance Gate of West Groove Subdivision, Santo Domingo, Santa Rosa City, Laguna	1007-1107H 06 Feb 2012	119	27	7
	1550-1650H 06 Feb 2012	102	25	8
AQL5 Laguna Blvd Near Laguna Techno Park Gate Brgy. Malamig, Biñan City, Laguna	0645-0745H 07 Feb 2012	147	29	9
	1320-1420H 06 Feb 2012	102	24	6
AQL6 Mamplasan Interchange Fronting Greenfields Subdivision Gate, Mamplasan, Biñan, Laguna	0840-0940H 13 Jan 2012	98	24	9
	1300-1400H 13 Jan 2012	89	20	8
DENR Standards (1-hour Sampling Average) (DAO 14)		**Not more than 300 μg/Ncm**	**Not more than 340 μg/Ncm**	**Not more than 260 μg/Ncm**

Source: JICA Study Team (2012)

AQL1 Ambient TSP level sampling along E. Aguinaldo Highway, Brgy. Biga II, Silang, Cavite (**Sta. 1**) using a Staplex High-Volume Sampler (indicated by the red marking).

AQL2 Sulfur Dioxide (SO2) and Nitrogen Dioxide (NO2) level measurement at the residential area in along Silang-GMA Road in Brgy. Sabutan, Silang Cavite (**Sta. 2**) on 22 December 2011.

AQL3 TSP level monitoring along the Sabutan-Tibig Road (**Sta. 3**) in Brgy. Tibig, Silang, Cavite on 22 & 23 December 2011.

AQL4 Afternoon TSP level monitoring along the Nuvali-Laguna Boulevard, Brgy. Santo Domingo, Sta. Rosa City, Laguna, **Sta. 4**.

AQL5 Morning and afternoon SO2 and NO2 level measurement at **Sta. 5**, Laguna Boulevard.

AQL6 Morning SO2 and NO2 level measurement at **Sta. 6**, Brgy. Mamplasan, Biñan City, Laguna on 13 January 2012.

Source: JICA Study Team (2012)

PHOTO BASELINE AIR QUALITY SAMPLING STATION

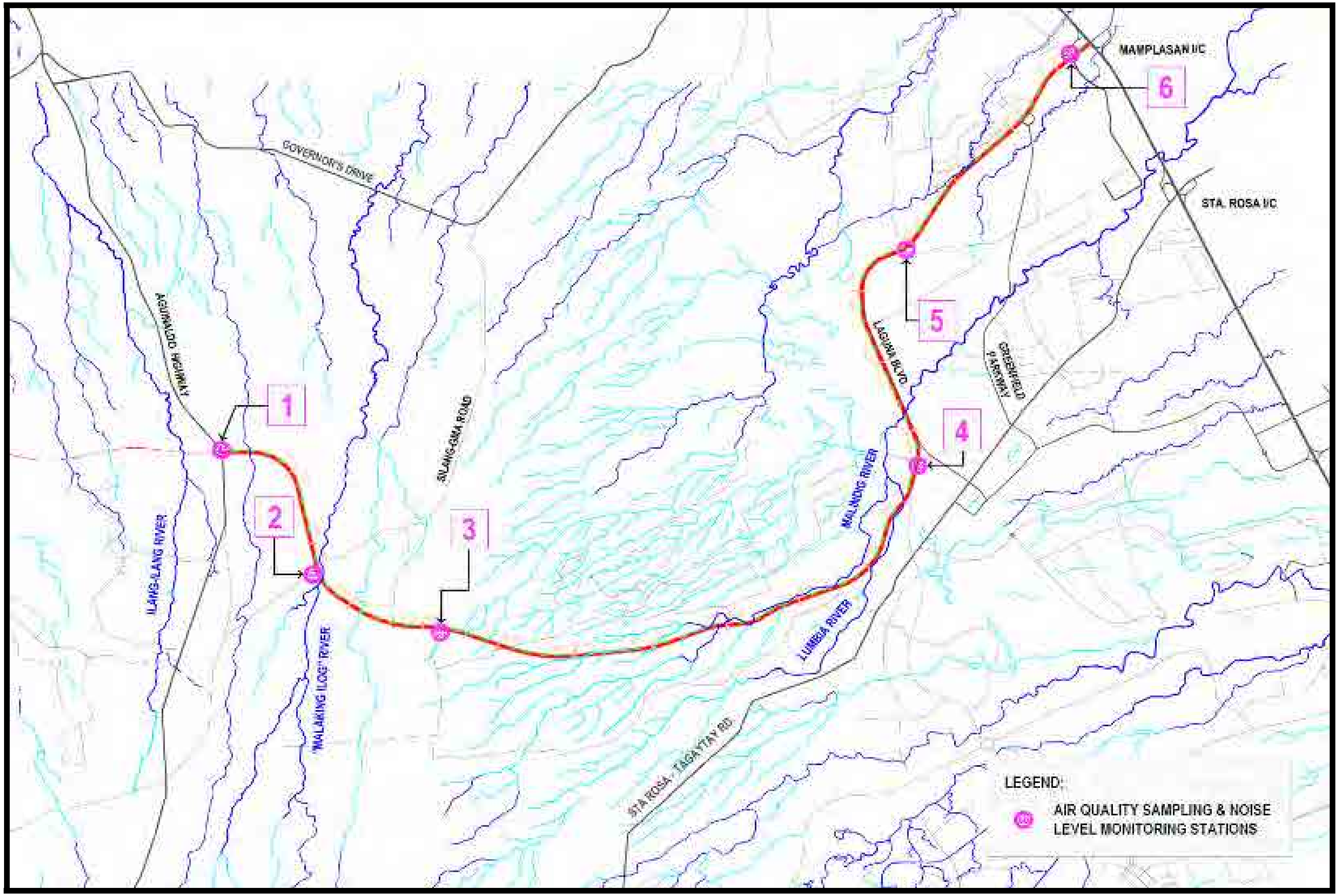
Total Suspended Particulates (TSP)

Result of the monitoring undertaken at all sampling stations showed that the existing TSP levels both in the morning and in the afternoon are **well within the DENR Standard** for a 1 hour sampling period (**300 μg/Ncm**). As can be discerned from **Table 9.5.4-23**, the average TSP level observed at the sampling sites ranged from **20 μg/Ncm** to **147 μg/Ncm**, the highest of which was recorded during the morning sampling at Sta. 6 (Nuvali-Laguna Blvd). The lowest TSP level of **20 μg/Ncm** was obtained in Brgy. Tibig (Sta. 3) also during the morning sampling.

Gaseous Air Pollutants (SO_2 & NO_2)

The SO_2 levels observed in all the sampling sites **do not exceed the required standard of the DENR** (**340 μg/Ncm**) for a 1 hour sampling period. In fact, the recorded concentration levels presented in **Table 9.5.4-22**, which ranged between **19 μg/Ncm** to **31 μg/Ncm** are way below the permissible limit. It can also be discerned from the **Table** that a relative higher SO_2 concentration levels of **31 μg/Ncm** and **30 μg/Ncm** were recorded at Sta. 2 (Brgy. Sabutan) during the morning and afternoon sampling periods, respectively.

Similarly, the measured NO_2 concentration levels at the **six** (**6**) sampling stations within the 1 hour period are **well within the DENR standard** (**260 μg/Ncm**). The concentration level range is between **3 μg/Ncm** to **11 μg/Ncm**. The highest NO2 concentration of **11 μg/Ncm** was recorded at Sta.1 during the afternoon monitoring period and at Sta. 2 during the morning sampling. The lowest concentration level of **3 μg/Ncm** was measured at Sta. 3 during the afternoon sampling time.



Source: *JICA Study Team (2012)*

FIGURE 9.5.4-15 AIR QUALITY AND NOISE LEVEL SAMPLING MAP

Air Quality Modeling

Air quality modeling was conducted. The model uses an hourly meteorological data to define the plume behavior, transport and diffusion for individual area sources and receptor combination for the input meteorological data and calculates short term 24-hours averages.

The model used is Industrial Source Complex Short Term 3 (ISCST3) that is based on a straight-line, steady-state Gaussian plume equation. The model emission sources are categorized into four basic types of sources, point, volume, area and open pit sources. The volume and area source option can be used to simulate line sources.

In this study, roadway is considered as an area source of road length of 50 meters long and the roadway width of 20 meters wide as one area source for each road section. Traffic volume forecasted to year 2017, 2020, and 2030 were used to determine the expected emission level for the 3 pollutant parameters such as Nitrogen Oxides (NO_2), Particulate Matter 10 (PM10) and Sulfur Dioxide (SO_2). The 2008 road transport emission factors from by United Kingdom (UK) - National Atmospheric Emission Inventory (NAEI) Programme was used in the study using speed coefficient by Euro vehicles given in TRL database Emission factors.

The concentration values are the result of the ISCST3 air pollution model, considering the wind speed and direction, temperature, and other meteorological data used as input in the model. Two wind regimes (season) are used to simulate the ground level concentration for northeast (NE) and southwest (SW) season. Emission data in the model are based on the traffic volume utilizing the emission factor of the pollutants.

The Emission Factor used for NO_2, PM10 and SO_2 based on a motorway or expressway driving (80 km/hr average speed) was summarized in **Table 9.5.4-24** below:

TABLE 9.5.4-24 UK - ROAD TRANSPORT EMISSION FACTORS: 2008 NAEI

	Diesel Car	**Petrol Car**	**Buses**	**Rigid Trucks**
NO_2, g/km	0.425	0.534	6.219	4.455
PM10, g/km	0.005	0.031	0.083	0.077
SO_2, g/km	0.003	0.001	0.004	0.003

Source: National Atmospheric Emission Inventory (NAEI), UK

Above emission factors are based on hot exhaust emission. These are the tailpipe emissions in g/km from a vehicle with its engine warmed up to its normal operating conditions.

Table 9.5.4-24 shows the forecast annual average daily traffic (AADT) for year 2017, 2020, and 2030. Based on the forecasted traffic, it is assumed that the light vehicle is 50% diesel and 50% gasoline (petrol) fueled cars. For the heavy vehicles, it is also assumed that the 50% are buses and 50% are rigid trucks.

TABLE 9.5.4-25 ANNUAL AVERAGE DAILY TRAFFIC FORECAST FOR 2016, 2020 AND 2030

Traffic Forecast	Vehicle Type	
	Light Vehicle	Bus + Heavy Vehicle
2017	13807	9401
2020	19932	11190
2030	36204	13661

Source: JICA Study Team (2012)

The corresponding computed emission rates in gram per second per square meter (g/s-m^2) based on annual average daily traffic volume and the UK-NAEI emission factors are shown in **Table 9.5.4-26**as follows:

TABLE 9.5.4-26 COMPUTED TOTAL EMISSION RATES PER AREA

	Year 2017	Year 2020	Year 2030
NO$_2$, g/s- m^2	0.068365	0.083765	0.110267
PM10, g/s- m^2	0.001168	0.001463	0.002039
SO2, g/s- m^2	0.000072	0.000094	0.000142

Source: JICA Study Team (2012)

The road sections considered in modeling are shown below:

Section A	0+000 to 9+200	Silang, Cavite to Santa Rosa, Laguna
Section B	9+200 to 18+100	Biñan, Laguna

The summary of maximum predicted ground level concentration (GLC) in ug/m3 using the ISCST3 air quality model for each section with the following traffic forecast are shown in **Table 9.5.4-27** to **Table 9.5.4-29**.

For **Table 9.5.4-28**, this will be TSP concentration instead of PM10 since the baseline ambient measurement is for TSP (since finer particulates such as PM10 can be collected from ambient with the TSP)

Based on Manila (NAIA) Meteorological data, South West (SW) wind occurred in the midday between 10 AM to 3 PM and North East (NE) wind early morning between 5 AM to 10 AM and late afternoon between 3 PM to 7 PM of December 22-23, 2011. For February 6, 2012, the NE wind was prevalent all day and for February 7, 2012, the NE wind is between 5 AM to 10 AM. Study Team used to add baseline concentration sampled in the early morning period or late afternoon period to NE predicted GLC and sampled on the midday period to SW predicted GLC.

TABLE 9.5.4-27 MAXIMUM GLC FOR NITROGEN DIOXIDE (NO_2)

Unit: µg/Ncm

Year	Section A-Silang to Sta. Rosa 0+000 to 9+200		Section B-Sta. Rosa 9+200 to 18+800		DENR Standard
	NE	**SW**	**NE**	**SW**	
2017	10.82133	11.72406	9.89533	7.80311	260
2020	11.00237	11.88366	10.09268	7.98013	
2030	11.31950	12.16324	10.43839	8.29023	

Source: JICA Study Team (2012)

TABLE 9.5.4-28 MAXIMUM GLC FOR PARTICULATE MATTER 10 (PM10)

Unit: µg/Ncm

Year	Section A-Silang to Sta. Rosa 0+000 to 9+200		Section B-Sta. Rosa 9+200 to 18+800		DENR Standard
	NE	**SW**	**NE**	**SW**	
2017	118.01326	95.01169	147.01445	119.01296	300 (TSP)
2020	118.01751	95.01543	147.01908	119.01712	
2030	118.02440	95.02151	147.02660	119.02386	

Source: JICA Study Team (2012)

TABLE 9.5.4-29 MAXIMUM GLC FOR SULFUR DIOXIDE (SO_2)

Unit: µg/Ncm

Year	Section A-Silang to Sta. Rosa 0+000 to 9+200		Section B-Sta. Rosa 9+200 to 18+800		DENR Standard
	NE	**SW**	**NE**	**SW**	
2017	31.00086	30.00076	29.00094	27.00084	340
2020	31.00112	30.00099	29.00123	27.00110	
2030	31.00170	30.00150	29.00185	27.00166	

Source: JICA Study Team (2012)

TABLE 9.5.4-30 AIR QUALITY PREDICTED AREA RELATED TO BASELINE SURVEY STATION

Predicted Area, CALAX Section		Base line Survey Station
Section A – Silang, Sta. Rosa	0+000 to 9+200	For NE and SW: AQL2 Silang, Brgy. Biga II
Section B – Biñan, Laguna	9+200 to 18+100	For NE: AQL5 Biñan, Brgy. Malamig For SW: AQL6 Biñan, Mamplasan

Source: JICA Study Team (2012)

(3) Global Warming

The project will contribute to solve increase of traffic volume and traffic congestion in the future, while increase of CO2 will affect global warming impact due to traffic volume increase.

During the Construction Period; implementation of the project will be required about 2 years of schedule. a number of construction vehicles and equipment will be schedules in operation activities. It will be predicted approximately 78,908 tons of CO2 generated during construction. As mitigation measures the government concerned may consider to encourage tree plantation with corporation with DENR where available open spaces along CALAX.

TABLE 9.5.4-31 PREDICTED CO_2 EMISSION CAUSED BY THE CONSTRUCTION

	CO_2 Emission Unit	Quantity	CO_2 Emission
Road Section	1,383(t-C/km)	12.1 km	16,734 ton
Steel Structure Section	14,362(t-C/km)	km	43,086 ton
PC Structure Section	6,484(t-C/km)	km	18,804 ton
Inter-Change(IC)	440.5(t-C/IC)	4	1,762 ton
Facility Installation (lighting, telecom, information facilities etc.)	15.7(t-C/km)	18.1 km	284 ton
		Total	78,908 ton

Source: CO2 emission rate from Technology Center of Expressway in Japan (2006)

O/M period after the construction: CO_2 emission from traffic vehicles at the project vicinity area in target year. Traffic demand forecast in the project area.

The following table shows the comparison CO_2 emission of with and without project case in the target years.

TABLE 9.5.4-32 COMPARISON OF WITH AND WITHOUT PROJECT IN TARGET YEARS

Target Year	Without Project (ton/year)	With Project (ton/year)	W/O-W (ton/year)
2017	3,614,788	3,525,457	89,330
2020	4,197,951	4,076,198	121,753

Source: JICA Study Team (2012)

CO_2 emission per vehicle type per traveling speed (g-CO_2/km. vehicle): CO_2 emission volume is depends on traveling vehicle speed, the predictive calculation was applied by the vehicles and circular table of evaluation for road policy of Ministry of land, transport and tourism, Japan. The CO_2 emission per km per vehicle was applied 2 type vehicle in accordance with different level of traveling speed. The following table shows CO_2 emission g-/km. vehicle.

TABLE 9.5.4-33 CO_2 EMISSION (G-CO_2/KM. VEHICLE)

km/hr	10	20	25	30	35	40	45	50	55	60	65	70	75	80
Small vehicle	342	229	204	186	172	161	152	146	141	138	137	137	139	142
Large vehicle	1515	1133	1042	963	894	836	788	750	723	706	700	705	719	744

Source: Circular table of evaluation for road policy. MTLT Japan

9.5.4.4 Noise Level

Monitoring of the ambient noise level along the noise sensitive receptor areas traversed by the proposed CALA Expressway alignment was concurrently undertaken with the air quality sampling. Both monitoring activities were conducted at the same sampling sites (see **Figure 9.5.4-15**).

Noise levels within a 30-second average period using a Center 322 Datalogging sound level meter on A-weighting scale. Noise averaging was performed during morning time (5:00-9:00 AM), daytime (9:00 AM-6:00 PM), evening time (6:00-10:00 PM), and nighttime (10:00 PM-5:00 AM). The noise standards utilized are categories Class B and Class C. **Class B** is "*A section which is primarily use for commercial purposes*", while **Class C** "*A section which is primarily reserved as a light industrial area*".

Ambient Noise Level

The highest noise levels for all monitoring time periods were recorded at Sta. 2, exceeding the DENR standards. This can be attributed primarily to the significant traffic volume plying the E. Aguinaldo Highway. As shown in **Table 9.5.4-34**, the observed noise levels at Sta. 1 are **80.8 dBA** (daytime), **74.0 dBA** (morning), **70.1 dBA** (evening), and **66.2 dBA** (nighttime)

On the contrary, noise levels recorded at **Sta. 3** during the morning time, daytime, evening time, and nighttime periods are within the DENR standards for both Class B and C categories. At the said station, the average noise level measured are **52.4 dBA** (morning), **52.6 dBA** (daytime), **54.9 dBA** (evening), and **47.6 dBA** (nighttime).

Table 9.5.4-34 will show that the nighttime noise level measured at Sta. 2, 4, 5 are still within the permissible limits for both categories. The nighttime noise level recorded ranges between **49.6-60.0 dBA**. It can in also be discerned that the daytime noise levels measured at Sta. 2 (**59.6 dBA**) and Sta. 4 (**63.6 dBA**) are within the permissible limits. The average evening time noise level observed at Sta. 2 (**59.4 dBA**), Sta. 3 (**54.9 dBA**), and Sta. 6 (**55.6 dBA**), are within the DENR standards of **60 dBA** and **65 dBA** for Class B and Class C categories, respectively.

TABLE 9.5.4-34 OBSERVED AMBIENT NOISE LEVEL AT THE SELECTED SAMPLING SITES ALONG THE PROPOSED CALA EXPRESSWAY ALIGNMENT (1/2)

Sampling Location	**Monitoring Period**	**Date & Time**	**Average Noise Level (in dBA)**	**DENR Standards (DAO 14)**	
				Class B*	**Class C****
Sta. 1 Aguinaldo Highway Brgy. Biga II, Silang Cavite	Morning	23 December 2011 5:03:48-6:08:18 AM	**74.0**	**60**	**65**
	Daytime	23 December 2011 10:44:25-11:48:55 AM	**80.8**	**65**	**70**
	Evening	22 December 2011 7:49:09-8:43:39 PM	**70.1**	**60**	**65**
	Nighttime	23-24 December 2011 11:55:05 PM-12:59:35 AM	**66.2**	**55**	**60**
Sta. 2 Along Silang-GMA Road Brgy Sabutan, Silang, Cavite	Morning	23 December 2011 7:50:01-8:54:31 AM	58.7	**60**	**65**
	Daytime	22 December 2011 2:04:09-3:08:39PM	59.6	**65**	**70**
	Evening	22 December 2011 6:31:19-7:36:09 PM	59.4	**60**	**65**
	Nighttime	22 December 2011 10:29:25-11:33:55 PM	**57.5**	**55**	**60**
Sta. 3 Along Sabutan-Tibig Barangay Road Brgy. Tibig, Silang, Cavite	Morning	23 December 2011 5:03:48-6:08:18 AM	52.4	**60**	**65**
	Daytime	22 December 2011 3:33:46-4:38:16 PM	52.6	**65**	**70**
	Evening	22 December 2011 8:57:11-10:01:41 PM	54.9	**60**	**65**
	Nighttime	23 December 2011 1:17:26-2:21:56 AM	47.6	**55**	**60**

Class B* "*A section which is primarily use for commercial purposes*"
Class C** "*A section which is primarily reserved as a light industrial area*".
Source: JICA Study Team (2012)

TABLE 9.5.4-34 OBSERVED AMBIENT NOISE LEVEL AT THE SELECTED SAMPLING SITES ALONG THE PROPOSED CALA EXPRESSWAY ALIGNMENT (2/2)

Sampling Location	Monitoring Period	Date & Time	Average Noise Level (in dBA)	DENR Standards (DAO 14)	
				Class B*	Class C**
Sta. 4 Nuvali-Laguna Blvd Near Entrance Gate of West Groove Subdivision, Santo Domingo, Santa Rosa City, Laguna	Morning		**69.4**	**60**	**65**
	Daytime	06 January 2012 10:21:17-11:25:47 AM	**66.4**	**65**	**70**
	Evening	06 January 2012 6:05:17-7:09:47 PM	55.6	**60**	**65**
	Nighttime	07 January 2012 1:02:25-2:06:55 AM	51.5	**55**	**60**
Sta. 5 Laguna Blvd Near Laguna Techno Park Gate Brgy. Malamig, Biñan City, Laguna	Morning		**64.5**	**60**	**65**
	Daytime	06 January 2012 2:28:54-3:33:24 PM	**63.6**	**65**	**70**
	Evening	06 January 2012 7:21:54-8:26:24 PM	**70.6**	**60**	**65**
	Nighttime	07 January 2012 11:43:11-12:47:41 AM	49.6	**55**	**60**
Sta. 6 Mamplasan Interchange Fronting Greenfields Subdivision Gate, Mamplasan, Biñan City, Laguna	Morning	13 January 2012 7:24:49–8:29:19 AM	**63.8**	**60**	**65**
	Daytime	13 January 2012 12:05:10-1:09:40 PM	**68.1**	**65**	**70**
	Evening	06 January 2012 8:51:46-9:56:16 PM	**63.1**	**60**	**65**
	Nighttime	06 January 2012 10:10:46-11:15:16 PM	**60.0**	**55**	**60**

Class B* “*A section which is primarily use for commercial purposes*”

Class C** “*A section which is primarily reserved as a light industrial area*”

Source: JICA Study Team (2012)

Sta. 1 Daytime noise level monitoring at sampling **Sta. 1**.

Sta. 2 Morning time noise level measurement in Brgy. Sabutan, Silang, Cavite (sampling **Sta. 2**).

Sta. 3 Daytime noise level monitoring using a portable Noise Meter at sampling **Sta. 3**, Brgy. Tibig, Silang, Cavite.

Sta. 4 Daytime noise level monitoring along the Nuvali-Laguna Blvd. (**Sta. 4**), Sta. Rosa City, Laguna.

Sta. 5 Noise level monitoring at sampling **Sta. 5**, Laguna Boulevard, Brgy. Malamig, Biñan City, Laguna.

Sta. 6 Daytime time noise level monitoring in Brgy. Mamplasan, Biñan City, Laguna.

Source: JICA Study Team (2012)

PHOTO BASELINE NOISE LEVEL SAMPLING STATION

Noise Modeling

Noise modeling was conducted using the available maps and site investigations. An inventory of the structures located within 200 meters from the expressway alignment areas had been made. It is estimated that about 1 school building, 1 church/chapel and about 5 clustered residential areas are located within 200 meters from the expressway alignment. **Table 9.5.4-35** contains the inventory of sensitive receptors and its approximate location. **Table 9.5.4-30** shows the residential areas exposed to expressway alignment.

Figure 9.5.4-16 illustrates the location map of noise predicted points.

Noise Calculation Formula

The noise level were calculated based on the following formula.

$$L_{\mathrm{Aeq}} = 10\log_{10}\frac{\overline{a}\{1+(M-1)r_2\}V^{n-1}Q}{2d} + 120 \quad [\mathrm{dBA}]$$

Where $\overline{a} = 3.6\times10^{-6}$

$n = 2$

M sound power rate of Heavy Vehicle and Light Vehicle = 5

V : Vehicle Speed (km/h)

Q : Traffic Volume (1000 veh/h)

d : distance from eenter line of highway (m)

$r_2 : \dfrac{LightVehicle}{Totalvolume}\times100(\%)$

Calculations for Noise Reduction

a) Noise barrier

In order to calculate for noise reduction, a simplified equation (as suggested in SETRA, Bruit et etudes routieres; Manuel du chef de projet; page 148-149) for pure simple diffraction was applied, shown below:

$$\Delta_{\mathrm{diff}} = 7.5 \log (3 + 20N) + 1.2$$

Where N = Fresnel Number

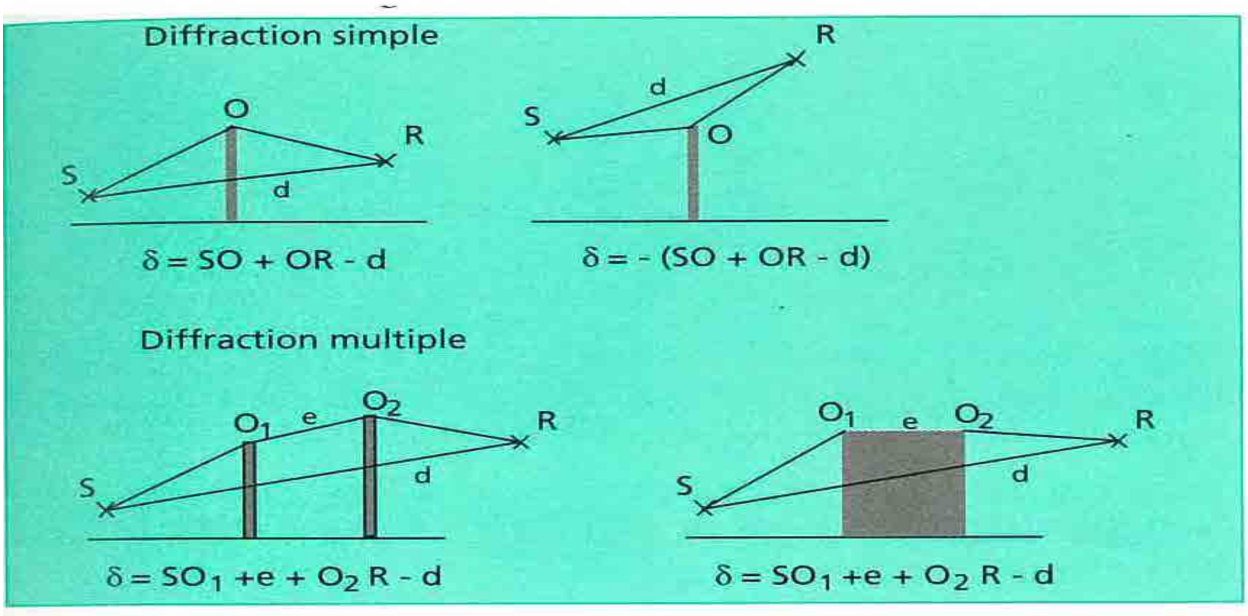
$N = 2\delta/\lambda$

δ = path difference in meters

λ = average wavelength of road noise spectrum

= 0.50 m

Figure provides the schematic diagram for evaluating noise reduction using the Diffraction Method.



SCHEMATIC DIAGRAM FOR THE DIFFRACTION METHOD OF EVALUATING NOISE REDUCTION

The height of the obstruction greatly influence the amount of noise reduced. Table shows the amount of noise reduced as a result of the height of the noise barriers.

Tabulated below is the typical noise reduction due to pure diffraction of assumed noise barrier height:

NOISE REDUCTION RESULTING FROM NOISE BARRIER

Noise Barrier Height (m)	Noise Reduction by Pure Diffraction $_{diff}$, dB(A)
1	6.2
2	10.1
3	12.9
4	14.8
5	16.3

b) double-glassed window

In order to reduce a more noise level, double-glassed window will be installed in the affected buildings.

The double-glassed window's installation can reduce approximately 25 dB(A).

TABLE 9.5.4-35 SENSITIVE RECEPTORS (CHURCH & SCHOOL) ALONG THE CALAX ALIGNMENT WITHIN 200 METERS FROM EXPRESSWAY ALIGNMENT

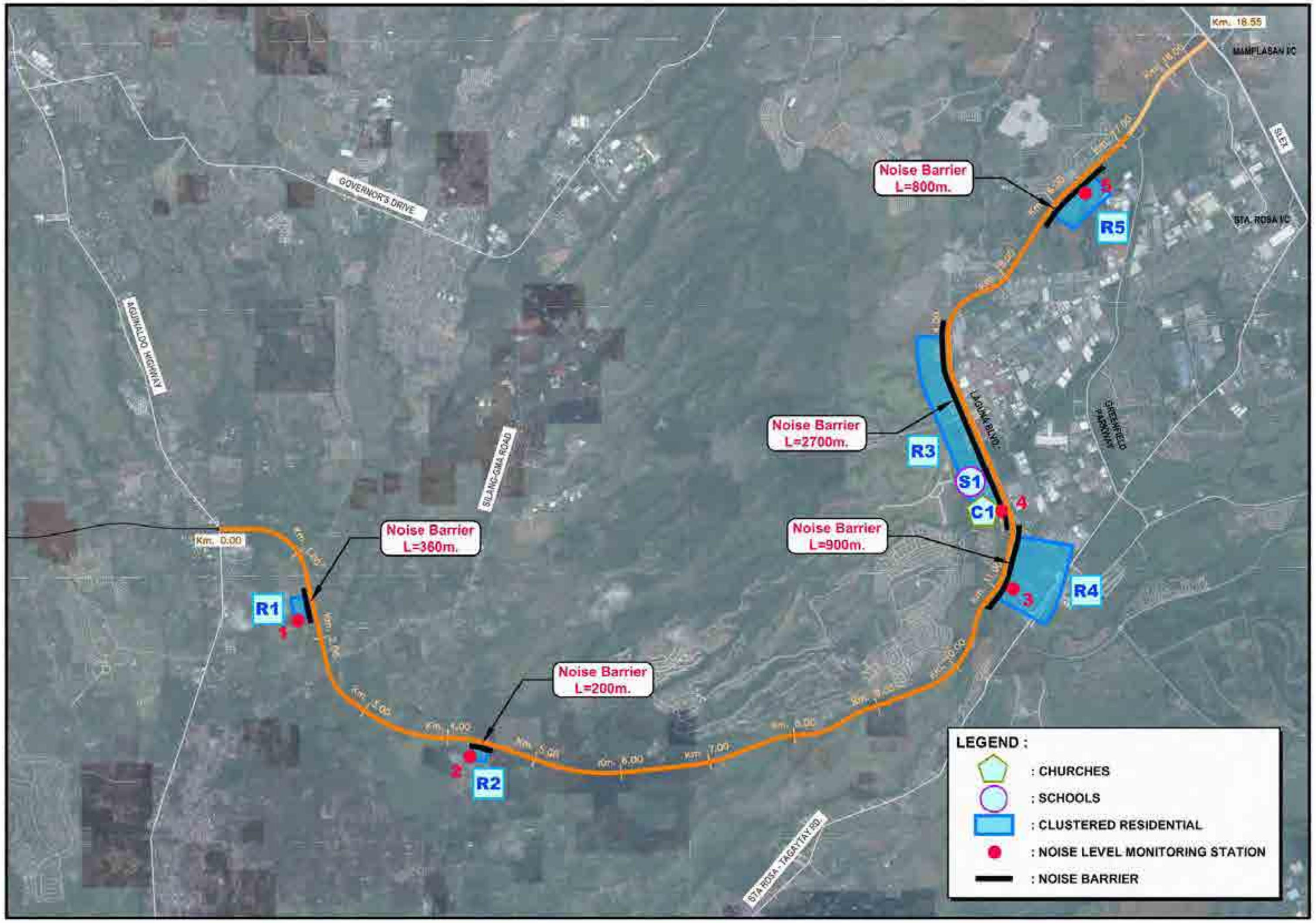
	Sensitive Receptor Along Expressway Alignment	**Station Position and Location of Receptor from Alignment**	**Expressway Road Elevation (m)**	**Ground Elevation (m)**	**Source to Receptor Reference Distance (m)**
Church:					
C1	St John Bosco Parish Church	11+980 North	84.043	77.023	40
School:					
S1	Caritas Don Bosco School	12+300 North	77.753	67.972	40

Source: JICA Study Team (2012)

TABLE 9.5.4-36 CLUSTERED RESIDENTIAL RECEPTORS ALONG THE CALAX ALIGNMENT WITHIN 200 METERS FROM EXPRESSWAY ALIGNMENT

	Residential Receptor Along Expressway Alignment	**Station Position and Location of Receptor from Alignment**	**Expressway Road Average Elevation (m)**	**Ground Average Elevation (m)**	**Source to Receptor Reference Distance (m)**
Clustered Residential:					
R1	Sabutan	1+680 to 1+860 South	264.789	263.100	110
R2	Tibig Village	4+400 to 4+500 South	288.500	280.500	170
R3	Sta. Rosa to San Jose Village	7+500 to 17+000 North	61.000	59.000	20
R4	Nuvali	10+900 to 11+600 South	94.500	88.500	30
R5	Greenfields	15+880 to 16+500 South	37.000	32.000	20

Source: JICA Study Team (2012)



Source: JICA Study Team (2012)

FIGURE 9.5.4-16 NOISE PREDICTED STATION MAP

Result of Noise Modeling

The Sensitive Receptors (Church and Schools)

The resulting noise levels that reach the sensitive receptors areas yield levels that are mostly non-compliant to Philippine noise standard for nighttime and daytime, all the maximum noise levels during the daytime and nighttime exceeds the maximum threshold at 50 dB(A) and 40 dB(A) respectively. The maximum noise level station is St. John Bosco Parish Church (C1) and Caritas Don Bosco School (S3) which is expected to be generated 68.5 dBA during daytime and 65.0 dBA during nighttime in year 2017 (see **Table 9.5.4-37**). These stations will be necessary to install noise barrier and **additional countermeasures (double-grazed windows for these buildings).**

The Clustered Residential

For residential areas, the resulting noise levels forecasted on year 2017 ranges from 64.0 to 70.0 dBA during daytime period and from 60.4 to 66.4 dBA for nighttime period (see **Table 9.5.4-38**). The allowable limit for a residential areas Class B category, the daytime limit is 65dBA and nighttime limit is 55 dBA.

All stations will be necessary to install noise barriers.

TABLE 9.5.4-37 PREDICTED & RESULTANT NOISE LEVEL AT SENSITIVE RECEPTORS FOR YEAR 2017 TRAFFIC FORECAST (1/2)

	Sensitive Receptor Along Expressway Alignment	Alignment Location	2017 Predicted Noise dB(A)		Resultant Noise with 3 m High Noise Wall dB(A)		3M High Noise Wall and double-glazed windows db(A)	
			Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime
Church:								
C1	St John Bosco Parish Church	11+980 North	68.5	65.0	55.6	52.1	**30.6**	**27.1**
School:								
S3	Caritas Don Bosco School	12+300 North	68.5	65.0	55.6	52.1	**30.6**	**27.1**
	DENR Standard (DAO 14)		**50**	**40**	**50**	**40**	**50**	**40**
	IFC EHC Standard		**55**	**45**	**55**	**45**	**55**	**45**

Source: JICA Study Team (2012) ☐ Exceeds DENR Standard

TABLE 9.5.4-37 PREDICTED & RESULTANT NOISE LEVEL AT SENSITIVE RECEPTORS FOR YEAR 2020 TRAFFIC FORECAST (2/2)

	Sensitive Receptor Along Expressway Alignment	Alignment Location	2020Predicted Noise dB(A)		Resultant Noise with 3 m High Noise Wall dB(A)		3M High Noise Wall and double-glazed windows db(A)	
			Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime
Churches:								
C1	St John Bosco Parish Church	11+980 North	69.5	65.8	56.6	52.9	**31.6**	**27.9**
Schools:								
S3	Caritas Don Bosco School	12+300 North	69.5	65.8	56.6	52.9	**31.6**	**27.9**
	DENR Standard (DAO 14)		**50**	**40**	**50**	**40**	**50**	**40**
	IFC EHC Standard		**55**	**45**	**55**	**45**	**55**	**45**

Source: JICA Study Team (2012) ☐ Exceeds DENR Standard

TABLE 9.5.4-38 PREDICTED & RESULTANT NOISE LEVEL AT CLUSTERED RESIDENTIAL FOR YEAR 2017 TRAFFIC FORECAST (1/2)

	Residential Receptor Along CALAX Alignment	**Alignment Location**	**2017 Predicted Noise dB(A)**		**Resultant Noise with 3 m High Noise Wall dB(A)**	
			Daytime	**Nighttime**	**Daytime**	**Nighttime**
Clustered Residential:						
R1	Sabutan	1+680 to 1+860 S	$\boxed{65.5}$	$\boxed{62.0}$	**52.6**	**49.1**
R2	Tibig	4+400 to 4+500 S	**64.0**	$\boxed{60.4}$	**51.1**	**47.5**
R3	Sta. Rosa Village to San Jose Village	12+000 to 14+500 N	$\boxed{70.0}$	$\boxed{66.4}$	**57.1**	**53.5**
R4	Nuvali	10+900 to 11+600 S	$\boxed{69.3}$	$\boxed{65.7}$	**56.4**	**52.8**
R5	Greenfields	15+880 to 16+500 S	$\boxed{70.0}$	$\boxed{66.4}$	**57.1**	**53.5**
	DENR Standard (DAO -14)		**65**	**55**	**65**	**55**
	IFC EHC Standard		**55**	**45**	**55**	**45**

Source: JICA Study Team (2012)

☐ Exceeds DENR Standard

TABLE 9.5.4-39 PREDICTED & RESULTANT NOISE LEVEL AT CLUSTERED RESIDENTIAL FOR YEAR 2020 TRAFFIC FORECAST (2/2)

	Residential Receptor Along CALAX Alignment	**Alignment Location**	**2020 Predicted Noise dB(A)**		**Resultant Noise with 3 m High Noise Wall dB(A)**		**Recommended Section for Noise Barrier**
			Daytime	**Nighttime**	**Daytime**	**Nighttime**	
Clustered Residential:							
R1	Sabutan	1+680 to 1+860 S	$\boxed{66.5}$	$\boxed{62.8}$	**53.6**	**49.9**	360m
R2	Tibig	4+400 to 4+500 S	**65.0**	$\boxed{61.3}$	**52.1**	**48.4**	200m
R3	Sta. Rosa Village to San Jose Village	12+000 to 14+500 N	$\boxed{71.0}$	$\boxed{67.3}$	**58.1**	**54.4**	2700m
R4	Nuvali	10+900 to 11+600 S	$\boxed{70.2}$	$\boxed{66.5}$	**57.4**	**53.6**	900m
R5	Greenfields	15+880 to 16+500 S	$\boxed{71.0}$	$\boxed{67.3}$	**58.1**	**54.4**	800m
	DENR Standard (DAO -14)		**65**	**55**	**65**	**55**	
	IFC EHC Standard		**55**	**45**	**55**	**45**	
						Total	**L = 4960 m**

Source: JICA Study Team (2012)

☐ Exceeds DENR Standard

Summary of Noise Modeling Result

All clustered residential located within 200 meers from expressway will be necessary to install noise barriers in 4960m in total. St. John Bosco Parish Church and Caritas Don Bosco School are located in above clustered residential. But in order to comply the DENR standard, they are necessary to install double grazed windows for those buildings.

Countermeasure for compliance to DENR noise standard

● 3m Noise Barrier L = 4960m
(5 residential including church and school
● Double-grazed windows for church and school

9.5.4.5 Protected Areas

The Philippine Government established the National Integrated Protected Areas System (NIPAS) in 1992, which designated the “protected areas” in its National Integrated Areas System Act: NIPAS Act RA 7586. In the Act, the following categories of protected areas are established:

- Strict Nature Reserve;
- Natural Park;
- Natural Monument;
- Wildlife Sanctuary;
- Protected Landscapes and Seascapes;
- Resource Reserve;
- Natural Biotic Areas; and
- Other categories established by law, conventions or international agreements which the Philippine Government is a signatory.

The protected areas include not only initial components of protected areas designated by NIPAS but also Proclaimed Protected Areas under NIPAS.

In the study area, there is neither the Initial Component of Protected Area nor Proclaimed Protected Area present. The nearest known proclaimed protected areas as shown in **Figure 9.5.4-17** are **Taal Volcano National Park** and **Mt. Makiling National Park**, which are **14.6 km** and **15.7 km south** of the proposed CALA Expressway, respectively.

Boundaries of two National Parks include buffalo zones. Along west boundary of Mt. Makiling National Park, South Luzon Expressway Extension was constructed and opened to traffic in 2010, and the private developer built large scale residential subdivision at north-west side of the boundary of this national park.

Huge developments, such as condominiums, villas, hotels, restaurants and golf courses have been and are being built in the area aong the northern boundary of Taal Volcano Natonal Park. So, urbanization along the boundary of this park is rapidly progressing.

In addition, the study area does not include designated wetland under the Ramsar Convention, World Heritage-listed area and Man and the Biosphere Reserve designated by UN Educational, Scientific and Cultural Organization.

Source: JICA Study Team (2012)

FIGURE 9.5.4-17 LOCATION MAP OF THE TAAL VOLCANO AND MT. MAKILING NATIONAL PARKS RELATIVE TO THE PROPOSED CALA EXPRESSWAY ALIGNMENT

9.5.5 Environmental Management Plan

Impact to natural and social environment for directly affected area and its PAPs were predicted, magnitude of the impact was assessed based on the Study and the Environmental Management Plan was prepared..

9.5.5.1 Pre-Construction and Construction Phase

Assessment results and mitigation measures are shown in **Table 9.5.5-1.**

TABLE 9.5.5-1 ENVIRONMENTAL MANAGEMENT PLAN (PRE-CONSTRUCTION AND CONSTRUCTION PHASE)

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing	Cost
Involuntary Relocation/ Resettlement	• A total of 36 structures (i.e. residential houses) with 50 households (or 197 people) will be affected and relocated. All of them are formal settlers. A total of about 77 farm land lots (or 64.7 ha.) will be affected. About 70.1% are land owners, about 5.2% are tenants. 24.7% are free occupants with permit of land owners. Number of people whose farm lands affected are estimated at about 460.	• To prepare Final RAP with full consensus with PAPS, and inventories of land and other assets.	• PMO-BOT with the Detailed Design (D/D) Consultant	• D/D Stage	• Included in D/D Cost • Parcellary Survey Cost: Php 4.3 Million • Final RAP preparation: Php 6.13 Million • Independent Assesor: Php 4.84 Million
		• To provide just (or fair) compensation, or land swapping (if feasible), and other supports that are stated in LARRIPP/WB OP 4.12.	• PMO-BOT, Region IV-A, DEO, MRIC/CRIC	• D/D Stage	• Included in D/D Cost
	• Loss of commercial crops like pineapple, coffee, coconut, papaya, cassava, and banana.	• A final Ressettlement Action Plan (RAP) with full consensus with the PAPs, and inventories of land and other properties shall be prepared prior to implementation of the project; and • Just compensation in accordance with LARRIPP/WBOP 4.12 shall be accorded to PAPs for loss of assets and source of livelihood.	• PMO-BOT with D/D Consultant	• D/D Stage	• Included in D/D Cost
	• Disturbance to agricultural activities along the proposed CALA Expressway alignment.	• Temporary crossings shall be provided to ensure safe and unhampered movements of framers to and from their agricultural lands; and • Just compensation in accordance with LARRIPP/WBOP 4.12 shall be accorded to PAPs for loss of assets and source of livelihood.	• PMO-BOT with D/D Consultant	• D/D Stage	• Included in D/D Cost

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing	Cost
Local Economy/ Employment and Livelihood	• (+) Demands for labor to the construction and related work are expected to be increased temporarily, which further stimulates local economy.	• To assure priority employment of PAPs during construction. Construction contract between DPWH and the selected contractor shall specify this condition.	• PMO-BOT with D/D Consultant	• Before finalizing bid document and contract	• Included in D/D Cost
			• PMO-BOT with the Construction Supervision (C/S) Consultant		• Included in C/S Cost
	• (-) Shops, small businesses and farmers locating on CALAX construction sites will have to be relocated.	• To provide just (or fair) income loss compensation and rehabilitation assistance.	• PMO-BOT, Region IV-A, DEO, MRIC/ CRIC, D/D and C/S Consultant	• During RAP Implementation	• Included in RAP Implementation Cost
Land Use	• About 118.8 ha of lands, of which 64.7 ha. are farming/natural vegetation will be lost and changed to CALAX. These lots along the new road and around the interchanges might be converted to market places / shopping malls, or residential uses. • Loss of fertile topsoil	• Respective LGUs shall amend city/municipality Land Use Plan and Zoning Ordinance to control unorderly urban development along CALAX and to restrict conversion of farm land to other land use purposes, and strictly enforce amended zoning ordinance. LGUs should also freeze the development within the proposed ROW.	• PMO-BOT, Region IV-A through Regional Development Council		• Included in Administrative Cost
		• Construction activities shall be limited to the required ROW limit of 50-60m to minimize crop damage and loss of farm land. • Unnecessary earth moving and related activities shall be minimized to prevent extensive loss of fertile topsoil. • Unrecycled/unused topsoil shall be replaced/delivered to the adjacent farmlands.	• PMO-BOT with C/S Consultant	• During Construction Stage	• Included in C/S Cost
Utilization of Local Resources	• Design can be made to balance cut soil volume and embankment soil volume within the project, so borrow material can be minimized (available from the Project). Ready-mixed concrete available in the Project area.	• Detailed design shall adopt construction methods which utilize available local resources.	• PMO-BOT with D/D Consultant	• D/D Stage	• Included in D/D Cost
			• Contractor, PMO-BOT with C/S	• Construction Stage	• Included in C/S Cost

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing	Cost
			Consultant		
		• Construction contract between DPWH and the selected contractor shall specify maximum utilization of available local resources.	• PMO-BOT with D/D Consultant	• D/D Stage	• Included in D/D Cost
			• Contractor, PMO-BOT with C/S Consultant	• Construction Stage	• Included in C/S Cost
Farm Land	• About 64.7 ha of farmland/ natural vegetation will be lost by this project in exchange to the expressway. Negative impact to farmers is expected in a form of loss of lands.	• To provide just (or fair) compensation, replacement of land when feasible and other supports such as disturbance compensation and rehabilitation assistance in accordance with LARRIPP/WB OP 4.12.	• PMO-BOT, Region IV-A, DEO, MRIC/ CRIC, D/D and Consultant	• D/D Stage	• Included in D/D Cost
		• Detailed design shall be undertaken focusing on existing farm roads to assure accessibility to farm lands.	• PMO-BOT with D/D Consultant	• D/D Stage	• Included in D/D Cost
Social Institutions, Social Infrastructure and Local Decision-making	• During the construction, it might create difficulty in accessing to social infrastructures such as market or access to jobs due to the increasing in vehicles and congestion during construction.	• To construct temporary road within the road right-of-way for transporting construction materials, equipment and laborers.	• PMO-BOT with D/D Consultant	• D/D Stage	• Included in D/D Cost
		• To implement proper traffic management with close coordination with local police and Barangay captains. • To provide proper information on construction schedule and traffic management plan.	• Contractor, PMO-BOT with C/S Consultant	• Construction Stage	• Included in Civil Work Cost
Means of Livelihood for the Poor and Socially Vulnerable	• About 84% of affected households belong to the poor (or below Region IV-A poverty threshold). • (+) Demands for labor to the construction and related work are expected to be increased temporarily, which further stimulates local economy.	• Qualified skilled workers and laborers in the Direct Impact Areas (DIA) duly endorsed by the Brgy. Captains shall be given priority in hiring during implementation of the project. • To include condition of priority employment of PAPs below poverty line into construction contractor's contract.	• PMO-BOT with D/D Consultant	• D/D Stage	• Included in D/D Cost
			• Contractor, PMO-BOT with C/S Consultant	• Construction Stage	• Included in C/S Cost
	• (-) Shops and small businesses locating on CALAX construction sites will have to be relocated.	• To provide just (or fair) compensation for income loss and rehabilitation assistance in accordance with LARRIPP/WB OP 4.12.	• PMO-BOT, Region IV-A, DEO, MRIC/CRIC	• D/D Stage	• Included in D/D Cost

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing	Cost
Water Usage and Water Rights	• 11 households (34%) whose houses are taken by the project rely on well for drinking water, 8 (25%) on piped water and 13 (41%) on purchase. • 12 households (37%) rely on well for water for washing clothes and dishes, 14 (44%) on piped water and 6 (19%) on purchase. • Wells are individually owned. • Interruption of water supply in areas serviced by the wells located in Brgy. Sabutan, Silang, Cavite. • There are 3 river resorts near the project site. Access to the site of one resort is affected. • There is no irrigation system in the project area.	• Affected wells shall be properly compensated at a market price. • A box culvert shall be constructed under the expressway to provide access to the one river resort. • Relocation and restoration of affected social service utilities shall be undertaken in the shortest possible time to minimize inconvenience to the affected public; • Affected residents shall be notified in advance to enable them to prepare and undertake necessary measures. Notice to the public shall be posted at conspicuous areas such as municipal and Barangay halls, schools, and places of worships; and • Close coordination with concerned utility companies shall be undertaken to expedite relocation and restoration of the affected utilities.	• PMO-BOT with D/D and C/S Consultant	• D/D and C/S Stage	• Included in D/D and C/S Cost
Sanitation	• Sanitary condition around construction site is anticipated to become worse due to generation of wastes during the construction.	• Temporary sanitation facilities such as garbage bins and portable toilets must be provided by the Contractor at the construction area. • Regular disposal of the solid and domestic wastes to the designated disposal areas duly-approved by respective LGUs and DPWH must be strictly complied with. • Weekly inspection of the work sites must be undertaken by DPWH to ensure proper management of the solid and domestic wastes generated.	• PMO-BOT with C/S Consultant and Contractor	• Construction Stage	• Included in C/S Cost and Civil Work Cost • Sanitation facility cost: Php 4,243 Million • Unsuitable material disposal: Php 53.23 Million
Risk, HIV/AIDS, Infectious disease	• Long-term exposure of workers, especially heavy equipment operators to high noise level may lead to hearing impairment. • Long-term exposure of workers, especially heavy equipment operators to exhaust gas	• Workers shall be provided with adequate PPEs such as ear muffs, gas/protective masks, hard hats, safety boots, safety gloves, reflectorized vests, and other related safety gears; • Wearing of the provided PPEs shall be strictly	• PMO-BOT with C/S Consultant and Contractor	• Construction Stage	• Included in C/S Cost and Civil Work Cost

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing	Cost
	emissions may result to upper respiratory ailments. • Direct contact of workers handling toxic materials may lead to chronic diseases.	implemented; • Personnel shall be trained on safety procedures and educated on health standards; • Personnel shall be comprehensively trained on handling of toxic materials;			
	• Temporally increase in infectious and communicable diseases is possible during construction phase due to influx of construction workers. • Poor sanitary environment can generate and spread communicable diseases such as diarrhea, common cold, and such. • Possible spread of sexually transmitted diseases	• Temporary sanitation facilities such as garbage bins and portable toilets must be provided by the Contractor at the construction area. • Regular disposal of the solid and domestic wastes to the designated disposal areas duly-approved by respective LGUs and DPWH must be strictly complied with. • Weekly inspection of the work sites must be undertaken by DPWH to ensure proper management of the solid and domestic wastes generated. • To provide Information, Education and Communication (IEC) on healthy behavior and Sexually Transmitted Disease (STD) to the construction workers. • Proper waste segregation scheme will be strictly enforced; • Domestic and solid wastes generated by the workers shall be regularly hauled and disposed to designated dumpsite in Brgy. Lalaan 1 and Brgy. Tubuan 1, Silang, Cavite, and approved dumpsites in Biñan and Santa Rosa Cities; • Inspection of workers' camps and field offices shall be conducted daily to ensure good housekeeping; • Medical screening of migrant workers shall be undertaken during hiring period; • Regular medical check-up of workers shall be conducted; and	• PMO-BOT with C/S Consultant and Contractor	• Construction Stage	• Included in C/S Cost and Civil Work Cost • HIV/AIDS counter measures: Php 1.4 Million

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing	Cost
		• Group consultations shall be undertaken to promote awareness among the community on how to prevent transmission of STDs			
Accident	• Accidents involving construction works, vehicles and machineries operation are anticipated. Traffic accidents may happen by construction vehicles and heavy machines during construction. • Fall down from higher position such as piers and bridges may happen.	• To construct temporary construction road within road right-of-way, implement traffic management plan in coordination with local police and inform construction schedule, etc. to people within the project area to prevent traffic accidents. • To educate construction workers on various construction safety measures, and strictly implement such safety measures. • To provide adequate lighting and reflectors and construction warning signs at construction sites as well as at traffic accident-prone sections of related roads. • To provide temporary fences so as ordinary people not to enter in the construction sites.	• PMO-BOT with C/S Consultant and Contractor	• Construction Stage	• Included in C/S Cost and Civil Work Cost • Safety measures cost: Php 2.8 Million
	• Safety of residents and pedestrians near the construction areas.	• All excavation areas shall be enclosed with metal sheets and barriers shall be installed at the construction areas to limit access to the public, especially children; • Pedestrians crosswalks shall be provided at critical construction areas such as built-up areas, schools, places of worships, hospitals, and residential areas; • Adequate lighting and reflectorized warning signs shall be installed within the construction sites to ensure safety of public, especially during nighttime; and • Well-trained traffic aides and flagmen shall be designated at critical construction sites such as those adjacent to residential and built-up areas to assist pedestrians ;	• PMO-BOT with C/S Consultant and Contractor	• Construction Stage	• Included in C/S Cost and Civil Work Cost
	• Safety of motorist plying the E. Aguinaldo Highway, Silang, Cavite section, Nuvali	• Adequate lighting and reflectorized warning signs shall be installed along the entire	• PMO-BOT with C/S	• Construction Stage	• Included in C/S Cost and

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing	Cost
	Spine Road, Laguna Boulevard, Nuvali Road, Mamplasan Overpass-Greenfield Parkway Road, and other main and secondary roads crossed by the proposed CALA Expressway alignment. • Safety of motorist at bridge and interchange construction sites.	construction sites, particularly at critical areas such as bridge sites and interchange locations to ensure safety of motorists, especially during nighttime; • A sound Traffic Management Plan (TMP) and re-routing schemes along major roads, bridge sites and interchange locations duly approved by the concerned LGUs shall be strictly implemented; • Well-trained traffic aides and flagmen shall be assigned along the major roads, bridge sites, interchange locations, and other critical construction sites such as those adjacent to residential and built-up areas to direct traffic and assists motorists; and • Parking of idle construction equipment and vehicles along the roads shall be prohibited, especially during nighttime.	Consultant and Contractor		Civil Work Cost
	• Possible traffic congestion along E. Aguinaldo Highway, Silang, Cavite section, Nuvali Spine Road, Laguna Boulevard, Nuvali Road, Mamaplasan Overpass-Greenfield Parkway Road, and other main and secondary roads intersected by the proposed CALA Expressway alignment. • Traffic congestion at bridge and interchange construction sites.	• A sound TMP and re-routing schemes duly approved by the concerned LGUs shall be strictly implemented to minimize traffic congestion along bridge sites, interchange locations, and other busy construction areas; • Well-trained traffic aides and flagmen shall be assigned along the major roads, bridge sites, interchange locations, and other busy areas to direct traffic; • Parking/waiting time of construction vehicles and equipment along major roads and busy areas shall be limited to prevent traffic congestion; and • Delivery and transport of fabricated construction materials will be done during the nighttime.	• PMO-BOT with C/S Consultant and Contractor	• Construction Stage	• Included in C/S Cost and Civil Work Cost
Topography, Geographical	• Possible occurrence of landslide and soil erosion along cut section and slope area.	• To provide suitable angle of repose along cut area in order to prevent landslide and soil	• PMO-BOT with D/D	• D/D Stage	• Included in D/D Cost

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing	Cost
Feature		erosion. • To provide sodding for slopes to prevent erosion. • To minimize a removal of vegetation and tree cutting	Consultant		
			• PMO-BOT with C/S Consultant and Contractor	• Construction Stage	• Included in C/S Cost and Civil Work Cost
Soil Erosion	• During the construction stage, erosion is likely to occur mainly by intense rain.	• To provide proper temporary drainage system to prevent water concentration at certain locations. • To provide temporary dike within the road right-of-way to prevent flow of eroded soils. • For high cut or embankment construction section, to cover embankment by vinyl sheet during heavy rain for prevention of slope collapse.	• PMO-BOT with D/D Consultant	• D/D Stage	• Included in D/D Cost
			• PMO-BOT with C/S Consultant and Contractor	• Construction Stage	• Included in C/S Cost and Civil Work Cost
Groundwater	• Groundwater table at project site is between GL-6m and GL-10m deep. Groundwater level might temporarily be dropped during construction by cutting off of recharge source e.g. surface water flow. • Hazardous material may seep into the ground water. • Possible contamination of groundwater table due to oil seepage and indiscriminate disposal of toxic chemicals (i.e. paints and used oils)	• To seal, remove, or contain solid wastes and other construction hazardous materials off from bare ground to prevent seeping into the ground especially when it rains. • To install and manage portable toilets for construction workers properly. • To maintain machineries and generators and prevent oil leakage. • Motor pool areas shall be located away from existing groundwater sources to prevent contamination; • Storage depots for used oils and other toxic wastes shall be provided in the motor pool area to temporarily hold these materials prior to disposal; and • Regular disposal of hazardous wastes such as used oils, worn out parts, and related materials shall be handled by DENR-accredited company and shall be disposed to DENR-approved sites.	• PMO-BOT with C/S Consultant and Contractor	• Construction Stage	• Included in C/S Cost and Civil Work Cost
Flora, Fauna	• There is no rare, threatened and endangered	• To minimize the loss of trees applying many	• PMO-BOT	• D/D Stage	• Included in

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing	Cost
and Biodiversity	flora and fauna species in the vicinity of the proposed alignment. • 9393 trees may be affected in order to acquire RROW.	planting trees in vacant space of RROW and vicinity area.	with D/D Consultant		D/D Cost
	• Temporary disturbance to wildlife movements and activities, particularly avifauna (bird).	• “Permit to Cut” shall be secured prior to any tree cutting activities along the alignment; • Balling/relocation of trees shall be carefully undertaken; • Tree cutting shall be limited within the required ROW of 50-60m; • Replacement of cut trees in reforestation area/s designated by the DENR-FMB Region IV-A shall be undertaken. Ratio and types of species to be introduced shall be determined by the DENR-FMB Region IV-A; • Planting of trees along National Roads as per DPWH D.O. 131, series of 1995) shall be strictly implemented; • Temporary but unavoidable bird activities such as feeding and nesting can be performed at adjacent forest patches and grassland areas; • Bird poaching shall be strictly prohibited; and • Workers shall be educated on wildlife fauna conservation and protection, especially avifauna to discourage possible poaching.	• PMO-BOT with C/S Consultant and Contractor	• Construction Stage	• Included in C/S Cost and Civil Work Cost • Tree planting cost:: Php 14.81 Million
Landscape	• Adverse impact on landscape is expected.	• To adopt the landscape design during Detailed Engineering Design Stage and discuss the impact of landscape with people.	• PMO-BOT with D/D Consultant	• D/D Stage	• Included in D/D Cost
Global Warming	• It is estimated that total emission of CO2 will be about 78,908 tons during construction phase.	• To use clean filters and mufflers of engines. • To minimize idling of engines. • To minimize traveling frequencies between construction sites and origin by making and executing efficient construction materials transportation schedule. • To prohibit old model equipment and vehicles. • To follow mitigation measures suggested for	• PMO-BOT with D/D Consultant	• D/D Stage	• Included in D/D Cost
			• PMO-BOT with C/S Consultant and Contractor	• Construction Stage	• Included in C/S Cost and Civil Work Cost • Tree planting

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing	Cost
		AIR POLLUTION. • To off-set this impact, plant enough trees along expressway and interchange sites.			cost:: Php 14.81 Million
Air Pollution	• Air quality was measured at 6 stations in dry season (2012). Results shows that highest values of TSP, SO2 and NO2 are 147 (DENR Standard: 300), 31 (DENR Standard: 340) and 11 (DENR Standard: 260), respectively. All parameters are far below DENR standards. (DAO-14) • Air pollution will be expected due to emissions from construction vehicles and dust generated from construction activities during construction period. In dry and wet weather pollutants and particulates matters disperse to further distance and might affect sensitive area such as hospital and residential area	• To spray exposed ground with water to minimize dust re-suspension. • To cover temporary stockpiles of excavated materials and construction spoils with tarpaulin or sack materials. • To transport and dispose construction spoils regularly to hauled areas duly-approved by the DENR/LGUs. • To perform regular maintenance of construction vehicles, heavy equipment and machineries. • Follow mitigation measures suggested for GLOBAL WARMING. • Aggravation of air pollution shall be minimized by adoption of above measures, considering that most of construction sites are located in the rice field areas.	• PMO-BOT with C/S Consultant and Contractor	• Construction Stage	• Included in C/S Cost and Civil Work Cost
	• Possible increase in the TSP level in the affected areas due to dust re-suspension.	• Exposed and cleared construction areas shall be regularly sprayed with water to minimize dust re-suspension; • A 20kph speed limit along the construction areas, particularly at dust sensitive receptor areas such as residential, schools, and hospitals shall be strictly enforced; • Temporary stockpiles of unrecycled materials and construction spoils shall be covered with tarpaulin or sack materials to prevent re-suspension of particulate matters; • Construction spoils shall be regularly hauled and disposed to areas duly-approved by the DENR and/or concerned LGUs; • Delivery and hauling trucks shall be provided with tarpaulin or sack material to minimize	• PMO-BOT with C/S Consultant and Contractor	• Construction Stage	• Included in C/S Cost and Civil Work Cost

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing	Cost
		dust re-suspension;			
		• Quarterly TSP monitoring at dust sensitive receptor areas shall be conducted during the pre-construction and construction phases of the project.	• Contractor with supervision of PMO-BOT and C/S Consultant	• Construction Stage	• Included in Civil Work Cost (Approximately Php 200,000 for construction period)
	• Possible increase in the concentration levels of SO_2 and NO_2 due to exhaust gas emissions from various construction vehicles, equipment, and machineries.	• PMS of construction equipment and machineries, and vehicles shall be strictly complied with to ensure these are in good working condition at all times; • Daily routine check-up of construction vehicles, equipment, and machineries must be strictly complied with; and	• PMO-BOT with C/S Consultant and Contractor	• Construction Stage	• Included in C/S Cost and Civil Work Cost
		• Quarterly SO_2 and NO_2 sampling at air pollution sensitive areas will be conducted during the pre-construction and construction phases of the project.	• Contractor with supervision of PMO-BOT and C/S Consultant	• Construction Stage	• Included in Civil Work Cost (Approximately Php 400,000 for construction period)
Water Pollution	• Water quality was measured at 3 stations in dry season (2012). Total Californ exceeds DENR Standard at all stations. Other parameters (ph, TSS, Lead, Dissolved Oxygen and BOD) did not exceed DENR (DAO-34). It is important not to worsen water quality than at present. • Possible decrease in water flow rate of the rivers and creeks crossed by the CALA Expressway alignment due to impediment caused by improper management of construction spoils and debris, particularly	• To adopt construction method minimizing generation of water pollution (e.g. Extra care shall be made to prevent cut/embankment and other materials to fall into the river). • To seal, remove, or contain solid wastes and other construction hazardous materials off from bare ground to prevent seeping into the ground especially when it rains. • To install and manage portable toilets for construction workers properly. • To maintain machineries and generators and to prevent oil leakage.	• PMO-BOT with C/S Consultant and Contractor	• Construction Stage	• Included in C/S Cost and Civil Work Cost
			• Contractor with supervision of PMO-BOT and C/S Consultant	• Construction Stage	• Included in Civil Work Cost (Approximately Php 5,000 per sampling activity)

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing	Cost
	stripped vegetation.	• Nets shall be provided at bridge construction sites to prevent debris from falling into the waterways and cause water flow impediment; • Temporary rechanneling of stream flow along major waterways such as Malaking Ilog River, Lumbia River, and Malindig river shall be considered; • Construction spoils and debris, particularly stripped vegetation shall be regularly hauled and disposed to designated dumpsite in Brgy. Lalaan 1 and Brgy. Tubuan 1, Silang, Cavite and designated dumpsites in Biñan and Sta. Rosa Cities. • Aggravation of water quality will be minimized by adoption of above measures.			
	• Possible increase in the present level of total coliform content of the waterways crossed by the proposed CALA Expressway alignment, particularly Malaking Ilog River, Lumbia River, and Malindig River due to improper management of solid and domestic wastes to be generated by the construction workers during implementation of the project.	• Temporary sanitation facilities, particularly potable toilets and garbage bins shall be provided at all construction sites, temporary field offices, and workers' camp sites to ensure proper solid and domestic wastes management; • Proper waste segregation shall be strictly implemented; • Solid and domestic wastes generated by the workers shall be regularly hauled and disposed to designated dumpsite in Brgy. Lalaan 1 and Brgy. Tubuan 1, Silang, Cavite and designated dumpsites in Biñan and Sta. Rosa Cities; • Daily inspection of the workers' campsites, temporary field offices, and all construction areas provided with temporary sanitation facilities shall be strictly implemented to ensure proper wastes and sanitation management; and • Coliform level monitoring along selected	• PMO-BOT with C/S Consultant and Contractor	• Construction Stage	• Included in C/S Cost and Civil Work Cost

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing	Cost
		waterways shall be conducted twice a year.			
	• Possible increase in the siltation level of the waterways crossed by the proposed CALA Expressway alignment, particularly Malaking Ilog River, Lumbia River, and Malindig River due to surface run-off.	• Earth moving activities and related construction works shall be cautiously undertaken to minimize soil disturbance that may cause surface run off, particularly along cut and slope areas adjacent to the waterways; • Temporary silt traps shall be constructed along the waterways to prevent siltation caused by surface run-off, particularly during high precipitation periods; • Exposed and open construction areas adjacent to the waterways shall be re-vegetated to prevent surface run-off, particularly during high precipitation periods; and • TSS level monitoring along selected waterways shall be conducted twice a year.	• PMO-BOT with C/S Consultant and Contractor	• Construction Stage	• Included in C/S Cost and Civil Work Cost
	• Possible increase in pH level of the waterways crossed by the proposed CALA Expressway alignment particularly Malaking Ilog River, Lumbia River, and Malindig River during bridge construction due to concrete spillage.	• Concrete pouring and road surfacing at bridge construction sites shall be closely supervised to prevent spillage into the waterways; • Nets shall be installed at bridge construction sites wo prevent contamination of the waterways in case of accidental concrete spillage during pouring; and • Washing of transit mixers and related construction equipment along the waterways shall be strictly prohibited to prevent increase in pH level.	• PMO-BOT with C/S Consultant and Contractor	• Construction Stage	• Included in C/S Cost and Civil Work Cost
	• Possible increase in the oil and grease level of the waterways crossed by the proposed CALA Expressways alignment, particularly Malaking ilog River, Lumbia River, and Malindig River due to oil spillage from heavy equipment and machineries during bridge construction.	• Public Maintenance System (PMS) of the construction equipment and machineries shall be strictly complied with to ensure that these are in good working conditions at all times; • Washing of construction equipment and machineries along the waterways shall be strictly prohibited to prevent oil and grease contamination; and	• PMO-BOT with C/S Consultant and Contractor	• Construction Stage	• Included in C/S Cost and Civil Work Cost

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing	Cost
		• On-site repair and maintenance of the construction equipment shall be strictly prohibited.			
Soil Contamination	• During the construction, excavated soil, surface water and oil from vehicles and machineries may pollute the ground.	• To seal, remove, or contain solid wastes and other construction hazardous materials off from bare ground to prevent seeping into the ground especially when it rains. • To install and manage portable toilets for construction workers properly. • To maintain machineries and generators and prevent oil leakage. • Aggravation of soil contamination shall be minimized by adoption of above measures.	• PMO-BOT with C/S Consultant and Contractor	• Construction Stage	• Included in C/S Cost and Civil Work Cost
Solid Waste	• Construction debris and excavated soil are generated during the construction. Human waste will be generated from workers during construction and operation.	• To seal, remove, or contain solid wastes and other construction wastes. • To dispose them at the disposal sites approved by respective LGUs and DPWH. • To select eco-friendly waste disposal methods. • To edificate and educate construction workers. • To conduct EIS on the disposal site if the site is to be newly developed for the project. • Effect of waste shall be minimized by adoption of above measures.	• PMO-BOT with C/S Consultant and Contractor	• Construction Stage	• Included in C/S Cost and Civil Work Cost
Noise	• Noise level was measured at 6 stations in dry season (2012). Noise level at all stations exceeded DENR Standard (DAO-14). It is important to adopt measures not to worsen noise level than at present. • Noise occur from machineries and vehicles used during construction work, hence construction work and transporting of materials need to be carefully done.	• To bore piles should be adopted during foundation works instead of pile driving. • To use noise suppressors equipped machineries. • To work in day time or non-critical time to minimize noise disturbance to adjacent residential areas. • To install temporary noise barriers at noise sensitive areas such as residential, schools, and places of worships to maintain noise level at permissible limit. • To strictly prohibit overloading on trucks. • PMS of the construction equipment and	• PMO-BOT with C/S Consultant and Contractor	• Construction Stage	• Included in C/S Cost and Civil Work Cost
			• Contractor with supervision of PMO-BOT and C/S Consultant	• Construction Stage	• Included in Civil Work Cost (Approximately Php 125,000 per construction period)

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing	Cost
		machineries shall be strictly complied with to ensure that these are in good working conditions at all times. • Aggravation of noise and vibration shall be minimized by adoption of above measures.			
Offensive Odor	• Possible offensive odor might be generated from construction vehicles and portable toilets for workers during construction.	• To seal, remove, or contain solid wastes and other construction wastes. • To dispose them off in an LGU approved solid wastes disposal site. • To install and manage portable toilets for construction workers properly. • To do good camp management.	• PMO-BOT with C/S Consultant and Contractor	• Construction Stage	• Included in C/S Cost and Civil Work Cost
Traffic Congestion	• During the construction, trucks transporting construction materials will cause traffic congestion.	• To implement traffic management plan in coordination with local police. • To transport materials during off-peak hours. • To prohibit parking of construction-related vehicles on the national/provincial roads. • To use temporary construction road built within the acquired road right-of-way as much as possible. • To educate truck drivers.	• PMO-BOT with D/D and Consultant	• D/D and Stage	• Included in D/D and Cost

9.5.5.2 Operation and Management (O & M) Phase

Environmental Management Plan for O & M phase is shown in **Table 9.5.5-2.**

TABLE 9.5.5-2 ENVIRONMENTAL MANAGEMENT PLAN (OPERATION AND MAINTENANCE PHASE)

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing	Cost
Involuntary Relocation/ Resettlement	• Chances of PAFs degrade quality of livelihood after relocation	• PAF's recovery way of life after resettlement needs to be taken care of. • DPWH shall monitor impacts after construction.	• PMO-BOT	• O&M Stage	• Included in DPWH Admin. Cost
Local Economy/ Employment Livelihood	• The newly constructed CALA Expressway will: ➢ Provide fast, safe, comfortable and reliable means of transport in Cavite and Laguna Provinces; ➢ Decongest traffic of roads in Cavite and Laguna Provinces; ➢ Support economic development by providing better transport access to economic/ industrial zones in the area; and • Support sound urbanization in the areas traversed by the CALA Expressway	• periodic inspection and maintenance of the newly constructed CALA Expressway based on standard DPWH inspection and maintenance procedures for roads and bridges shall be undertaken to maximize optimum service to road users;	• Expressway Operator	• O&M Stage	• Included in O&M Cost of Expressway
	• Changed way of life and loss of livehood of tenant/subsistence farmers due to land use conversion by the developers/landowners	• To educate and finance farmers so as for them to adopt above. • To include in the Toll Concession Agreement the priority employment of PAPs for O & M activities.	• LGU and Expressway Operator	• O&M Stage	
Land Use	• Possible conversion of **marginally utilized** agricultural lands adjacent to the newly constructed CALA Expressway, particularly in Brgy. Kaong, Sabutan, Tibig, Carmen, and Inchican in silang, Cavite into other uses.	• Concerned LGUs must pass necessary ordinances and strictly implement such to support existing legislations prohibiting illegal conversion of agricultural lands into other uses.	• LGU	• O&M Stage	
Farm Land	• Estimated monetary values of crops that would yield in the land acquired for CALAX were estimated to be 570,000 pesos per year. Some of PAPs who lose farm land might face financial difficulty if their losses of income sources are not properly compensated or alternative means of compensation have been provided.	• To adopt high productivity farming methods and high yield seeds. • To educate and finance farmers so as for them to adopt above • Proper compensation such as job training and prioritized job opportunity.	• LGU	• O&M Stage	

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing	Cost
Accident	• CALAX will be built as 4-lane divided facility with center median and international geometric design standard is adopted therefore, occurrence of accidents will be unlikely due to quality of the facility. Accident may occur only when a driver does not follow traffic rules and regulations. Traffic on existing roads will be decreased, thus accidents will be expected to reduce. • Traffic accident on ordinary roads will occur at the entrances/exits to/from the expressway. • Safety of motorists plying the newly constructed CALA Expressway	• Provide traffic signal controlled intersection with channelization to minimize traffic accidents. • Provide sidewalks with guardrails, pedestrian crossings on the ordinary roads near interchanges. • Educate drivers, who works in trucking company, Japanese manufacturing company located in the project area to follow traffic rules and regulations. • Install traffic signboards at appropriate places. • Regularly repair roads and bridges to ensure good condition for vehicle movement. • Road signs and markings, information display board, and streetlights, especially along bridges and interchanges shall be properly maintained; and • Periodic inspection and maintenance of the newly constructed CALA Expressway based on standard DPWH inspection and maintenance procedures for roads and bridges shall be undertaken to maximize optimum service to road users.	• LGU and Expressway Operator/PM O-BOT	• O&M Stage	
Flora, Fauna and Biodiversity	• There is no rare, threatened and engagered faonch and flora species in the vicinity of the proposed alighment.	• To plant many trees in vacant space of RROW and maintain the watering for glass and trees.	• Expressway Operator	• O&M Stage	• Included in O&M Cost of Expressway
Landscape	• Viaduct structure will be constructed along residential area and commercial area. Adverse impact on landscape is expected.	• To clean the viaduct structure for keeping a good view.	• Expressway Operator	• O&M Stage	• Included in O&M Cost of Expressway

<table>
<tr><th>Item</th><th>Potential Impact</th><th>Mitigation/Enhancement Measures</th><th>Responsible Organization</th><th>Implementing Timing</th><th>Cost</th></tr>
<tr><td>Global Warming</td><td>Amount of GHG e.g. CO2 is expected to increase along CALAX as number of vehicles on CALAX increases. However, overall CO2 including related ordinary roads, is estimated to decrease 89,330 tons and 121,753 tons in 2017 and 2030, respectively compared with the without Project case.
CO2 estimation(With CALAX (Laguna Section and Without) unit; ton/year
<table>
<tr><th>Year</th><th>W/O case</th><th>With case</th><th>W-W/O</th></tr>
<tr><td>2017</td><td>3,614,788</td><td>3,525,457</td><td>-89,330</td></tr>
<tr><td>2020</td><td>4,197,951</td><td>4,076,198</td><td>-121,753</td></tr>
</table></td><td>• To use clean filters and mufflers of engines
• To minimize idling of engines
• To maintain vehicle mechanics, engines, oil filter, exhaust pipe, and such in proper shape
• To prohibit old model vehicles
• To strengthen vehicle emission regulation</td><td></td><td></td><td></td></tr>
<tr><td rowspan="3">Air Pollution</td><td rowspan="2">Predicted air qualities such as NOX, SO2and PM-10 are less than 1μg/Ncm with CALAX. During O & M period, all parameters are estimated to be below DENR Standards. (DAO-14)
Maximum Predicted Air Quality along CALAX(Laguna section)
<table>
<tr><th>Year</th><th>NOX (μg/ Ncm)</th><th>SO2 (μg/ Ncm)</th><th>PM-10 (μg/ Ncm)</th></tr>
<tr><td>2017</td><td>11.724</td><td>31.0009</td><td>147.014</td></tr>
<tr><td>2020</td><td>11.884</td><td>31.0011</td><td>147.019</td></tr>
<tr><td>2030</td><td>12.163</td><td>31.0017</td><td>147.027</td></tr>
<tr><td>DENR</td><td>260</td><td>340</td><td>300</td></tr>
</table></td><td>• To clean the dust on road daily in order to reduce fine particles.
• To spread water on the road and plants along the road.</td><td>• Expressway Operator</td><td>• O&M Stage</td><td>• Included in O&M Cost of Expressway</td></tr>
<tr><td>• To do campaign for minimizing idling of engines and using clean filters and mufflers of engines.</td><td>• LTO</td><td>• O&M Stage</td><td>• LTO</td></tr>
<tr><td>• Possible increase in TSP level in areas along the newly constructed CAL Expressway due to increase in vehicular traffic volume.</td><td>• Survival rate of the treest planted along the newly constructed CALa Expressway (DPWH D.O. 131, series of 1995) shall be continuously monitored. Trees not only act as natural sieves for re-suspended dust particles, but also enhance aesthetics of the road sides; and
• The Philippine Clean Air Act and Anti-Smoke Belching Law shall be strictly implemented by the concerned government agencies.</td><td>• Expressway Operator</td><td>• O&M Stage</td><td>• Included in O&M Cost</td></tr>
</table>

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing	Cost
	- Possible increase in the level of gaseous air contaminants such as SO$_2$ and NO$_2$ due to increase in vehicular traffic volume.	- Survival rate of the trees planted along the newly constructed CALA Expressway (DPWH D.O. 131, series of 1995) shall be continuously monitored. Trees absorb gaseous air pollutants and convert them into oxygen through transpiration process; and - The Philippine Clean Air Act and Anti-Smoke Belching Law shall be strictly implemented by the concerned government agencies.	- Expressway Operator	- O&M Stage	- Included in O&M Cost (Php 10,000 per sampling station)
Water Pollution	- Litters on road surface and eroded soils from embankment slope may cause water pollution, however, minimal impact.	- Implement proper road maintenance. - To install proper drainage systems. - To remove the solid waste stuff under the culvert before and after rainy season.	- Expressway Operator	- O&M Stage	- Included in O&M Cost
Noise	- Predicted noise level at church and school (2 points) along CALAX are 69.5 dBA during day time period and 65.8 dBA for night time period on year 2020.Since the noise level standard of DENR during the day time and night time are 50 dBA and 40 dB respectively, noise level of all point excess the standard. - For residential area (5 points), predicted noise level on year 2020 are from 65.0 to 71.0 dBA during day time period and from 61.3 to 67.3 dBA during night time period. Since the noise level standard of DENR during the day time and night time are 65 dBA and 55 dB respectively, all points exceed noise standard during daytime and nighttime. - It is necessary to reduce noise levels and make them acceptable based on the DENR regulation and/or at least the present average noise level of the area.	- Noise barriers can achieve 12.9 dBA noise level reduction according to noise model prediction. - Noise barriers will be constructed at the sensitive areas along CALAX before operation. - Double-glazed windows installation will be adopted for the very sensitive buildings. - When noise measurement results show that noise level is exceeding DENR Standard, additional countermeasures to reduce noise level will be implemented.	- Expressway Operator	- O&M Stage	- Included in O&M Cost (Php 5,000 per sampling station)
			- Contractor, PMO-BOT, C/S Consultant	- Construction Stage	- Noise barriers installation cost : Php 240 Million - Double-glazed windows cost for church and school in sensitive receptors. Php 1.7 Million included

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing	Cost
					Civil Work Contingency Cost

9.5.6 Environmental Monitoring Plan

9.5.6.1 Environmental Monitoring Plan

Environmental Monitoring Plan for Pre-construction and Construction Stage and Operation/Maintenance Stage are shown in **Table 9.5.6-1** and **Table 9.5.6-2**, respectively.

The DENR ambient air quality guideline for critical pollutants, for noise in general area and for water quality are shown in **Table 9.5.6-3, Table 9.5.6-4,** and **Table 9.5.6-5,** respectively.

TABLE 9.5.6-1 ENVIRONMENTAL MONITORING PLAN (CONSTRUCTION STAGE)

Item	Parameter to be Monitored	Location to be Monitored	Method of Analysis/ Execution	Frequency of Measurement	Responsibility Agency	Cost
Affected houses, establishments and trees	No. of houses and establishments to be directly affected	Affected location along the proposed alignment	Survey	Once	PMO-BOT and D/D Consultant	Included D/D Cost
	No. of trees		Terrestrial Survey/Inventory	Once	PMO-BOT and D/D Consultant	Included D/D Cost
Air Pollution	Ambient air quality: TSP, SO_2 ,NO_2,CO compared to the DENR Standards	Km 1+800 (south) Km 4 +400 (south) Km 12+500 (north) Km 11+500 (south) Km 16+400 (south)	Air Quality Test	Quarterly	Contractor with supervision of PMO-BOT and C/S Consultant	Included in Civil Works Cost (Approximately Php 600,000 for construction period)
Noise	Noise Monitoring: morning time, day time, evening time and night time .	Km 1+800 (south) Km 4 +400 (south) Km 12+500 (north) Km 11+500(south) Km 16+400 (south)	Noise measurement	Quarterly	PMO-BOT, C/S Consultant and Contractor	Included in Civil Works Cost (Approximately Php 125,000 for construction period)
Water Pollution	Surface water quality: pH, TSS (Suspended Solid), BOD, DO, temperature, Total Coliform and Lead compared to the DENR Standards	River at Km 2 +250 River at Km (0+000) River at Km 12+250	Water Quality Test	Twice a year	Contractor with supervision of PMO-BOT and C/S Consultant	Included in Civil Works Cost (Php 5,000 per sampling activity)
Solid Wastes	Tons/day, no. of items	Construction site. Office/ base camp	Visual observation	Daily	Contractor with supervision of PMO-BOT	Included in Civil Work Cost
Sanitary Wastes	Tons/day	Office/ base camp	Visual observation	Daily	Contractor with supervision of PMO-BOT	Included in Civil Work Cost
Unsuitable Soil	Tons/day	Construction site. Office/ base camp	Visual observation	Daily	Contractor with supervision of PMO-BOT	Included in Civil Work Cost

Item	Parameter to be Monitored	Location to be Monitored	Method of Analysis/ Execution	Frequency of Measurement	Responsibility Agency	Cost
Hazardous Wastes	Liters/no. of drums (liquids) kilograms(solids)	Construction site. Office/ base camp	Visual inspection. weighing	Monthly	Contractor with supervision of PMO-BOT	Included in Civil Work Cost
Tree	Number of trees cut Number of trees planted	Construction site	Visual observation	Monthly	Contractor with supervision of PMO-BOT	Included in Civil Work Cost
Occupational Safety	No. of work related injuries No. of safety man-hours	Construction site	Log-book registration	Daily	Contractor with supervision of PMO-BOT	Included in Civil Work Cost
Public Perception/ Acceptability	No. of valid complains	Affected Barangay	Consultations with local officials and residents	Variable	PMO-BOT, DENR, LGU	

TABLE 9.5.6-2 ENVIRONMENTAL MONITORING PLAN (OPERATION AND MAINTENANCE STAGE)

Item	Parameter to be Monitored	Location to be Monitored	Method of Analysis/ Execution	Frequency of Measurement	Responsibility Agency	Cost
Air Pollution	Ambient air quality: TSP, SO_2 ,NO_2,CO compared to the DENR Standards	Km 1+800 (south) Km 4 +400 (south) Km 12+500 (north) Km 11+500 (south) Km 16+400 (south)	Air Quality Test	Twice a year (for 2years)	Expressway Operators	Included in O&M Cost (Approximately Php 10,000 per sampling station)
Noise	Noise Monitoring: morning time, day time, evening time and night time	Km 1+800 (south) Km 4 +400 (south) Km 12+500 (north) Km 11+500(south) Km 16+400 (south)	Noise measurement	Quarterly(for 2years)	Expressway Operators	Included in O&M Cost (Approximately Php 5,000 per sampling station)
Solid Wastes	Kg/day	Field operation	Visual observation	Daily	Expressway Operators	Included in O&M Cost
Sanitary Wastes	Kg/day	Field operation	Visual observation	Daily	Expressway Operators	Included in O&M Cost
Hazardous Wastes	Liters/no. of drums (liquids) kilograms(solids)	Field operation	Visual inspection. weighing	Monthly	Expressway Operators	Included in O&M Cost
Occupational Safety	No. of work related injuries No. of safety man-hours	Field operation	Log-book registration	Daily	Expressway Operators	Included in O&M Cost
Expressway Safety	No. of vehicle accidents	Field operation	Log-book /database registration	Daily	Expressway Operators	Included in O&M Cost
Public Perception/ Acceptability	No. of valid complains	Affected Barangay or concerned citizens	Consultations with local officials and residents	Variable	Expressway Operators	Included in O&M Cost

TABLE 9.5.6-3 DENR NATIONAL AMBIENT AIR QUALITY GUIDELINE FOR CRITERIA POLLUTANTS

Pollutant	Short Term (a)			Long Term (b)		
	μg/Ncm	ppm	Ave. Time	μg/Ncm	ppm	Ave. Time
Suspended Particulate Matter (e) - TSP PM -10	230 (f) 150 (g)		24 hours 24 hours	90 60	-- --	1 year (c) 1 year (c)
Sulfur Dioxide (SO_2) (e)	180	0.07	24 hours	80	0.03	1 year
Nitrogen Dioxide (NO_2)	150	0.08	24 hours	--	--	--
Photochemical Oxidants As Ozone	140 60	0.07 0.03	1 hour 8 hours	-- --	-- --	-- --
Carbon Monoxide (CO)	35 mg/Ncm 10 mg/Ncm	30 9	1 hour 8 hours	-- --	-- --	-- --
Lead (d)	1.5	--	3 mo. (d)	1.0	--	1 year

(a) Maximum limits represented by (98%) values not to be exceeded more than once a year.
(b) Arithmetic Mean
(c) Annual Geometric Mean
(d) Evaluation of this guideline is carried out for 24- hours averaging time and averaged over three moving calendar months.
(e) SO_2 and Suspended Particulates are sampled once every 6-days when using the manual method
(f) with mass median diameter less than 25-50 μm.
(g) with mass median less than 10 μm.

DENR Administrative Order No. 14; Revised Air Quality Standards of 1992, Revising and Amending the Air Quality Standards of 1978.

TABLE 9.5.6-4 DENR STANDARDS FOR NOISE IN GENERAL AREAS (DBA)

TIME	CLASS				
	AA	A	B	C	D
Daytime (0700Hr-700Hr)	50	60	65	70	75
Evening (1700Hr-100Hr)	45	50	60	65	70
Nighttime (2100Hr-500Hr)	40	45	55	60	60
Morning (0500Hr-700Hr)	45	50	60	65	70

Class AA – a section of contiguous area which requires quietness, such as areas within 100 meters from school sites, nursery schools, hospitals and special homes for the aged.
Class A – a section or contiguous area which is primarily used for residential purposes.
Class B – a section or contiguous area which is primarily a commercial area.
Class C – a section primarily zoned or used as light industrial area.
Class D – a section which is primarily reserved, zoned or used as a heavy industrial area.

Rules and Regulations of the National Pollution Control Commission (NPCC)

TABLE 9.5.6-5 WATER QUALITY CRITERIA FOR CONVENTIONAL AND OTHER POLLUTANTS CONTRIBUTING TO AESTHETIC AND OXYGEN DEMAND FOR FRESH WATERS

Fresh Surface Water Parameter	Unit	Class C	Class D
		Fishery, Recreational(Boating), Industrial use (after treated)	**For agriculture, irrigation, livestock, industrial use, other inland water**
Temperature	^{o}C	$3^{o}C$ maximum rise	$3^{o}C$ maximum rise
pH	-	6.5 - 8.5	6.0 - 9.0
Dissolved Oxygen (DO)	mg/L	minimum 5.0 mg/L	3.0 (at 40% saturation)
Biochemical Oxygen Demand (BOD5)	mg/L	< 10.0 mg/L	10 (15)
Total Coliform	MPN/ 100ml	5,000	N/A
Total Suspended Solids (TSS)	mg/L	Not more than 30mg/L increase	Not more than 60mg/L increase
Total Dissolved Solids (TDS)	mg/L	N/A	1000 (or natural back ground value if greater than 1000)
SAR		N/A	8-18

DENR Administrative Order No. 34, series of 1990; Revised Water Usage and Classification / Water Quality Criteria Amending Section Nos: 68 and 69, Chapter III of the 1978 NPCC Rules and Regulations Criteria of Water Use Regulation

N/A: No standards

9.5.6.2 Monitoring Frequency and Monitoring Report

RAP Implementation Stage

- Detailed Design (D/D) Consultant shall hire RAP Implementation Specialists and undertake daily monitoring.
- D/D Consultant shall prepare a monthly monitoring report and submit to PMO-BOT, DPWH Region IV-A, ESSO, and PMO-IROW.
- PMO-BOT prepares quarterly monitoring report and submit to JICA.

Construction Stage

- PMO-BOT shall organize an Environmental Unit.
- The Contractor shall organize Environmental Unit and undertake daily monitoring.
- The contractor shall prepare a monthly monitoring report and submit to the Construction Supervision (C/S) Consultant, PMO-BOT, DPWH Region IV-A, and ESSO.
- C/S Consultant shall hire Environmental Monitoring Specialists and undertake daily monitoring.
- C/S Consultant shall prepare a monthly monitoring report and submit to PMO-BOT, DPWH Region IV-A, and ESSO.
- PMO-BOT prepares quarterly monitoring report and submits to JICA.

- PMO-BOT shall make accessible the monitoring report by the public quarterly.

Operation and Maintenance Stage

- The Concessionaire shall organize Environmental Unit and undertake daily monitoring.
- The Concessionaire shall measure noise and air quality semi-annually and submit it to PMO-BOT.
- The Concessionaire shall prepare semi-annual monitoring report and submit it to PMO-BOT and ESSO.
- PMO-BOT prepares semi-annual monitoring report and submit to JICA for the first 2 years of O/M Stage.
- PMO-BOT shall make accessible the monitoring report by the public quarterly

Table 9.5.6-6 shows the draft monitoring form to be submitted to JICA. This monitoring form shows the monitoring items, measurement points, frequency, survey method, survey period, standard etc.

TABLE 9.5.6-6 MONITORING FORM

1. Responses/Actions to Comments and Guidance from Government Authorities and the Public

Monitoring Item	Monitoring Results During Report Period
Number of Responses/Actions to Comments and Guidance from Government Authorities (DENR, LGUs)	- Quarterly during construction - Twice a year during operation for two years

2. Mitigation Measures

- Air Quality (Emission Gas/Ambient Air Quality)

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Country's Standards	Referred International Standards	Remarks (Measurement Point, Frequency, Method, etc.)
SO_2	μg/Ncm	25.3	31	340	-	- Same points as baseline survey - Quarterly during construction - Twice a year during operation for two (2) years - Air sampler & high volume sampler
NO_2	μg/Ncm	7.9	11	260	200 (IFC)	
CO	mg/Ncm	*	*			
Dust (TSP)	Mg/Ncm	90	147	300	-	

*Note: Data will be provided during construction phase of the project.

- Water Quality (Effluent/Wastewater/Ambient Water Quality)

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Country's Standards	Referred International Standards	Remarks (Measurement Point, Frequency, Method, etc.)
pH	-	7.5	8.0	6.5 – 8.5		- Upstream and downstream portions of affected water bodies - Twice a year during construction - Grab sampling
TSS (Suspended Solid)	Mg/L	8.2	10.2	15 – 50		
BOD	Mg/L	1.5	2.2	20		
DO	Mg/L	7.1	7.7	min. 5.0		
Temperature	°C	25	28	-		
Total Coliform	MPN/ 100mL	67,000	160,000	5,000		
Lead	Mg/L	8.2	10.2	30		

- **Waste**

Monitoring Item	Monitoring Results During Report Period
Solid Wastes (ton/day)	- Monthly during construction - Twice a year during operation for two (2) years
Sanitary Waste (ton/day)	
Unsuitable Soil (cubic meter/day)	
Spill-out oil from equipment (liter/month)	
Hazardous Wastes (liquid: liter/month)	
Hazardous Wastes (solid: kg/month)	

- **Noise/Vibration**

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Country's Standards	Referred International Standards	Remarks (Measurement Point, Frequency, Method, etc.)
Noise level	dBA	61.7	80.8	40-50 (hospital) 45-55 (residential) 55-65 (commercial) 60-70 (L industrial) 65-75 (H industrial)	45-55 (hospital) 45-55 (residential) 70 (commercial) 70 (industrial)	- Same points as baseline survey - Quarterly during construction - Twice a year during operation for two (2) years - Digital sound level meter

3. Natural Environmental

- **Ecosystem**

Monitoring Item	Monitoring Results During Report Period
Number of trees cut	- Monthly during construction
Number of trees planted	- Monthly during construction - Twice a year during operation for two (2) years

4. Social Environment

- **For the IMA**

Monitoring Item	Monitoring Results During Report Period
1. Budget and Timeframe – Schedule for the mobilization of appointed land acquisition and resettlement staff – Schedule for the capacity building and training activities – Achievement of resettlement implementation activities against the agreed implementation plan – Disbursement of funds in accordance to RAP – Schedule of social preparation phase – Schedule for the occupation of acquired land for project implementation 2. Delivery of Compensation – AF entitlements as provided in the entitlement matrix, such as payments on structure and lands. – Number of PAF to donate to the Government – Number of PAFs with land title under C.A. 141, Sec. 112. – Land holdings with quit claims & easements. – PAFs preference of payment compensation on land and expropriation. – Number of PAF receiving relocation & actual occupations. – Implementation of income and livelihood restoration activities. 3. Public Participation – Schedules of Consultations & community activities.	- Monthly during RAP Implementation - Quarterly during construction - Twice a year during operation for two (2) years

– PAFs awareness on their entitlements. – Issues in grievance mechanism and resolution of conflicts. 4. Benefits – Changes incurred in the patterns of occupation, production and resources compared to pre-project situation. – Changes in income and expenditures patterns compared to pre-project situation. – Changes in key social and cultural parameters relating to living standards. – Changes encountered by the vulnerable groups.	

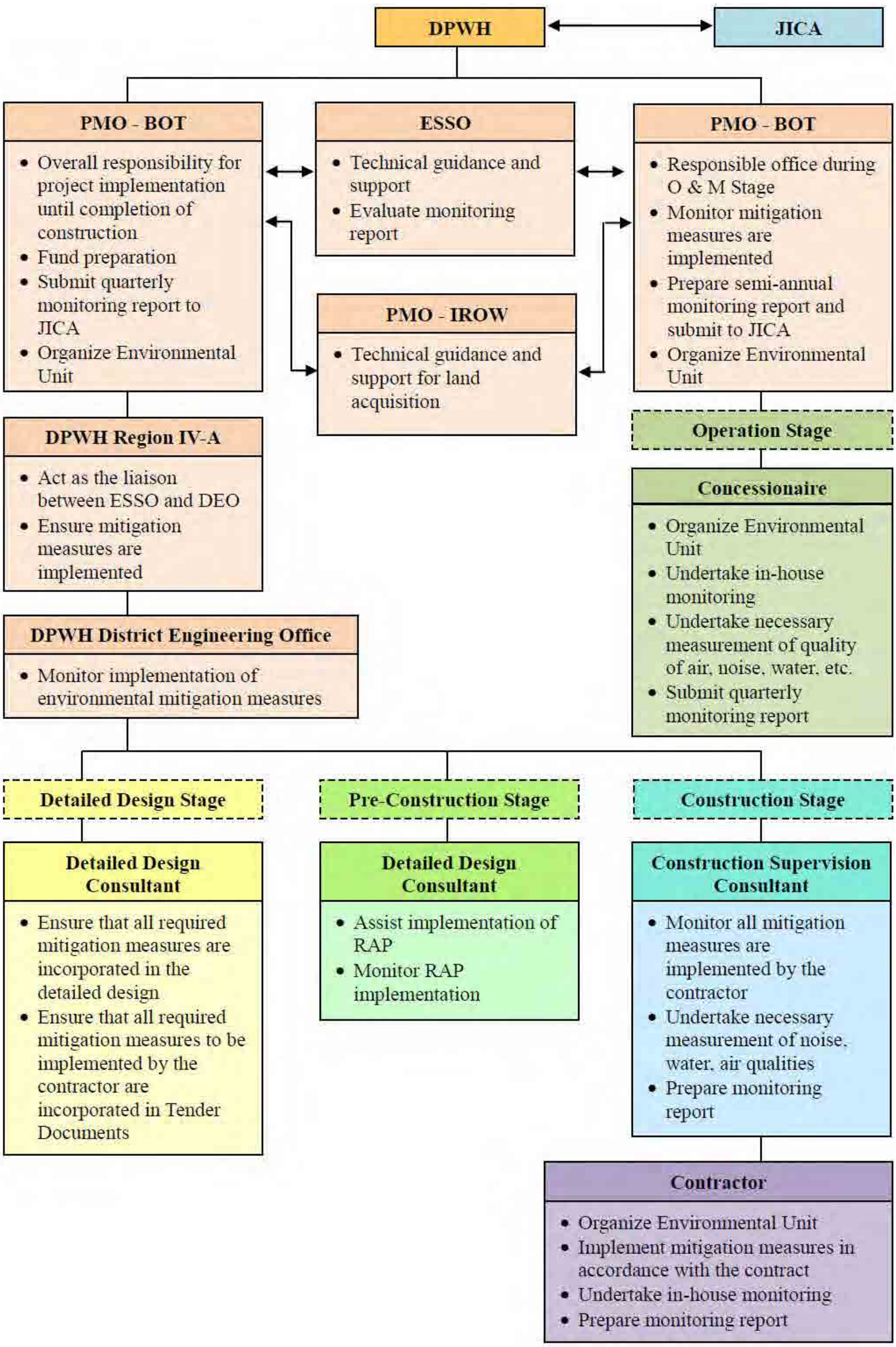
- **For the EMA**

Monitoring Item	Monitoring Results During Report Period
1. Restoration of Living Standards – Compensation Payments on house free of depreciation, fees or transfer cost – Restoration on Community Perceptions. – Achievement of PAFs on the replacement of key social cultural elements. 2. Restoration of Livelihoods – Sufficiency of payment compensation to replace lost assets. – Assistance to re-establish the affected enterprises. – Effectiveness and sustainability of the provided income earning opportunities for the vulnerable groups. – Restoration of pre-project income levels and living standards through the jobs provided by the project. 3. Levels of PAP Satisfaction – Awareness of Affected Families on the resettlement procedures and their entitlements, including its realization. – Assessment of PAFs on the restoration of their living standards and livelihood. – PAFs awareness on the grievance mechanism, including the procedures in the resolution of conflicts and their satisfactions. 4. Effectiveness of Resettlement Planning – Proper identification of PAFs affected assets. – Sufficiency of budget and adequacy of timelines to properly meet objectives. – Generosity of entitlement packages. – Identification and assistance to the vulnerable groups. – Actions of resettlement implementers on the unforeseen problems. 5. Social and Environmental Impact – Unintended environmental impacts. – Unintended impacts on employment or incomes.	- Monthly during RAP implementation - Quarterly during construction - Twice a year during operation for two (2) years

9.5.7 Institutional Arrangement and Budget

9.5.7.1 Institutional Arrangement

Environmental management and monitoring organization is shown in **Figure 9.5.7-1** which shows concerned agencies by implementation stage and their functions.PMO-BOT, the Contractor and the Concessionaire are required to organize an “Environmental Unit”.



Source: JICA Study Team (2012)

FIGURE 9.5.7-1 ENVIRONMENTAL MANAGEMENT AND MONITORING IMPLEMENTATION ORGANIZATION

9.5.7.2 Budget

DPWH Administrative Cost

Total administrative cost of the Project is estimated at Php 192.48 Million for DPWH's staff and other expenditure including cost of PMO-BOT, ESSO, PMO-IROW, DPWH Region IV-A, and DEO. Environmental and Management and Monitoring Cost for DPWH will be sub-alloted from the total administrative cost.

Consultancy Cost

Monitoring cost by the D/D and C/S Consultants is included in the Consultancy Service Contract as follows;

Detailed Engineering and Pre-construction Stage:

Cost for an Environmental Specialist, RAP Specialists, Independent Assessors, RAP Monitoring Specialist are included in the Consultancy Contract (estimated at 24.9 Million Pesos).

Construction Supervision Stage:

Cost for Environmental Monitoring Specialist is included in the Consultancy Contract (estimated at 16.8 Million Pesos).

Contractor's Cost

Monitoring cost by the Contractor will be included in the Civil Work Contract. Cost for noise and air quality measurements is included in the Civil Work Contract.

Concessionaire's Cost

Monitoring cost by the Concessionaire during O & M period will be included in the Toll Concession Agreement. Cost for noise and air quality measurements is included in the Toll Concession Agreement.

9.5.8 System for Environmental Management

Project proponent and construction contractor must ensure compliance with ECC by Establishing an Environmental Unit (EU) to effectively handle, implement, and manage all environmental-related aspects of the project. Proof of establishment of the EU shall be submitted to EMB. The EU shall also have the following responsibilities:

- Implement the approved Environmental Management and Monitoring Program; and
- Monitor actual impacts vis-à-vis the predicted impacts on human/social and physical environmental management measures in the EIS.

9.6 RELOCATION ACTION PLAN

9.6.1 Relocation Policy

Since CALAX (Laguna Section) is located in a rural area, DPWH's relocation policy in LARRIPP which has been created for the World Bank funded project, i.e. satisfies OP4.12, can be applied.

- The Government of the Republic of Philippines is bound to follow the Project Resettlement Policy (the Project Policy) for the CALAX (Laguna Section) specifically which is intended to comply with JICA's guidelines.
- Where there are gaps between the Republic of Philippines legal framework for resettlement and JICA's Policy on Involuntary Resettlement, practicable mutually agreeable approaches will be designed consistent with Government practices and JICA's Policy.
- Land acquisition and involuntary resettlement will be avoided where feasible, or minimized, by identifying possible alternative project designs that have the least adverse impact on the communities in the project area.
- Where displacement of households is unavoidable, all PAPs (including communities) losing assets, livelihoods or resources will be fully compensated and assisted so that they can improve, or at least restore, their former economic and social conditions.
- Compensation and rehabilitation support will be provided to any PAPs, that is, any person or household or business which on account of project implementation would have his, her or their standard of living adversely affected;
- Right, title or interest in any house, interest in, or right to use, any land (including premises, agricultural and grazing land, commercial properties, tenancy, or right in annual or perennial crops and trees or any other fixed or moveable assets, acquired or possessed, temporarily or permanently;
- Income earning opportunities, business, occupation, work or place of residence or habitat adversely affected temporarily or permanently; or
- Social and cultural activities and relationships affected or any other losses that may be identified during the process of resettlement planning.
- All affected people will be eligible for compensation and rehabilitation assistance, irrespective of tenure status, social or economic standing and any such factors that may discriminate against achievement of the objectives outlined above.
- Lack of legal rights to the assets lost or adversely affected tenure status and social or economic status will not bar the PAPs from entitlements to such compensation and rehabilitation measures or resettlement objectives.

- All PAPs residing, working, doing business and/or cultivating land within the project impacted areas as of the date of the latest census and inventory of lost assets (IOL), are entitled to compensation for their lost assets (land and/or non-land assets), at replacement cost, if available and restoration of incomes and businesses, and will be provided with rehabilitation measures sufficient to assist them to improve or at least maintain their pre-project living standards, income-earning capacity and production levels.
- PAPs that lose only part of their physical assets will not be left with a portion that will be inadequate to sustain their current standard of living. The minimum size of remaining land and structures will be agreed during the resettlement planning process.
- People temporarily affected are to be considered PAPs and resettlement plans address the issue of temporary acquisition.
- Where a host community is affected by the development of a resettlement site in that community, the host community shall be involved in any resettlement planning and decision-making. All attempts shall be made to minimize the adverse impacts of resettlement upon host communities.
- The resettlement plans will be designed in accordance with Land Acquisition, Resettlement, Rehabilitation and Indigenous Peoples' Policy (LARRIPP) of DPWH (February, 2007) and JICA's Policy on Involuntary Resettlement.
- The Resettlement Plan will be translated into local languages and disclosed for the reference of PAPs as well as other interested groups.
- Payment for land and/or non-land assets will be based on the principle of replacement cost.
- Compensation for PAPs dependent on agricultural activities will be land-based wherever possible.
- Resettlement assistance will be provided not only for immediate loss, but also for a transition period needed to restore livelihood and standards of living of PAPs. Such support could take the form of short-term jobs, subsistence support, salary maintenance, or similar arrangements.
- The resettlement plan must consider the needs of those most vulnerable to the adverse impacts of resettlement (including the poor, those without legal title to land, ethnic minorities, women, children, elderly and disabled) and ensure they are considered in resettlement planning and mitigation measures identified. Assistance should be provided to help them improve their socio-economic status.
- PAPs will be involved in the process of developing and implementing resettlement plans.

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

9.6.2 Summary of Relocation and Assets

9.6.2.1 Household Interview Survey

Households in the project area were classified into the following three (3) types;

Type-A: Households who are living in the residential houses which are affected by the project. A total of 36 structures (50 households) were identified and 32 (or 89%) residential structure owners/respondents answered the interview.

Type-B: Households who are doing the farming and their farm lands are affected by the project. Estimated number of farm lots is about 77, of which 31 households (about 40%) were interviewed.

Interviewee selection criteria were established as follows;

- In each barangay, all types of land ownership, namely, land owners, tenants and free occupation with land owner's permit, shall be interviewed.
- The barangay captain's opinion shall be obtained for selection of land owners. Land owners shall be so selected that they will represent the land owners' characteristics in the barangay.
- Since PAP's major crop productions are Banana (49%), Pineapple (37%) and Corn (10%) shown in **Table 9.6.3-13**, interviewees were selected from PAP's to product Banana, Pineapple and Corn in each Barangy.

Since the interviewees were selected as mentioned above, the interview results reveals the whole picture of project area.

Interview results were as follows;

- 22% of the land owners were interviewed. They were selected based on the recommendation of the barangay captain in accordance with the criteria set above. Thus, interview results of land owners can be judged that their answers reflect the characteristics of land owners in the barangay.
- 3 tenants out of 4 were interviewed; therefore, the survey results show the characteristics of all the tenants.
- 16 households out of 19 were interviewed to those who are free occupation with land owners' permit; therefore, the survey results show the characteristics of these category of households.

Type-C: Secondary Impact Areas (i.e. youth sector, aged sector, business sector, transport sector, residential, women's and NGO/Pos). A total of 135 respondents were interviewed.

Household structure, income, assets, expenditures, household and business expenditure, education, available skills, available facilities, about relocation, affected land, affected structure, land validity, structure validity, perception on the project, project awareness, and project acceptability were included in the interview.

9.6.2.2 Summary of Project Affected Persons (PAPs)

Summary of Survey Result

Table 9.6.2-1 shows the summary of the number of households and people whose houses are affected and to be relocated. **Table 9.6.2-2** shows the summary of the number of household who will lose their farm land.

TABLE 9.6.2-1 NUMBER OF HOUSEHOLD WHOSE RESIDENTIAL HOUSES ARE AFFECTED AND TO BE RELOCATED

Municipality/ City	Barangay	No. of Structures	No. of Residential Households affected	No. of Residential Households to be Relocated	No. of People Relocated
Silang, Cavite	Sabutan	15	19	19	75
	Kaong	2	3	3	13
	Tibig	12	16	16	67
Biñan, Laguna	Timbao	7	12	12	42
Total		36	50	50	197

Note : No informal households, there are two commercial structures identified, however a number of households are not included in the table.

Source: JICA Study Team (2012)

TABLE 9.6.2-2 NUMBER OF HOUSEHOLD WHO WILL LOSE FARM LAND

Municipality	Barangay	No. of Farm Lots Affected	No. of Households who will Lose Farm Land	Ownership Land			No. of People Who Will Lose Farm Land
				Land Owner	Tenants	Free Occupation with Permit	
Silang, Cavite	Sabutan	27	55	27	0	0	162
	Kaong	4	7	2	2	0	25
	Tibig	27	45	25	2	0	160
	Carmen	19	23	0	0	19	119
Total		77	130	54	4	19	466

Note: (1) Approximate number. Final number will be determined through legal research on land title and parcellary survey during the D/D Stage.

Source: JICA Study Team (2012)

TABLE 9.6.2-3 SUMMARY OF LAND ACQUISITION AND RESETTLEMENT IMPACTS

Affected Assets	Unit	Permanent Loss		Total
		Severe	Marginal	
Cavite[b]	parcel	62	8	70
Laguna	Parcel	0	7	7
Sub-total		62	15	77
Residential[c]				
Formal[d]	No.	36	0	36
Informal	No.	0	0	0

Affected Assets	Unit	Permanent Loss		Total
		Severe	Marginal	
Annual Crops	Ha.[e]	18.94	0	18.94
Commercial stalls (Small-scale)	No.[f]	524	0	524
Auxiliary STructures[g]	No.	2	0	2
Public Infrastructure[h]	No.	34	0	34
Perennial Crops (fuit bearing trees[i] and non-fruit bearing[j])	No.	6	0	6

Note:

[a] - Estimates only, based on Cadastral Map of respective City Assessor's Offices (no parcellary survey yet)

[b] - There are 62 parcels but only 52 have crops; 10 parcels are raw lands

[c] - Residential structures

[d] - There are cases where there are more than one (1) household per dwelling structure. In the project-affected areas, there are 36 structures with 50 households

[e] - pineapple, cassava, corn, palay

[f] - banana hill

[g] - fish ponds, carabao shed, pig pen, deep wells, fence/gate, farm structures/equipment, area development

[h] - waiting sheds, electrical posts

[i] - mango, avocado, santol, jack fruit, banana, coconut, etc.

[j] - narra, mahogany ipil-ipil, Benjamin tree, palm tree, etc.

Source: JICA Study Team (2012)

TABLE 9.6.2-4 SUMMARY OF RROW ACQUISITION IMPACTS ON LAND, STRUCTURES, AND TREES

Affected City/ Municipality	Area (In Ha)	Land[a] (Php)	No. of Structures	Structures[b] (Php)	No. of Trees	TreesB[b] (Php)
Silang, Cavite	64.71	420,615,000	56	16,928,130	5,906	12,279,205
Biñan, Laguna	40.45	2,425,000,000	164	14,917,675	2,195	1,656,940
Sta. Rosa, Laguna	13.68	684,000,000	0	0	1,292	874,855
Total	**118.84**	**3,529,615,000**	**220**	**31,845,805**	**9,393**	**14,811,000**

Notes:

Structures include *residential* (those with families living in it); *commercial* such as small scale business (i.e. *carinderia*); *auciliary* such as fence, goat pen, pig pen, and *public utilities* (electric posts).

[a] - Based on BIR Zonal Values for Cavite/Silang, Revenue District (RDO 54A 0 DO#39007, November 05, 2007);

[b] - Based on Municipal Assessoors of Silang, Cavite Schedule of Market Values (1980); City Assessor of Biñan; Schedule of Market Values (1980) and City Assessor's of Sta. Rosa Schedule of Market Values (1980)

Source: JICA Study Team (2012)

Survey Results

Table 9.6.2-5 shows number of residential houses, households and people affected and relocated.

TABLE 9.6.2-5 NUMBER OF WHOSE RESIDENTIAL HOUSES ARE AFFECTED AND TO BE RELOCATED

Municipality/ City	Barangay	No. of Structures	No. of Residential Households Affected	No. of Residential Households to be Relocated	Land Tenure (*)			Residential Structure (*)		
					Owner	Rental	Total	Owner	Rental	Total
Silang, Cavite	Sabutan	15	19	19	12	2	14	11	3	14
	Kaong	2	3	3	1	1	2	2	0	2
	Tibig	12	16	16	9	2	11	9	2	11
Biñan, Laguna	Timbao	7	12	12	5	0	5	5	0	5
Total		36	50	50	27	5	32	27	5	32

Source: JICA Study Team (2012)

*) : Interview survey result, No. of smaple 32 structure owners/respondents (89%)

TABLE 9.6.2-6 MATERIALS OF DWELLING STRUCTURES

Municipality/ City	Salvage	Light	Mixed	Strong	Total
Silang, Cavite	1	10	4	14	29
Biñan, Laguna	0	0	1	6	7
Total	1	10	5	20	36

Materials:

Salvaged (plastic, tin, cardboard, etc.)
Light (nipa, cogon, bamboo, wood)
Mixed (light and strong)
Strong (hollow blocks, G.I. Sheets, wood)

Source: JICA Study Team (2012)

Overall RAP requirements are shown in **Table 9.6.2-7**.

TABLE 9.6.2-7 OVER-ALL RAP REQUIREMENTS

	Compensation Structure	LARRIPP, 2007	This Project
Compensation	For Structure	• Cash including cost of restoring the remaining structure • Determined by Appraisal Committee • No deduction for salvaged building materials (Replacement Cost)	• No. of residential houses affected: 36 (50 HH, 197 persons)
	For Other Improvement	• Cash • Replacement cost for the affected portion of public structure to the Government or non-Government agencies or to the community • Cost for reconnecting the facility such as water, power and telephone	• Commercial Structure: 2 • Auxiliary Structure: 34 • Public Infrastructure: 6
	For Crops, Trees and Perennials	• Cash • Commercial value as determined by DENR or Appraisal Committee • PAFs given sufficient time to	• Fruit bearing/crops: 524+3730 = 4254 • None Fruit Bearing Trees: 5253

	Compensation Structure	LARRIPP, 2007	This Project
		harvest crops • Compensation for damaged crops (palay, corn) at market value • Fruit-bearing trees based on assessment of Provincial/Municipal Assessors	
	For Land	• Replacement Cost • Initial Offer: Zonal Valuation • Second Offer: Market Value • Land Swapping if feasible (Land for Land) (Cash compensation when affected holding has a higher value than relocation plot.)	• Residential house land: 36 lots (36 owners, all severe) • Farm Land: Approximately 77 lots (Severe 62, Marginal 15) • Survey Result…70.1% are land owners, 5.2% are tenants and 24.7% are free occupation with permit.
	Other Types of Assistance or Entitlement	**Disturbance Compensation** • Lessees: 5 times the average of gross harvest for the past three years, but not less than Php15,000. • Tenant: Value of gross harvest of 1 year and not less than Php15,000 per ha. (E.O. 1035)	• About 70.1% of farm lands are owned. • No Lessee • 5.2% are classified as tenant farmers • 24.7% are free occupation with permit.
		Income Loss • Loss of business/income, entitled to an income rehabilitation assistance not to exceed Php15,000 or based on tax record.	• Two (2) small-scale owners are affected.
		Inconvenience Allowance • Php10,000 to PAF when severely affected structures which require relocation and new construction.	• Thirty six (36) residential houses (50 households)
		Rehabilitation Assistance • Skills training and other development activities equivalent to Php15,000 per family	• Max. fifty (50) households who lose income. • Some farmers who become land less.
		Rental Subsidy • Without sufficient additional land to allow reconstruction of their lost house. • Equivalent to prevailing average monthly rental. • Period between delivery of house compensation and the delivery of land compensation	• When availability of relocation sites is delayed, this should be considered (maximum of 50 households)
		Transportation Allowance and Assistance	• 50 households

Note: Severe –More than 20% of Total Land/Properties affected
Marginal – Less than 20% and still viable for continued use.

Source: JICA Study Team (2012)

9.6.3 Household Survey Result

Socioeconomic survey of PAPs was conducted from February 27, 2012 to March 14, 2012.

9.6.3.1 Bio Data of PAPs

Majority of the respondents have a nuclear (54%) structure of household, 19% are living alone, 22% are family with extension and 5% sharing in one structure (see **Table 9.6.3-1**).

TABLE 9.6.3-1 HOUSEHOLDS STRUCTURE OF PAPS INTERVIEWED

Municipality/Barangay			Single	Nuclear	Extended	Joint	Total
Type A - Residential/Household Structure							
Silang, Cavite	Sabutan	Count	2	8	3	1	14
		% within Barangay	*14%*	*57%*	*21%*	*7%*	*100%*
	Kaong	Count	0	1	1	0	2
		% within Barangay	*0%*	*50%*	*50%*	*0%*	*100%*
	Tibig	Count	1	8	2	0	11
		% within Barangay	*9%*	*73%*	*0%*	*0%*	*82%*
Biñan, Laguna	Timbao	Count	0	3	0	2	5
		% within Barangay	*0%*	*60%*	*0%*	*0%*	*60%*
Total of Type A Respondents		Count	3	20	6	3	32
		% within Barangay	*9%*	*63%*	*19%*	*9%*	*100%*
Type B - Farm Lands							
Silang, Cavite	Sabutan	Count	2	0	4	0	6
		% within Barangay	*33%*	*0%*	*67%*	*0%*	*100%*
	Kaong	Count	0	1	1	0	2
		% within Barangay	*0%*	*50%*	*50%*	*0%*	*100%*
	Tibig	Count	2	5	0	0	7
		% within Barangay	*29%*	*71%*	*0%*	*0%*	*100%*
	Carmen	Count	5	8	3	0	16
		% within Barangay	*31%*	*50%*	*19%*	*0%*	*100%*
Total Type B Respondents		Count	9	14	8	0	31
		% within Barangay	*29%*	*45%*	*26%*	*0%*	*100%*
Total Type A & B		**Count**	**12**	**34**	**14**	**3**	**63**
		% within Barangay	***19%***	***54%***	***22%***	***5%***	***100%***

Note:
Single – Single (individual) occupant
Nuclear – Family consisting of parents and siblings
Extended – Nuclear family plus immediate family members like parents, siblings
Joint – Nuclear plus one or more extended families

Source : JICA Study Team (2012)

9.6.3.2 Communication/Language

The most common dialect is Tagalog. This dialect is used by 95% of the respondents, followed by ‘Ilocano”, “Bicolano”, and “Ilongo” (see **Table 9.6.3-2**).

TABLE 9.6.3-2 ETHNO LINGUISTIC AFFILIATION OF THE RESPONDENTS

City/Municipality/Barangay			Tagalog	Ilocano	Bicolano	Ilonggo	Total
Type A - Residential/Household Structure							
Silang, Cavite	Sabutan	Count	13	1	0	0	14
		% within Barangay	*93%*	*7%*	*0%*	*0%*	*100%*
	Kaong	Count	2	0	0	0	2
		% within Barangay	*100%*	*0%*	*0%*	*0%*	*100%*
	Tibig	Count	11	0	0	0	11
		% within Barangay	*100%*	*0%*	*0%*	*0%*	*100%*
Biñan, Laguna	Timbao	Count	5	0	0	0	5
		% within Barangay	*100%*	*0%*	*0%*	*0%*	*100%*
Total of Type A		Count	31	1	0	0	32
		% within Barangay	*97%*	*3%*	*0%*	*0%*	*100%*
Type B - Farm Lands							
Silang, Cavite	Sabutan	Count	5	0	1	0	6
		% within Barangay	*83%*	*0%*	*17%*	*0%*	*100%*
	Kaong	Count	2	0	0	0	2
		% within Barangay	*100%*	*0%*	*0%*	*0%*	*100%*
	Tibig	Count	7	0	0	0	7
		% within Barangay	*100%*	*0%*	*0%*	*0%*	*100%*
	Carmen	Count	15	0	0	1	16
		% within Barangay	*94%*	*0%*	*0%*	*6%*	*100%*
Total Type B Respondents		Count	29	0	1	1	31
		% within Barangay	*94%*	*0%*	*3%*	*3%*	*100%*
Total of Type A and B		**Count**	**60**	**1**	**1**	**1**	**63**
		% within Barangay	***95%***	***2%***	***2%***	***2%***	***100%***

Source : JICA Study Team (2012)

9.6.3.3 Educational Attainment

The level of educational attainment of the male project affected respondents in the host city/municipality is presented in **Table 9.6.3-3**. Majority of the male were able to finish secondary schooling. As seen from this table, 52% of the respondents were able to finish the secondary education, 30% primary education and 11% successfully finished college. The 4% has taken up vocational and post graduate level while the remaining 3% was not able to have education.

TABLE 9.6.3-3 EDUCATIONAL ATTAINMENT OF MALE RESPONDENTS

City/Municipality/Barangay			**A**	**B**	**C**	**D**	**E**	**F**	**Total**
Type A - Residential/Household Structure									
Silang, Cavite	Sabutan	Count	4	8	2	0	0	0	14
		% within Barangay	29%	57%	14%	0%	0%	0%	100%
	Kaong	Count	1	1	0	0	0	0	2
		% within Barangay	50%	50%	0%	0%	0%	0%	100%
	Tibig	Count	3	7	1	0	0	0	11
		% within Barangay	27%	64%	9%	0%	0%	0%	100%
Biñan, Laguna	Timbao	Count	1	3	1	0	0	0	5
		% within Barangay	20%	60%	20%	0%	0%	0%	100%
Total of Type A - Respondents		Count	9	19	4	0	0	0	32
		% within Barangay	28%	59%	13%	0%	0%	0%	100%
Type B - Farm Lands									
Silang, Cavite	Sabutan	Count	1	1	1	1	1	1	6
		% within Barangay	17%	17%	17%	17%	17%	17%	100%
	Kaong	Count	1	1	0	0	0	0	2
		% within Barangay	50%	50%	0%	0%	0%	0%	100%
	Tibig	Count	2	2	2	0	0	1	7
		% within Barangay	29%	29%	29%	0%	0%	14%	100%
	Carmen	Count	6	10	0	0	0	0	16
		% within Barangay	38%	63%	0%	0%	0%	0%	100%
Total of Type B Respondents		Count	10	14	3	1	1	2	31
		% within Barangay	*32%*	*45%*	*10%*	*3%*	*3%*	*6%*	*100%*
Total of Type A and B		**Count**	**19**	**33**	**7**	**1**	**1**	**2**	**63**
		% within Barangay	***30%***	***52%***	***11%***	***2%***	***2%***	***3%***	***100%***

Note:
A – Primary; B – Secondary; C – Tertiary; D – Vocational; E – Post-Graduate; F - None

Source: JICA Study Team (2012)

Table 9.6.3-4 shows the educational attainment of women, which has majority (41%) of them are able to finish secondary or high school education, seconded by 24% primary education. Female respondents who were able to finish college has a greater percentage (17%) compared to the male respondents.

TABLE 9.6.3-4 EDUCATIONAL ATTAINMENT OF FEMALE RESPONDENTS

City/Municipality/Barangay			Primary	Secondary	Tertiary	Vocational	Post Graduate	None	Total
Type A - Residential/Household Structure									
Silang, Cavite	Sabutan	Count	2	8	1	1	0	2	14
		% within Barangay	*18%*	*45%*	*9%*	*9%*	*0%*	*18%*	*100%*
	Kaong	Count	0	2	0	0	0	0	2
		% within Barangay	*0%*	*100%*	*0%*	*0%*	*0%*	*0%*	*100%*
	Tibig	Count	2	5	1	1	0	2	11
		% within Barangay	*18%*	*45%*	*9%*	*9%*	*0%*	*18%*	*100%*
Biñan, Laguna	Timbao	Count	1	3	1	0	0	0	5
		% within Barangay	*18%*	*45%*	*9%*	*9%*	*0%*	*18%*	*100%*
Total of Type A Respondents		Count	5	18	3	2	0	4	32
		% within Barangay	*16%*	*56%*	*9%*	*6%*	*0%*	*13%*	*100%*
Type B – Farm Lands									
Silang, Cavite	Sabutan	Count	2	1	2	0	1	0	6
		% within Barangay	*33%*	*17%*	*33%*	*0%*	*17%*	*0%*	*100%*
	Kaong	Count	0	2	0	0	0	0	2
		% within Barangay	*0%*	*100%*	*0%*	*0%*	*0%*	*0%*	*100%*
	Tibig	Count	2	1	3	0	0	1	7
		% within Barangay	*29%*	*14%*	*43%*	*0%*	*0%*	*14%*	*100%*
	Carmen	Count	6	4	3	0	3	0	16
		% within Barangay	*38%*	*25%*	*19%*	*0%*	*19%*	*0%*	*100%*
Total of Type B Respondents		Count	10	8	8	0	4	1	31
		% within Barangay	*32%*	*26%*	*26%*	*0%*	*13%*	*3%*	*100%*
Total of Type A and B		**Count**	**15**	**26**	**11**	**2**	**4**	**5**	**63**
		% within Barangay	***24%***	***41%***	***17%***	***3%***	***6%***	***8%***	***100%***

Note:

A – Primary; B – Secondary; C – Tertiary; D – Vocational; E – Post-Graduate; F - None

Source: JICA Study Team (2012)

Table 9.6.3-5 shows that children who were able to finish college education have a high percentage of 32% and 50% are still studying. 18% of the children are out of school youth.

TABLE 9.6.3-5 EDUCATION OF CHILDREN

City/Municipality/Barangay			Finished College	Schooling	Out of School	Total
Type A - Residential/Household Structure						
Silang, Cavite	Sabutan	Count	4	15	7	26
		% within Barangay	*15%*	*58%*	*27%*	*100%*
	Kaong	*Count*	1	2	0	3
		% within Barangay	*33%*	*67%*	*0%*	*100%*
	Tibig	*Count*	2	5	2	9
		% within Barangay	*22%*	*56%*	*22%*	*100%*
Biñan, Laguna	Timbao	*Count*	1	3	0	4
		% within Barangay	*25%*	*75%*	*0%*	*100%*
Total of Type A Respondents		Count	8	25	9	42
		% within Barangay	*19%*	*60%*	*21%*	*100%*
Type B – Farm Lands						
Silang, Cavite	Sabutan	Count	6	5	1	12
		% within Barangay	*50%*	*42%*	*8%*	*100%*
	Kaong	Count	1	2	0	3
		% within Barangay	*33%*	*67%*	*0%*	*100%*
	Tibig	Count	3	6	2	11
		% within Barangay	*27%*	*55%*	*18%*	*100%*
	Carmen	Count	17	17	8	42
		% within Barangay	*40%*	*40%*	*19%*	*100%*
Total of Type B Respondents		Count	27	30	11	68
		% within Barangay	*40%*	*44%*	*16%*	*100%*
Total of Type A and B		**Count**	**35**	**55**	**20**	**110**
		% within Barangay	***32%***	***50%***	***18%***	***100%***

Source: JICA Study Team (2012)

9.6.3.4 Main Occupation of PAPs

Of 32 respondents whose houses are affected, main occupation of the 6 households (19.0%) is farming, 11 households (34%) is employment and 15 households (16%) is others (drivers, factory workers, etc.).

Of 31 respondents whose farm lands are affected, main occupation of 21 households (68%) is farming, 4 households (13%) is employment and 6 households (19%) is others.

9.6.3.5 Family Economy

Table 9.6.3-6 shows the monthly family income bracket of the PAPs interviewed, 24% of them are earning between 6,001 to 15,000 and 22% have income bracket of 10,001 to 15,000. While 22% of them are earning 10,000 or less that most of them falls from the annual poverty threshold for family of 6 persons in the provinces of Cavite and Laguna that is Php8,938 and

Php8,265 respectively based on National Statistical Yearbook 2010 under Region IV-A.

TABLE 9.6.3-6 MONTHLY FAMILY INCOME

City/Municipality/Barangay			**3,000 orless**	**3,001 to 6,000**	**6,001 to 10,000**	**10,001 to 15,000**	**15,001 to 20,000**	**20,001 to 30,000**	**30,001 to 40,000**	**40,001 to 50,000**	**50,001 to 60,000**	**60,001 or more**	**Total**
Type A - Residential/Household Structure													
Silang, Cavite	Sabutan	Count	1	1	3	6	0	1	1	0	0	1	14
		% within Barangay	*7%*	*7%*	*21%*	*43%*	*0%*	*7%*	*7%*	*0%*	*0%*	*7%*	*100%*
	Kaong	Count	0	0	0	1	0	0	0	0	0	1	2
		% within Barangay	*0%*	*0%*	*0%*	*50%*	*0%*	*0%*	*0%*	*0%*	*0%*	*50%*	*100%*
	Tibig	Count	1	1	1	3	3	1	1	0	0	0	11
		% within Barangay	*9%*	*9%*	*9%*	*27%*	*27%*	*9%*	*9%*	*0%*	*0%*	*0%*	*100%*
Biñan, Laguna	Timbao	Count	0	0	2	0	1	0	0	1	0	1	5
		% within Barangay	*0%*	*0%*	*40%*	*0%*	*20%*	*0%*	*0%*	*20%*	*0%*	*20%*	*100%*
Total of Type A		Count	2	2	6	10	4	2	2	1	0	3	32
		% within Barangay	*6%*	*6%*	*19%*	*31%*	*13%*	*6%*	*6%*	*3%*	*0%*	*9%*	*100%*
Type B – Farm Lands													
Silang, Cavite	Sabutan	Count	0	0	1	2	0	1	0	0	1	1	6
		% within Barangay	*0%*	*0%*	*17%*	*33%*	*0%*	*17%*	*0%*	*0%*	*17%*	*17%*	*100%*
	Kaong	Count	0	0	1	0	0	0	0	1	0	0	2
		% within Barangay	*0%*	*0%*	*50%*	*0%*	*0%*	*0%*	*0%*	*50%*	*0%*	*0%*	*100%*
	Tibig	Count	0	0	2	0	0	1	2	2	0	0	7
		% within Barangay	*0%*	*0%*	*29%*	*0%*	*0%*	*14%*	*29%*	*29%*	*0%*	*0%*	*100%*
	Carmen	Count	1	0	5	2	2	5	0	1	0	0	16
		% within Barangay	*6%*	*0%*	*31%*	*13%*	*13%*	*31%*	*0%*	*6%*	*0%*	*0%*	*100%*
Total of Type B		Count	1	0	9	4	2	7	2	4	1	1	31
		% within Barangay	*3%*	*0%*	*29%*	*13%*	*6%*	*23%*	*6%*	*13%*	*3%*	*3%*	*100%*
Total of Type A and B		**Count**	**3**	**2**	**15**	**14**	**6**	**9**	**4**	**5**	**1**	**4**	**63**
		% within Barangay	***5%***	***3%***	***24%***	***22%***	***10%***	***14%***	***6%***	***8%***	***2%***	***6%***	***100%***

Source: JICA Study Team (2012)

Table 9.6.3-7 shows the household expenditures. The bulk of the household expenditures comprises of food (51%) followed by education (25%). The PAPs considered that if farming will be lost from their livelihood, food security problem will arise from their displacement. They believe that having a farmland sustain their meal from planting backyard vegetables for daily consumption.

TABLE 9.6.3-7 AVERAGE ANNUAL HOUSEHOLD EXPENDITURES OF THE PAPS INTERVIEWED (1 OF 2)

Municipality/Barangay			**Food**	**Utilities**	**Education**	**Rent**	**Health**	**Transportation**	**Total**
Type A – Residential/Household Structure									
Silang, Cavite	Sabutan	Average	68,092	12,678	17,371	1,714	1,653	5,867	7,669
		% within Barangay	*64%*	*12%*	*16%*	*2%*	*2%*	*5%*	100%
	Kaong	Average	60,000	2,250	12,000	300	2,500	50,000	127,050
		% within Barangay	*47%*	*2%*	*9%*	*0%*	*2%*	*39%*	100%
	Tibig	Average	72,245	7,690	14,463	2,181	2,181	9,796	108,560
		% within Barangay	*67%*	*7%*	*13%*	*2%*	*2%*	*9%*	100%
Biñan, Laguna	Timbao	Average	174,720	22,800	6,700	0	0	5,840	210,060
		% within Barangay	*83%*	*11%*	*3%*	*0%*	*0%*	*3%*	100%
Total of Type A		Average	375,057	45,418	50,534	4,195	6,334	71,503	453,339
		% within Barangay	*69%*	*10%*	*12%*	*1%*	*1%*	*8%*	100%

Source: JICA Study Team (2012)

TABLE 9.6.3-7 HOUSEHOLD EXPENDITURES OF THE PAPS INTERVIEWED 2/2

Municipality/Barangay			Food	Utilities	Education	Rent	Health	Transportation	Total
Type B – Farm Lands									
Silang, Cavite	Sabutan	Count	32,578	32,408	5,688	0	2,835	3,857	10,808
		% within Barangay	*22%*	*21%*	*53%*	*0%*	*2%*	*3%*	100%
	Kaong	Count	61,200	4,500	11,250	300	2,700	5,625	52,725
		% within Barangay	*58%*	*4%*	*21%*	*1%*	*5%*	*11%*	100%
	Tibig	Count	49,745	23,650	3,861	0	38	19.81	10,591
		% within Barangay	*43%*	*20%*	*36%*	*0%*	*0%*	*0%*	100%
	Carmen	Count	68,321	15,820	1,395	111	918	409.3	8,093
		% within Barangay	*53%*	*12%*	*17%*	*1%*	*11%*	*5%*	100%
Total of Type B		Count	211,844	76,378	22,194	411	6,453	9,911	82,217
		% within Barangay	*39%*	*17%*	*35%*	*1%*	*5%*	*3%*	100%
Total of Type A and B		**Count**	**586,901**	**121,796**	**2,444,240**	**4,606**	**342,441**	**81,414**	**535,556**
		% within Barangay	***51%***	***14%***	***25%***	***1%***	***4%***	***5%***	**100%**

Source: JICA Study Team (2012)

9.6.3.6 Income Sources

The main source of income of PAPs who lose structures is via employment while the PAPs who lose land are by farming. Employment here refers to jobs in government and private offices including skilled workers. Aside from the primary occupation of the PAPs there are others sources of income of their household members but majority (52%) of them has no secondary source of income.

9.6.3.7 Land Ownership

(1) Residential Lands

The respondents' landownership shows in **Table 9.6.3-8** that out of 32 Type A respondents 27 owned the land as well, while the remaining are renting the land where their structures are built.

(2) Farm Lands

With regards to Type B respondents, 12 owned the land, three (3) are tenants and 16 are occupying the farmland with permit from the owner. The said 16 respondents are within Brgy. Carmen. Based on coordination meeting with the SAMACA NGO in Carmen, almost all of the tenants were paid by the developers and signed a waiver in exchange for their farmland. According to said NGO, since the land is not yet used by the developer, the tenants who received payments have been given a permit to continue their farming activity. See **Table 9.6.3-9** for the tenure status of Type B respondents.

TABLE 9.6.3-8 LAND TENURE STATUS OF IMPACTED STRUCTURES

City/Municipality/Barangay			Owner	Renter	Total
Type A - Residential/Household Structure					
Silang, Cavite	Sabutan	Count	12	2	14
		% within Barangay	*86%*	*14%*	*100%*
	Kaong	*Count*	1	1	2
		% within Barangay	*50%*	*50%*	*100%*
	Tibig	*Count*	9	2	11
		% within Barangay	*82%*	*18%*	*100%*
Biñan, Laguna	Timbao	*Count*	5	0	5
		% within Barangay	*100%*	*0%*	*100%*
Total of Type A Respondents		Count	27	5	32
		% within Barangay	*84%*	*16%*	*100%*

Source: JICA Study Team (2012)

TABLE 9.6.3-9 LAND TENURE STATUS ON LAND FARMING

City/Municipality/Barangay			Owner	Tenant	Free occupation with Permit	Total
Type B – Farm Lands						
Silang, Cavite	Sabutan	Count	6	0	0	6
		% within Barangay	*100%*	*0%*	*0%*	*100%*
	Kaong	Count	1	1	0	2
		% within Barangay	*50%*	*50%*	*0%*	*100%*
	Tibig	Count	5	2	0	7
		% within Barangay	*58%*	*42%*	*0%*	*100%*
	Carmen	Count	0	0	16	16
		% within Barangay	*0%*	*0%*	*100%*	*100%*
Total of Type B Respondents		Count	12	3	16	31
		% within Barangay	*39%*	*10%*	*51%*	*100%*

Source: JICA Study Team (2012)

9.6.3.8 Structure Ownership

Table 9.6.3-10 shows that out of 32 households interviewed, 27 of them own the structure and only five (5) are renting.

TABLE 9.6.3-10 RESIDENTIAL STRUCTURE OWNERSHIP

City/Municipality/Barangay			Owner	Renter	Total
Silang, Cavite	Sabutan	Count	11	3	14
		% within Barangay	*79%*	*21%*	*100%*
	Kaong	Count	2	0	2
		% within Barangay	*100%*	*0%*	*100%*
	Tibig	Count	9	2	11
		% within Barangay	*82%*	*18%*	*100%*
Biñan, Laguna	Timbao	Count	5	0	5
		% within Barangay	*100%*	*0%*	*100%*
Total of Type A Respondents		**Count**	***27***	***5***	***32***
		% within Barangay	***84%***	***16%***	***100%***

Source: JICA Study Team (2012)

9.6.3.9 Social Acceptability

There are a total of 199 respondents who were asked on their social acceptability on the proposed Cavite –Laguna Expressway Project (Laguna Section). These consist of:

a) 32 Type A respondents (residential structure owners);
b) 31 Type B respondents (PAPs at farm lands);
c) 135 Type C respondents or the indirectly affected respondents from residential, business, youth, transportation, senior, NGO/POs sectors.

Majority (69%) of Type A (Residential household to be affected by project) have objection to the Project.

About 40% of Type B (Form land to be affected by project) also object to the Project.

Majority (87%) of Type C (Indirectly affected) are in favor of the Project.

Their common reasons are:

- Most concerns are their livelihood after lands/houses are taken by the project.
- Although the Government says compensation will be done by replacement cost basis, most of them still worry that compensation cost would be lower than the replacement cost.
- Some compensation such as disturbance compensation is very low.
- Although the Government says “land for land” compensation is one of the ways to compensate, however, most of them think that it is practically very difficult and the Government will not pursue this type of compensation.

In order to address above issues/concerns of PAPs, the Government should employ Independent Assessor (IA) to fairly decide compensation cost. IA should also talk with PAPs frequently to remove PAP’s concerns. DPWH should also make all kinds of efforts to realize “land for land” compensation. DPWH in close coordination with LGU’s and Barangay Captains should also implement in Livelihood Restoration Program.

As seen in **Table 9.6.3-11** the highest percentage of respondents who refuses the project are those have impact on land and structures (Type A).

TABLE 9.6.3-11 SOCIAL ACCEPTABILITY OF THE RESPONDENTS 1 OF 2

City/Municipality/Barangay/Respondents			**Yes**	**No**	**Total**
Type A – Residential/Household Structure					
Silang, Cavite	Sabutan	Count	3	11	14
		% within Barangay	21%	79%	100%
	Kaong	Count	1	1	2
		% within Barangay	50%	50%	100%
	Tibig	Count	1	10	11
		% within Barangay	9%	91%	100%
Binan, Laguna	Timbao	Count	5	0	5
		% within Barangay	100%	0%	100%
Total Type A		Count	10	22	32
		% within Barangay	31%	69%	100%

City/Municipality/Barangay/Respondents			Yes	No	Total
Type B – Farm Lands					
Silang, Cavite	Sabutan	Count	5	1	6
		% within Barangay	83%	17%	100%
	Kaong	Count	1	1	2
		% within Barangay	50%	50%	100%
	Tibig	Count	4	3	7
		% within Barangay	57%	43%	100%
	Carmen	Count	8	8	16
		% within Barangay	50%	50%	100%
Total Type B		Count	18	13	31
		% within Barangay	58%	42%	100%

Source: JICA Study Team (2012)

TABLE 9.6.3-11 SOCIAL ACCEPTABILITY OF THE RESPONDENTS 2 OF 2

CityMunicipality/Barangay/Respondents			Yes	No	Total
Type C – Indirectly Affected					
Type of Respondent	Residential Sector	Count	31	4	35
		% within Type of Respondent	89%	11%	100%
	Business Sector	Count	27	2	29
		% within Type of Respondent	93%	7%	100%
	Youth Sector	Count	12	7	19
		% within Type of Respondent	63%	37%	100%
	Transportation Sector	Count	20	1	21
		% within Type of Respondent	95%	5%	100%
	Aged Sector	Count	18	3	21
		% within Type of Respondent	86%	14%	100%
	NGO/PO/ Homeowners Association/ Agricultural Cooperative	Count	10	0	10
		% within Type of Respondent	100%	0%	100%
Total Type C		Count	118	17	135
		% within Type of Respondent	87%	13%	100%
Total of Type A, B, and C		**Count**	**146**	**52**	**198**
		% within Barangay	**74%**	**26%**	**100%**

Source: JICA Study Team (2012)

9.6.3.10 Relocation of Informal Settlers

There are no identified informal settlers to be affected by the CALAX Project.

9.6.3.11 Farmlands and Livelihood to be Affected

As mentioned in this report, the western section of this project is mostly agricultural land which is located in the municipality of Silang. The loss of livelihood to be mostly affected is farming. **Table 9.6.3-12** shows the five year trend of annual gross harvest per crop being planted by the PAPs that was provided by the Department of Agriculture of Silang, Cavite that have knowledge on the status of farming activities and production for the past five years. Table shows that the vast tracks of crops being planted is pineapple.

TABLE 9.6.3-12 YEAR TREND OF ANNUAL GROSS HARVEST

City/ Municipality	Crops	2006			2007			2008			2009			2010		
		Area Planted (Has.)	Area Harvested (Has.)	Production (MT/Ha.)	Area Planted (Has.)	Area Harvested (Has.)	Production (MT/Ha.)	Area Planted (Has.)	Area Harvested (Has.)	Production (MT/Ha.)	Area Planted (Has.)	Area Harvested (Has.)	Production (MT/Ha.)	Area Planted (Has.)	Area Harvested (Has.)	Production (MT/Ha.)
SILANG	Corn	134.25	179.25	1,165.50	99.00	111.00	555.00	328.82	272.02	1,218.16	403.57	448.13	1,768.18	398.61	323.35	1,344.92
	Vegetables	73.79	60.48	728.44	93.30	93.83	1,355.94	99.55	99.46	1,427.16	104.06	104.06	1,409.37	102.92	98.39	1,327.53
	Sugarland	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R	N.R.	N.R.	N.R.0
	Cassava	149.57	123.57	1,777.73	179.00	179.00	2,685.00	171.75	166.75	2,504.00	184.45	184.45	2,765.25	47.45	47.45	818.75
	Pineapple	912.00	799.50	20,136.25	933.00	933.00	23,325.00	943.25	943.25	23,418.50	951.25	951.25	23,662.50	813.27	810.27	20,264.25
	Coffee	1,815.50	1,657.50	1,657.25	1,559.50	1,559.50	1,247.50	1,468.00	1,468.00	1,174.40	1,526.50	1,526.50	1,221.20	1,455.00	1,452.50	1,162.00
	Banana	339.5	339.5	2,808.5	415.75	415.75	3,417.5	339.5	339.5	2,808.5	842.25	842.25	2,834	340.775	340.775	2,882.30
	Coconut	1,325	1,325	3,975	1,365	1,365	4,095	1,325	1,325	3,975	1,270	1,270	3,810	1,093	1,093	3,279

Note: **N.R. – No Record**

Source: *5 Years Agricultural Profile 2006-2010 Office of the Provincial Agriculturist Province of Cavite*

The types of crops being planted by the PAPs are presented in **Table 9.6.3-13**. The land area, production and yield per crop is also shown in every barangays to be traversed by the proposed project.

TABLE 9.6.3-13 CROPS PRODUCTION OF PAPS

City/ Municipality	Barangay	Crops	Land Area (ha.)	Production (T)	Yield (T/ha.)
Silang, Cavite	Sabutan	Corn	12.7	56.00	4.41
		Banana	17.66	250.00	14.20
		Papaya	0.50	3.00	6.00
		Pineapple	8.90	98.00	11.00
		Coffee	5.00	6.00	1.20
		Coconut	5.00	10.00	2.00
		Leafy Vegetables	0.48	0.70	1.50
	Kaong	Banana	17.56	260.00	15.00
		Pineapple	16.86	185.00	11.00
		Coffee	10.40	8.00	0.80
		Coconut	4.50	10.00	2.20
		Cassava	2.50	0.65	0.30
	Tibig	Banana	14.60	220.00	15.10
		Pineapple	19.80	210.00	11.00
		Coffee	16.60	12.00	1.00
		Coconut	8.50	16.00	2.00
		Cassava	2.50	0.70	0.30
	Carmen	Pineapple	12.50	165.00	13.20
		Cassava	15.50	4.90	0.30
		Corn	21.80	125.00	6.00
		Camote	6.00	10.00	2.00
		Banana	8.00	105.00	13.00
	Total	Corn		181(10%)	
		Banana		835(49%)	
		Papaya		3(0%)	
		Pineapple		658(37%)	
		Coffee		26(1%)	
		Coconut		36(2%)	
		Leafy Vegetables		0.7(0%)	
		Cassava		6(0%)	
		Camote		10(1%)	

Source: JICA Study Team (2012)

When asked if there are other farmlands available for the PAPs who will lose their livelihood from farming, the response gives that 87% of them has no other land to cultivate. In this regard the loss of land of the tenants was coordinated with the Provincial Governor and Agrarian Reform Office of Cavite in order to inquire on the available farmlands/CARP lands that can be provided for the displaced tenants in exchange for their loss due to the project. According to them, there is no available CARPable land that can be provided to them. It is also noticeable in the land use map of Cavite that their farmlands are almost being converted to developed lands that results into urbanization of the province which is very near to the urbanized city of Biñan and Sta. Rosa.

Relocation of Farmland Owners

When asked about the compensation preference of PAPs (Type B), the result reveals that they prefer to replace their affected farmland to equally productive farmland in order to continue their farming activities (58%). The remaining 42% preferred to receive cash compensation because they believe that there is no available land in Cavite for farming and only in faraway places and mountainous area, which are uncultivated and unproductive. Please refer to **Table 9.6.3-14**.

TABLE 9.6.3-14 ENTITLEMENT PREFERENCE OF PAPS LOSING FARM LAND/PROPERTY DUE TO THE PROJECT (TYPE B – FARM LANDS)

Municipality/Barangay			**Land for land, pond for pond**	**Cash Compensation**	**Total**
Silang, Cavite	Sabutan	Count	4	2	6
		% within Barangay	*67%*	*33%*	*100%*
	Kaong	Count	2	0	2
		% within Barangay	*100%*	*0%*	*100%*
	Tibig	Count	5	2	7
		% within Barangay	*71%*	*29%*	*100%*
	Carmen	Count	7	9	16
		% within Barangay	*44%*	*56%*	*100%*
Total		**Count**	**18**	**13**	**31**
		% within Barangay	***58%***	***42%***	***100%***

Source: JICA Study Team (2012)

In terms of additional assistance or acceptable livelihood replacement to lost farmland, the 58% of the PAPs are very firm in their reply that is to provide them another equally productive farmland while the remaining 42% preferred provision of business capital or funds to augment the loss of income from farming. Please refer to **Table 9.6.3-15**.

TABLE 9.6.3-15 ACCEPTABLE LIVELIHOOD IN REPLACEMENT TO LOST FARMLAND (TYPE B – FARM LANDS)

Municipality/Barangay			**Provision of another equally productive farmland**	**Business capital**	**Total**
Silang, Cavite	Sabutan	Count	4	2	6
		% within Barangay	*67%*	*33%*	*100%*
	Kaong	Count	2	0	2
		% within Barangay	*100%*	*0%*	*100%*
	Tibig	Count	5	2	7
		% within Barangay	*71%*	*29%*	*100%*
	Carmen	Count	7	9	16
		% within Barangay	*44%*	*56%*	*100%*
Total		**Count**	**18**	***18***	***13***
		% within Barangay	***58%***	***58%***	***42%***

Source: JICA Study Team (2012)

9.6.3.12 Availability of Social Services

Power and Water Supply

All the barangays' **power supply** is provided by MERALCO. In terms of **water supply**, majority of the respondents get their water from artesian well for domestic use such as washing of clothes and dishes (**10%**), and from barangay water district (**46%**), while drinking water is being purchased like mineral and distilled water (**48%**). Please refer to **Table 9.6.3-16** and **Table 9.6.3-17**.

TABLE 9.6.3-16 SOURCE OF WATER FOR WASHING CLOTHES AND DISHES

City/Municipality/Barangay			**Dug well**	**Artesian well**	**Pump well**	**Piped**	**Purchase**	**Total**
Type A - Residential/Household Structure								
Silang, Cavite	Sabutan	Count	10	1	0	2	1	14
		% within Barangay	*71%*	*7%*	*0%*	*14%*	*7%*	*100%*
	Kaong	Count	0	0	0	1	1	2
		% within Barangay	*0%*	*0%*	*0%*	*50%*	*50%*	*100%*
	Tibig	Count	1	0	0	8	2	11
		% within Barangay	*9%*	*0%*	*0%*	*73%*	*18%*	*100%*
Biñan, Laguna	Timbao	Count	0	0	0	3	2	5
		% within Barangay	*0%*	*0%*	*0%*	*60%*	*40%*	*100%*
Total of Type A Respondents		Count	11	1	0	14	6	32
		% within Barangay	*34%*	*3%*	*0%*	*44%*	*19%*	*100%*
Type B – Farm Lands								
Silang, Cavite	Sabutan	Count	1	1	1	2	1	6
		% within Barangay	*17%*	*17%*	*17%*	*33%*	*17%*	*100%*
	Kaong	Count	0	0	0	1	1	2
		% within Barangay	*0%*	*0%*	*0%*	*50%*	*50%*	*100%*
	Tibig	Count	2	0	0	4	1	7
		% within Barangay	*29%*	*0%*	*0%*	*57%*	*14%*	*100%*
	Carmen	Count	4	4	0	8	0	16
		% within Barangay	*25%*	*25%*	*0%*	*50%*	*0%*	*100%*
Total of Type B Respondents		Count	7	5	1	15	3	31
		% within Barangay	*23%*	*16%*	*3%*	*48%*	*10%*	*100%*
Total of Type A and B Respondents		**Count**	**18**	**6**	**1**	**29**	**9**	**63**
		% within Barangay	***29%***	***10%***	***2%***	***46%***	***14%***	***100%***

Source: JICA Study Team (2012)

TABLE 9.6.3-17 SOURCE OF WATER SUPPLY FOR DRINKING

City/Municipality/Barangay			Dug well	Artesian	Piped	Purchase	Total
Type A - Residential/Household Structure							
Silang, Cavite	Sabutan	Count	3	3	3	5	14
		% within Barangay	*21%*	*21%*	*21%*	*36%*	*100%*
	Kaong	Count	0	0	0	2	2
		% within Barangay	*0%*	*0%*	*0%*	*100%*	*100%*
	Tibig	Count	2	3	3	3	11
		% within Barangay	*18%*	*27%*	*27%*	*27%*	*100%*
Biñan, Laguna	Timbao	Count	0	0	2	3	5
		% within Barangay	*0%*	*0%*	*40%*	*60%*	*100%*
Total of Type A Respondents		Count	5	6	8	13	32
		% within Barangay	*27%*	*9%*	*18%*	*45%*	*100%*
Type B – Farm Lands							
Silang, Cavite	Sabutan	Count	0	1	2	3	6
		% within Barangay	*0%*	*17%*	*33%*	*50%*	*100%*
	Kaong	Count	0	0	0	2	2
		% within Barangay	*0%*	*0%*	*0%*	*100%*	*100%*
	Tibig	Count	2	0	0	5	7
		% within Barangay	*29%*	*0%*	*0%*	*71%*	*100%*
	Carmen	Count	2	0	7	7	16
		% within Barangay	*13%*	*0%*	*44%*	*44%*	*100%*
Total of Type B Respondents		Count	4	1	9	17	31
		% within Barangay	*13%*	*3%*	*29%*	*55%*	*100%*
Total of Type A and B Respondents		**Count**	**9**	**7**	**17**	**30**	**63**
		% within Barangay	***14%***	***11%***	***27%***	***48%***	***100%***

Source: JICA Study Team (2012)

Health

Health personnel visit all the barangays, but for more modern health facilities the nearest hospitals are located in *poblacions*. There are **five** (**5**) hospitals in the Municipality of Silang, **one** (**1**) of which is a private hospital located in Brgy. Sabutan. There are **three** (**3**) hospitals in Biñan and also **three** (**3**) major hospitals in Sta. Rosa.

Education

With regards to educational facilities, elementary schools are available in every barangay.

In terms of secondary education, the barangays with educational facilities offering secondary education Sabutan National High School, Kaong National High School, Munting Ilog National High School. There are seven (7) tertiary schools in the Municipality of Silang. Of them there are two (2) public schools namely Cavite State University and Philippine National Police Academy located in Silang Proper. In the city of Biñan and Sta. Rosa primary educational facilities are also available in every barangay, while secondary education facilities are located in the poblacions of each city. There are eight (8) tertiary educational facilities in Biñan. Polytechnic University of the Philippines is the available tertiary educational facility in Sta. Rosa that is managed by the government.

Life in the Province

The collection of garbage in barangays is very limited; only 11% and mostly those who are near the *poblacions* area such as Brgy. Sabutan are serviced. The Project-affected barangays generally bury 14% or burn 71% of their waste in their backyard.

The common means of public utility transportation in the project is tricyle. Barangay along the provincial roads are accessible by jeepneys.

9.6.4 Compensation and Rehabilitation Plan

9.6.4.1 Assets Inventory

Number of residential houses affected is shown in **Table 9.6.2-1**. Approximate number of farm land lot affected is shown in **Table 9.6.2-2**. Other improvement affected is shown in **Table 9.6.2-3**.

9.6.4.2 Eligibility

Legal owners of residential, commercial and institutional land who have full title, tax declaration or other acceptable proof of ownership shall be eligible for compensation. On the other hand, owners of structures, whether these are based on legitimate or informal occupation of lands including, shanty dwellers, who have no land title or tax declaration or other acceptable proof of ownerships, shall be compensated based on replacement cost, as defined in the IRR of R.A. 8974. LARRIPP clearly agreed to WP OP4.12 stating in its CHAPTER 2 sectionE.2 (pp8):

Quote;

(1) The absence of a formal legal title to land by some affected groups should not be a bar to compensation, especially if the title can be perfected; particular attention should be paid to households headed by women and other vulnerable groups, such as indigenous

peoples and ethnic minorities, and appropriate assistance provided to help them improve their status.

(2) In case of severe impacts on agricultural land use, rehabilitation measures shall be given to PAFs

(3) If possible, income restoration entitlements many also be given to informal settlers affected by non-severe loss of agricultural land.

Unquote.

(1) The majority of the respondents who owns their land constitutes of 96.6% but do not have other land to construct to relocate their house or other farm land to cultivate

(2) A majority or 92.2% of the PAPs own the structures they are occupying. Only a few are either sharing (6.2%) or occupying the structures (1.6%) with permission from owners.

(3) Mostly situated in private lands which they inherited from relatives who were former tenants of vast haciendas of landed families in Nueva Ecija.

(4) These residential properties through the years were transferred down to several generations up to the present occupants and real ownership status nobody really knows. Most responses gathered from the structure occupants were that they inherited the land where their houses are now situated. (No title)

With the foregoing premises, for most of the structure occupants, ownership of the lots where their houses were built is considered free occupation on private land with permit.

TABLE 9.6.4-1 ENTITLEMENT MATRIX

Type of Loss	Application	Entitled Person	Compensation/Entitlements	Actions For Each Compensation/ Entitlement	Organization Responsible For Each Action
LAND (classified as Agricultural, Residential, Commercial or Institutional).	More than 20% of the total landholding lost or where less than 20% lost but the remaining land holding become economically unviable.	Project affected Family (PAF) with Torrens Certificate of Title (TCT) or tax declaration (Tax declaration can be legalized to full title).	PAF will be entitled to: • Cash compensation for loss of land at 100% replacement cost at the informed request of PAFs. This entitlement covers the residential land if the remaining farm land holding becomes economically unviable and (it's the only asset/property the PAF has, thus) the Project Affected Family (PAF) is obliged to relocate their house to other place for new jobs (refer to STRUCTURE (B) below), or • **Land for land**, if feasible, will be provided in terms of a new parcel of land of equivalent productivity, at a location acceptable to PAFs. • Cash compensation for damaged crops at market value at the time of taking. • Cash compensation for disturbance allowance equivalent to 5 times of average gross harvest which shall be assessed and determined by the Independent Assessor. • Rehabilitation assistance in the form of skills training equivalent to at least P15,000.00, per family, if the present means of livelihood is no longer viable and the Affected Family (AF) will have to engage in a new income activity.	(1) Public consultation meeting (2) Parcellary survey to identify land owners, area to be acquired, preparation of subdivision map, etc. (3) Assessment of land value, procurement of independent land/asset appraiser, damaged crops, disturbance compensation, etc. (4) Validation of assessment (5) Preparation of RAP Report (6) Approval of RAP (7) Disclosure of Compensation Package (8) Land purchase contract with land owners (9) Payment to land owners (10) Transfer of Title	(1) PMO, RO/DEO with D/D Consultant (2) PMO,RO/DEO with D/D Consultant (3) Independent land/ Asset Appraiser (4) PMO, RO/DEO, MRIC/CRIC (5) PMO, D/D Consultant (6) DPWH Secretary (7) PMO, RO/DEO (8) RO/DEO (9) PMO, RO/DEO (10) RO/DEO
		AF without TCT	• Cash compensation for damaged crops at market value at the time of taking. • Tenant farmers are entitled to financial assistance equivalent to the value of the gross harvest for one year on the principal and secondary crops of the area acquired, based on the average annual gross harvest for the last three preceding crop years and determined by the Independent Assessor, provided, that **in no case shall the financial assistance be less than P15,000.00 per hectare** (E.O. 1035)		

Type of Loss	Application	Entitled Person	Compensation/Entitlements	Actions For Each Compensation/ Entitlement	Organization Responsible For Each Action
	Less than 20% of the total landholding lost or where less than 20% lost or where the remaining landholding still viable for use.	AF with TCT or tax declaration (Tax declarations that are legalizable to full title).	PAF will be entitled to: • Cash compensation for loss of land at 100% replacement cost at the informed request of PAFs. • Cash compensation for damaged crops at market value at the time of taking. • Cash compensation for disturbance allowance equivalent to 5 times of average gross harvest, which shall be determined by the Independent Assessor.		
		AF without TCT	• Cash compensation for damaged crops at market value at the time of taking. • Tenant farmers are entitled to financial assistance equivalent to the value of the gross harvest for one year on the principal and secondary crops of the area acquired, based on the average annual gross harvest for the last three preceding crop years and determined by the Independent Assessor provided, that **in no case shall the financial assistance be less than P15,000.00 per hectare** (E.O. 1035)		
STRUCTURES (A) (classified as Residential, Commercial & Industrial)	More than 20% of the total landholding loss or where less than 20% loss but the remaining structure no longer functions as intended or no longer viable for continued use.	AF with TCT or tax declaration (Tax declaration can be legalized to full title).	AF will be entitled to: • Cash compensation for entire structure at 100% replacement cost.	(1) Public Consultation Meeting (2) Parcellary Survey to identify asset owners, assets to be acquired, (3) Valuation (4) Validation of assets (5) Preparation of RAP (6) Approval of RAP (7) Disclosure of Compensation Package (8) Pledge of undertakings (9) Payment (10) Relocation	(1) PMO, RO/DEO with D/D Consultant (2) PMO,RO/DEO with D/D Consultant (3) Independent land/ Asset Appraiser (4) PMO, RO/DEO, MRIC/CRIC/ESSO (5) PMO, D/D Consultant/ESSO (6) DPWH Secretary (7) PMO, RO/DEO/ESSO (8) RO/DEO/PMO/ESSO
		AF without TCT.	AF will be entitled to: • Cash compensation for entire structure at 100% of replacement cost.		
		AF who are Renter	• Three (3) months rental subsidy shall be provided equivalent to the amount that will equal to the rent of the same type of house rented.		
	Less than 20% of the total landholding lost or where the remaining structure is still functional and is viable for continued use.	PAF with TCT or tax declaration (Tax declaration can be legalized to full title).	• Compensation for affected portion of the structure to be computed based on replacement cost		
		PAF without TCT	• Compensation for affected portion of the structure to be computed based on replacement cost.		

Type of Loss	Application	Entitled Person	Compensation/Entitlements	Actions For Each Compensation/ Entitlement	Organization Responsible For Each Action
STRUCTURES (B)	(B) Farm land becomes economically unviable due to the Project and the Project Affected Family (PAF) is obliged to relocate their house to other place.	PAF with Torrens Certificate of Title (TCT) or tax declaration	PAF will be entitled to: (a) Cash compensation for entire structure at 100% Replacement Cost (RC), (b) Moving allowance, (c) Income rehabilitation, if source of income is severely affected	(11) Demolition	(9) PMO, RO/DEO (10) PMO, RO/DEO (11) RO/DEO
		PAF without TCT	PAF will be entitled to: (a) Cash compensation for entire structure to be computed at replacement cost, (b) Moving allowance, (c) Income rehabilitation, if source of income is severely affected		
		PAF who are Renter whose source of income are severely affected	PAF will be entitled to: (a) Rental subsidy (refer to renter, structure (A) (b) Moving allowance, (c) Income rehabilitation if source of income is severely affected		
Improvements	Severely or marginally affected	PAF with or without TCT, tax declaration	Cash compensation for affected improvements at replacement cost.	Same as “Structure”	Same as “Structure”
Trees and perennials	Severely or marginally affected	PAF with or without TCT, tax declaration	Cash compensation for affected trees and perennials at current market value as prescribed by the concerned LGUs and/or DENR. For fruit-bearing perennial trees, basis shall be commercial value or based on respective City Agriculturist Office valuation, whichever is higher; For timber species planted/cultivated by PAPs, pricing shall be based on DENR valuation schedule	Same as “Structure”	Same as “Structure”
Income loss	Severely or marginally affected	PAF that own Small shops with or without TCT, or tax declaration (small shops are for example Sari-sari store, carinderia, fruit-stand, etc.)	Cash compensation equivalent to one month minimum wage as prescribed by the Regional Wage Board; or Cash compensation equivalent to income loss from demolition and of their shop and for the entire duration of shop closure, until they are able to re-establish shop; Rehabilitation assistance in the form of skills	(1) Public consultation meeting (2) Socio-economic survey to identify income loss families (3) Evaluation of income loss (4) Validation	(1) RO/DEOwith D/D Consultant (2) RO/DEOwith D/D Consultant (3) RO/DEOwith Independent Asset Assessor (4) RO/DEO, MRIC,

Type of Loss	Application	Entitled Person	Compensation/Entitlements	Actions For Each Compensation/ Entitlement	Organization Responsible For Each Action
			training equivalent to the amount of at least P15, 000.00 per family, if their current means of livelihood is no longer viable in the relocation site, and the PAF will have to engage in a new income generating activity.	(5) Payment	CRIC (5) RO/DEO (Regional Office/District Engineering Office)
		PAPs that own large scale commercial establishments with or without TCT, or tax declaration	NOT APPLICABLE		
Unemployed Women/wives	Severely or marginally affected	Women/wives who lose a job	Vocational training equivalent to the amount of P 15,000.00 per family	Same as “Income Loss”	Same as “Income Loss”
Additional allowance	Vulnerable persons as head of households	Person with disability, senior citizens	Additional allowance to be determined by FULL-BLOWN RAP preparer.	Same as “Income Loss”	Same as “Income Loss”
Priority Employment of PAPs during construction	All PAPs	All PAPs	All PAPs are given priority to be employed by the Contractor during construction for unskilled laborers	**(1)** This condition specified in Special Provision of Construction Contract. **(2)** During construction, Contractor announces required number and period of employment. **(3)** Contractor employs PAPs.	(1) Detailed Design Consultant and PMO-BOT (2) Contractor (3) Contractor

Source: JICA Study Team (2012)

Land for Land Compensation

About 60% of land owners whose farm lands are taken by the project wish “land for land” compensation. They wish to do farming continuously at the substitution lands to maintain their livelihood.

This type of compensation is practically very difficult, because the Government has to acquire another farm lands which are equivalent to the present land in terms of land productivity and location.

Although it is a very hard task of DPWH, however, DPWH should do utmost efforts from this early stage to realize this type of compensation with close coordination with concerned LGU’s and barangay captains.

DPWH should search idle lands, big farm land owners who are willing to sell their land to DPWH for the purpose of “land for land” compensation, the farm land owners whose farm lands are marginally affected by the project but willing to sell entire lot area for the purpose of this type of compensation and other feasible measures.

Two (2) land areas owned by Cathay Land, Inc. (CLI) are diagonally divided into two areas by the project. CLI mentioned that their two land areas are no longer suitable for their urban development, and at present, CLI has no plan how to develop the area. DPWH can negotiate with CLI and purchase full their land areas and the land area other than road ROW can be provided to farm land owners who wish “land for land” compensation.

DPWH should seek all possible ways to realize this type of compensation and action should be started from now until construction starts.

9.6.4.3 Valuation and Compensation for Losses

Valuation for compensating loss of land shall be in accordance with Section 5 of R.A. 8974; for dwellings and other structures, on replacement cost as defined in Section 10 of its Implementing Rules and Regulations (IRR), as well as the LARRIPP of the DPWH. Small-scale commercial establishments like sari-sari stores, which will incur temporary decrease in income due to limited access/frontage, shall also be provided income rehabilitation assistance. Inconvenience allowance shall be given to PAPs with severely affected structures, which require relocation and new construction.

For informal settlers, affected families shall be provided free transportation (including those who opt to go back to their province) upon their transfer to the relocation sites. Rehabilitation assistance such as skills training and other development activities per family will be provided in coordination with other government agencies, if the present means of livelihood is no longer viable and the PAPs will have to engage in a new income activity. Rental Subsidy will be given to PAPs without sufficient additional land to allow the reconstruction of their lost house.

(1) Principle of Replacement Cost

All compensation for land and non-land assets owned by households/shop owners who meet the cut-off-date will be based on the principle of replacement cost.

Replacement cost is the amount calculated before displacement which is needed to replace an affected asset without depreciation and without deduction for taxes and/or costs of transaction.

- Replacement Cost is defined as follows;
  - *For Agricultural Land*

    It is the pre-project or pre-displacement, whichever is higher, market value of land of equal productive potential or use located in the vicinity of the affected land, plus the cost of preparing the land to levels similar to those of the affected land, plus the cost of any registration and transfer taxes.
  - *For Land in Urban Areas*

    It is the pre-displacement market value of land of equal size and use, with similar or improved public infrastructure facilities and services and located in the vicinity of the affected land, plus the cost of any registration and transfer taxes.
  - *For Houses and Other Structures*

    It is the market cost of the materials to build a replacement structure with an area and quality similar to or better than those of the affected structure, or to repair a partially affected structure, plus the cost of transporting building materials to the construction site, plus the cost of any labor and contractors' fees, plus the cost of any registration and transfer taxes. In determining the replacement cost, depreciation of the asset and the value of salvage materials are not taken into account, nor is the value of benefits to be derived form the project deducted from the valuation of an affected asset.

  Where domestic law does not meet the standard of compensation at full replacement cost, compensation under domestic law is supplemented by additional measures so as to meet the replacement cost standard.
- Such additional assistance is distinct from resettlement measures to be provided under other clauses in OP 4.12, para. 6.

- Existing regulations, methods and market price survey results of DPWH, DENR, DA, and LGUs will be used where ever available for compensation calculations for building, crops and trees.
- Independent asset assessor is employed to valuate lands, structures, trees and other compensations.
- Houses and other related structures based on actual current market prices of affected materials, labor and mark-up costs. Unit cost for the materials is updated every year, using standard price in each region. Labor cost is added as 25 % of the material cost. In addition to the total estimated direct cost, 20 % mark-up is included in the grand total of replacement cost, covering transfer cost and taxes.
- Annual crops equivalent to current market value of crops at the time of compensation;
- For perennial crops, cash compensation at replacement cost that should be in line with local government regulations, if available, is equivalent to current market value given the type and age at the time of compensation.

For timber trees, cash compensation at replacement cost that should be in line with local government regulations, if available, will be equivalent to current market value for each type, age and relevant productive value at the time of compensation based on the diameter at breast height of each tree.

9.6.4.4 Livelihood Restoration Program

Livelihood Restoration Program (LRP) will be prepared during the detailed design stage as a part of Final RAP and implemented by DPWH in close coordination with concerned LGUs. LRP will focus on skills training equivalent to the amount of Php 15,000 per family by this project. Budget may not be enough, thus regular LRP being done by respective LGUs should be also utilized. LGUs should give priority to PAPs of the project for LRP.

Although the project will provide job opportunities to PAPs during construction phase, this is temporary in nature, thus long-term solution is important. Nonetheless, PAPs should be give priority to job opportunities during construction.

DPWH should guide the Contractor to announce to PAPs the following:
- What types of jobs are available for how many days and for how many people?
- What kinds of skills are required?
- What are the levels of wages?
- What are the conditions of employment?
-

Tha Contractor should coordinate with respective Bagangay captaion for them to recommend appropriate PAPs to be emlployed.

Stakeholders meetings will be held to identify what kinds of skills training are needed, and based on the results of their needs, LRP will be prepared.

In addition to the skills training to be conducted by the project, existing programs being implemented by LGUs, Technical Education and Skills Development Authority (TESDA), NGOs and POs will be arranged by DPWH for PAPs to be participated in such program. DPWH needs to closely coordinate with those agencies and organizations.

Possible areas for skills training will be as follows;

- Tellers at toll booths needed by Expressway Operator
- Road maintenance workers needed by Expressway Worker
- Expressway patrol persons needed by Expressway Operator
- Workers at factories in Economic Zones along the Expressway
- Dress making
- Sewing skills
- Typing / encoding works
- Secretariat works

9.6.5 Grievance Redressing Mechanism

If there will be grievances arising from any aspect of the Project, these will be handled through negotiations following the succeeding procedures.

In accordance with the LAPRAP Tracking Manual of DPWH, a Grievance Handling Committee (HGC) shall be formed within the City/Municipal Resettlement Implementing Committee (CRIC/MRIC-GHC) to facilitate the resolution of the PAPs' grievances. The CRIC's/MRIC's Chairperson shall head this Committee. Each representative from concerned Barangay government shall be his Co-Chairperson(s). The GHC shall consist of the following:

- Legal Officer from the Legal Service (DPWH Central)
- IROW Engineer
- IROW Agent
- Land Management Section Chief/Representative (DENR Regional/Provincial Office)
- City/Municipal Assessor
- Community Environment and Natural Resources Officer (CENRO)
- RP Preparer (from PJHL-PMO or their Consultant)
- Representatives of PAPs
- Representatives of NGOs

This procedure is initiated once the letters from PAFs, expressing their grievances are received by the CRIC-GHC. The deadline for submitting letters of grievances shall be until end of construction after the date of public disclosure of compensation package to affected families; with a maximum extension of another 15 days, if request was made by more than ten percent (10%) of the PAFs.

A Grievance Action Form (GAF), as prescribed in the said LAPRAP Tracking Manual shall be used during the detailed design stage to cover the various aspects of property acquisition based on validation of the RP. The GAF shall, at the very least, contain the following:

- Basic information on PAPs (Name, Address, Contact Number)

- Date of last disclosure meeting;
- Category of grievance filed (Legal, Technical/Engineering, Social, and Financial)
- Type of action taken (Resolved at the CRIC level, or referred to higher authorities.

Respective Barangay Captains, as Co-Chairperson of the GHC shall be the first recipient of the GAF. All GAFs shall be consolidated by the CRIC/MRIC Chairperson and presented to the CRIC/MRIC for deliberation and appropriate action, on a weekly basis. Unresolved grievances at the CRIC/MRIC level shall be elevated to the respective District Engineering Offices for resolution of complaints. Recommendations of the District Engineer shall be elevated to the Regional ESSO for approval and final action. If there are still unresolved grievances, a case shall be filed in the proper courts.

PAPs shall be exempted from all administrative and legal fees incurred in pursuant to the grievance redress procedures.

9.6.6 Institutional Arrangement

The implementation of the RAP will be pursued by various government offices in cooperation with the PAFs and expressway concessionaire. In this section, the various players involved in the RAP implementation are named and their respective roles defined. While the expressway project is pursued under the Japan ODA Loan arrangements, the primary responsibility for the implementation of the project still lies with government specifically the Department of Public Works and Highways. This section is based on DAO D.O. 5, Series of 2003 and the DPWH LARRIP 3rd Edition.

9.6.6.1 Department of Public Works and Highways

DPWH is the Executing Agency (EA) who is responsible to the Philippine Government and the donor agency for the planning and implementation of the expressway project. DPWH will initiate through its relevant departments and PMOs the preparation of all documents necessary for the approval and implementation of the expressway project which includes the updating of feasibility studies, securing of clearances/permits, acquisition of ROW, and monitoring of project implementation. The expressway project will be overseen by the Office of the Assistant Secretary for Planning who shall report directly to the DPWH Secretary on matters related to the project.

9.6.6.2 Project Management Office – Build-Operate-Transfer

PMO-BOT has the overall operational responsibility for implementing the project from the detailed design up to construction. In coordination with other relevant government agencies and the detailed design consultant, the PMO-BOT shall manage and supervise the project, including resettlement planning and land acquisition. It shall ensure that funds for the timely implementation of the RAP is available and that expenses are properly accounted for. PMO-BOT will be assisted by ESSO and IROW-PMO who provides technical guidance and support in the preparation and implementation of the RAP.

9.6.6.3 Environmental and Social Services Office (ESSO)

ESSO shall provide technical guidance and support in the implementation of the RAP and will be responsible for the following resettlement activities:

- Oversee the preparation and planning of the RAP;
- Submit RAP budgetary requirements for approval and allocation of needed financial resources by the DPWH central office;
- In accordance to the Department's resettlement policies, guide the project consultants, and Regional Offices in their tasks, such as parcellary survey of project area, verification of PAFs, final inventory of affected assets, and information dissemination;
- Amend or update the RAP in the event problems arise during the internal and/or external monitoring of its implementation;
- Follow-up with the DPWH Accounting Office for the processing of compensation claims of PAFs;
- In collaboration with the IROW-PMO, monitor the actual payment of compensation to PAFs; and
- In collaboration with IROW-PMO, prepare periodic supervision and monitoring reports on RAP implementation for submission to the PMO-BOT and the donor institution.

9.6.6.4 Infrastructure Right-of-Way (IROW)- PMO

IROW-PMO will provide guidance to PMO-BOT and consultants on the preparation of RAP;

- It will spearhead the negotiations with the PAFs and secure agreements on the final valuation of the affected assets which will be used in the payment of compensation;
- It will finalize the compensation plan for the PAFs, based on the result of the negotiation process; and submit the same to the DPWH financial service for approval and payment;
- In collaboration with ESSO, monitor the progress of RAP implementation, including compensation disbursements and prepare monitoring reports for submission to the PMO-BOT and donor institution.

9.6.6.5 District Engineering Office (DEO) of DPWH

The concerned DEO will serve as the major player in the implementation of the RAP with the following functions:

- Oversee the staking-out, verification and validation of the PAF's affected assets;
- Conduct inventories of properties that will be affected in coordination with the Detailed Design Consultant;
- Prepare parcellary maps of the project area in coordination with the Detailed Design Consultant;
- Approve disbursement vouchers/payments on PAFs compensation and other benefits;
- Submit disbursement reports on payments to PAFs to the Regional/Central Office accounting office and PMO-BOT;
- Submit monthly progress reports to ESSO, Regional Office and PMO-BOT; and
- Serve as an active member of the Resettlement Implementation Committee (RIC) of the City/Municipality.

9.6.6.6 Regional Office (Region IV-A) of DPWH

The Regional Office shall act as the Liaison between ESSO, IROW-PMO and the District Engineering Offices and shall ensure that the RAP is implemented as planned. Its specific activities are:

- Oversee the activities of DEOs;
- Monitor the RAP implementation and fund disbursement;
- Submit monthly progress reports to ESSO;
- Monitor payments to PAFs;
- Address grievances filed at its office by the PAFs for speedy resolution.

9.6.6.7 Resettlement Implementation Committee (RIC)

The RIC shall be composed of representatives from the Regional Office and District Engineering Office, the City/Municipality LGU, affected barangays, and PAFs/PAPs. No NCIP nor ICC/IP representatives are included in the RIC as Region IV-A is not a recognized ancestral land. The establishment of the RIC shall be made through the signing of a Memorandum of Understanding (MOU) between DPWH, the concerned LGU. The function of the RIC includes:

- Assist the project consultants and DPWH staff engaged in RAP preparation activities in (a) validating the list of PAFs; b) validating the assets of the PAFs that will be affected by the project; (c) assist DPWH in arranging for a suitable relocation facility for the displaced PAFs, and (d) participate in monitoring the RAP implementation;
- Assist the DPWH staff engaged in the RAP preparation in the public information campaign, public participation and consultation meetings;
- Receive complaints and grievances from PAFs and other stakeholders and refer the matter to the appropriate authorities;

- Maintain a record of all public meetings, complaints and actions taken to address complaints and grievances; and
- In coordination with concerned government authorities, assist in the enforcement of laws/ordinances regarding encroachment into the project site or ROW.

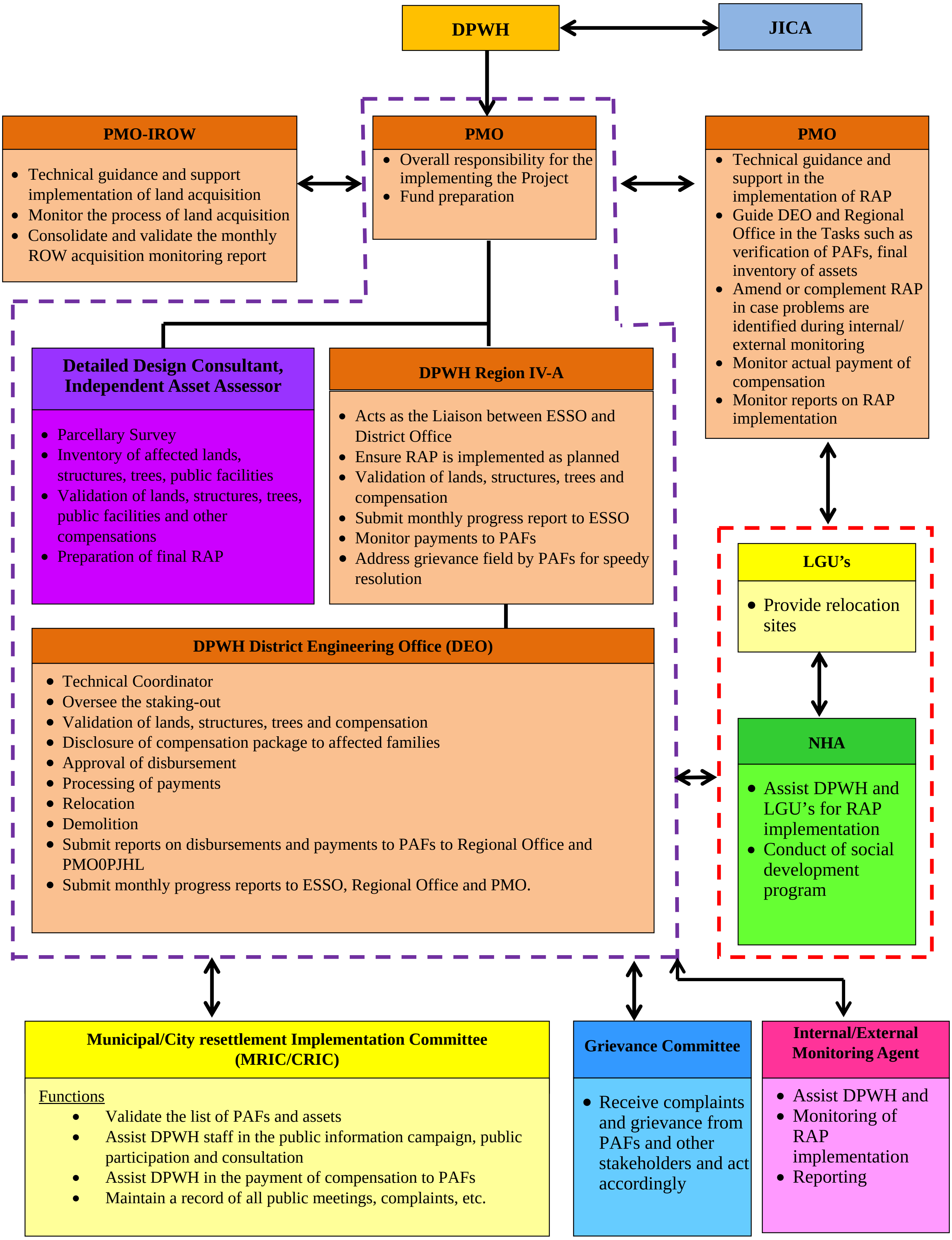
9.6.6.8 National Housing Authority (NHA)

Although relocation of informal settlers is among the tasks of the National Housing Authority (NHA), there are just too many government projects that require relocation, particularly in urban areas where there is very little land that can be utilized as relocation site. It is quite important to coordinate with NHA at the early stage of the Project. For this particular project, NHA's functions are as follows;

- Coordinate with DPWH and LGUs for relocation of PAFs;
- Build houses at relocation sites, if necessary;
- Undertake the Social Development Program (SDP).

9.6.6.9 Organization Chart of RAP Implementation

Organization chart of RAP Implementation is shown in **Figure 9.6.6-1**.



DPWH

JICA

PMO-IROW

- Technical guidance and support implementation of land acquisition
- Monitor the process of land acquisition
- Consolidate and validate the monthly ROW acquisition monitoring report

PMO

- Overall responsibility for the implementing the Project
- Fund preparation

PMO

- Technical guidance and support in the implementation of RAP
- Guide DEO and Regional Office in the Tasks such as verification of PAFs, final inventory of assets
- Amend or complement RAP in case problems are identified during internal/ external monitoring
- Monitor actual payment of compensation
- Monitor reports on RAP implementation

Detailed Design Consultant, Independent Asset Assessor

- Parcellary Survey
- Inventory of affected lands, structures, trees, public facilities
- Validation of lands, structures, trees, public facilities and other compensations
- Preparation of final RAP

DPWH Region IV-A

- Acts as the Liaison between ESSO and District Office
- Ensure RAP is implemented as planned
- Validation of lands, structures, trees and compensation
- Submit monthly progress report to ESSO
- Monitor payments to PAFs
- Address grievance field by PAFs for speedy resolution

LGU's

- Provide relocation sites

DPWH District Engineering Office (DEO)

- Technical Coordinator
- Oversee the staking-out
- Validation of lands, structures, trees and compensation
- Disclosure of compensation package to affected families
- Approval of disbursement
- Processing of payments
- Relocation
- Demolition
- Submit reports on disbursements and payments to PAFs to Regional Office and PMO0PJHL
- Submit monthly progress reports to ESSO, Regional Office and PMO.

NHA

- Assist DPWH and LGU's for RAP implementation
- Conduct of social development program

Municipal/City resettlement Implementation Committee (MRIC/CRIC)

Functions

- Validate the list of PAFs and assets
- Assist DPWH staff in the public information campaign, public participation and consultation
- Assist DPWH in the payment of compensation to PAFs
- Maintain a record of all public meetings, complaints, etc.

Grievance Committee

- Receive complaints and grievance from PAFs and other stakeholders and act accordingly

Internal/External Monitoring Agent

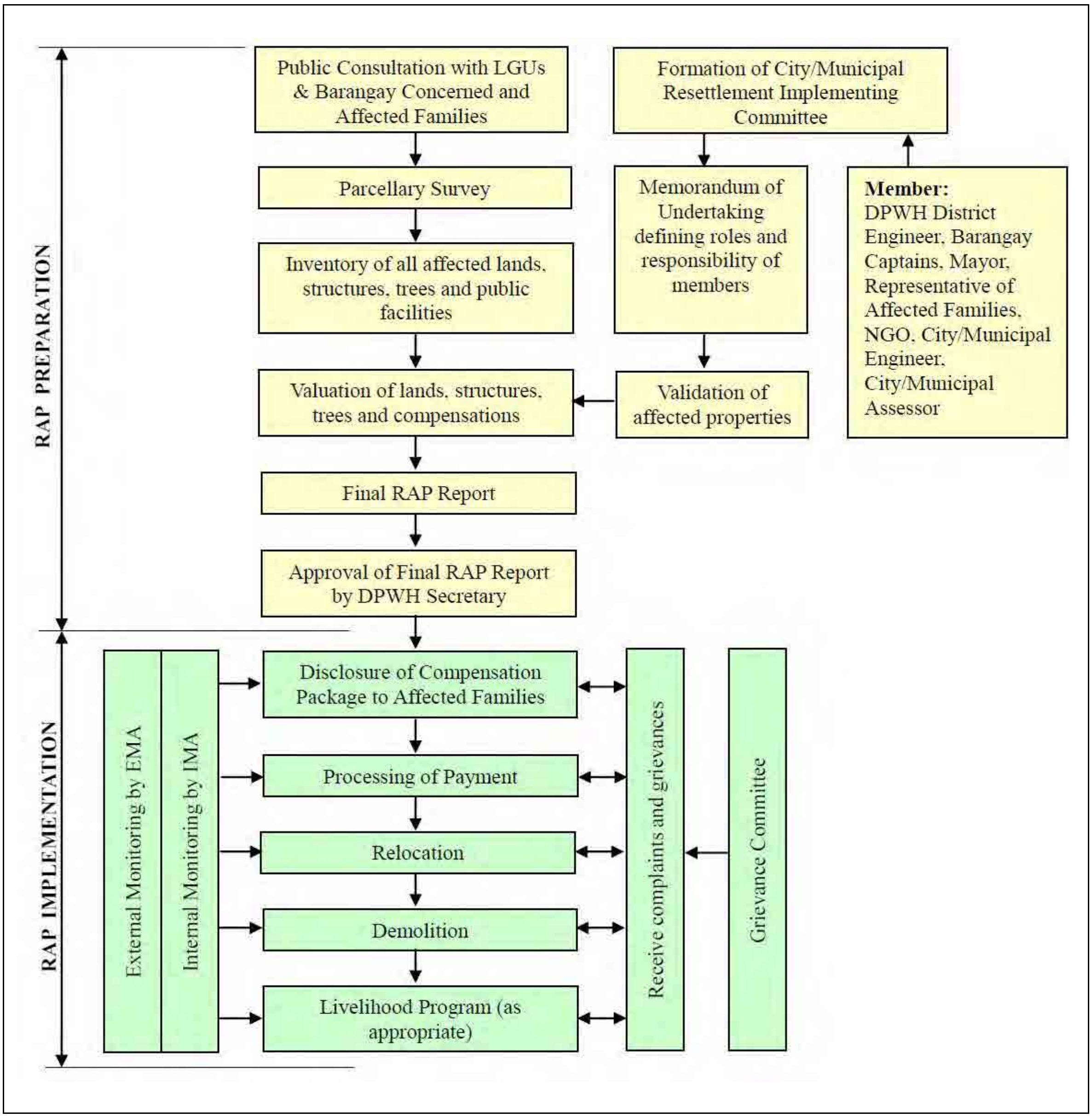
- Assist DPWH and
- Monitoring of RAP implementation
- Reporting

Source: JICA Study Team (2012)

FIGURE 9.6.6-1 RAP IMPLEMENTATION ORGANIZATION

9.6.7 RAP Implementation Process

RAP implementation process is shown in **Figure 9.6.7-1.**



Source: JICA Study Team (2012)

FIGURE 9.6.7-1 RAP IMPLEMENTATION PROCESS

9.6.8 Implementation schedule

9.6.8.1 Cut-Off date (Survey Commencement Date)

Cut-off date for compensation eligibility is the date commencement when social survey was carried out. The concept of the "cut-off date" was also emphasized during each IEC. "Cut-off date", as defined in the Land Acquisition, Resettlement, Rehabilitation and Indigenous Peoples Policy (LARRIPP, 3rd Edition 2007) of DPWH is "the date of the census of affected families within the Project boundaries". As cited in World Bank's O.P. 4.12, cut-off date is the date the census begins. The cut-off date could also be the date the project area was delineated, prior to the census, provided that there has been an effective public dissemination of information on the area delineated, and systematic and continuous dissemination subsequent to the delineation to prevent further population influx.

TABLE 9.6.8-1 DATE OF CENSUS COMMENCEMENT (CUT-OFF DATE)

Province	City/Municipality	Barangay	Starting Date (Cut-Off)
Cavite	Silang	Biga II	February 27, 2012
		Sabutan	February 28, 2012
		Kaong	February 29, 2012
		Tibig	February 29, 2012
		Munting Ilog	February 29, 2012
		Carmen	March 01, 2012
		Hukay	March 01, 2012
		Inchican	March 04, 2012
Laguna	Biñan		March 02, 2012
	Sta. Rosa		March 02, 2012

Source: JICA Study Team (2012)

Note: Census was conducted with tagging survey at the same time.

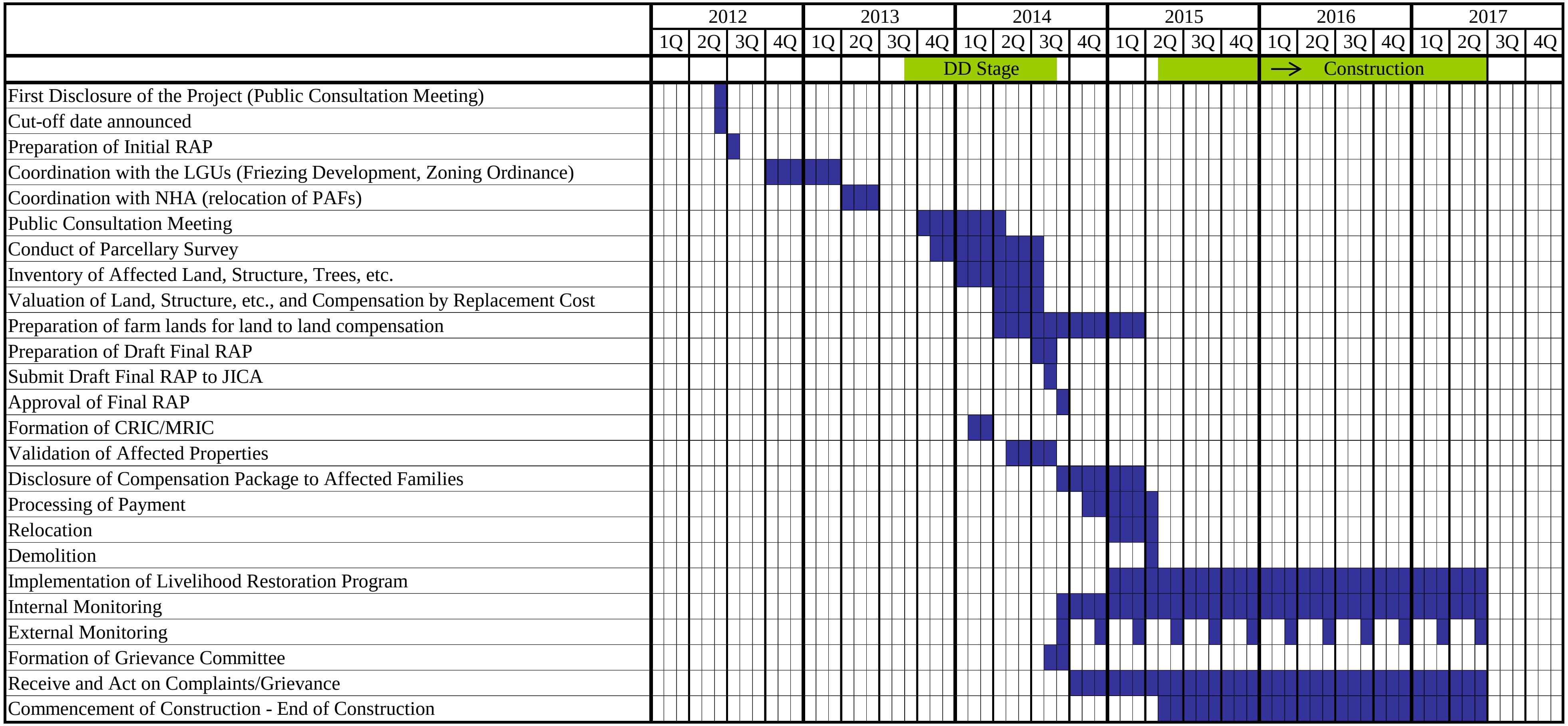
9.6.8.2 Tagging

Process of tagging of affected structures, which was carried out by the RAP Team was well explained during consultation meetings to make sure that the PAPs are well informed of the purpose of the sticker tags and photographs. It was also pointed out during said meetings that the preparation of the parcellary plans (prepared by the DPWH - District Office) should be completed first before the final location and extent (size) of land take can be determined. Tagging of affected structures and improvements commenced in February 27, 2012 using the project design and alignment provided by the JICA Study Team.

9.6.8.3 RAP Implementation Schedule

RAP implementation schedule is shown in **Table 9.6.8-2**.

TABLE 9.6.8-2 RAP IMPLEMENTATION SCHEDULE



	2012												2013												2014												2015												2016												2017											
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First Disclosure of the Project (Public Consultation Meeting)						■																																																																		
Cut-off date announced						■																																																																		
Preparation of Initial RAP							■																																																																
Coordination with the LGUs (Friezing Development, Zoning Ordinance)										■	■	■	■	■	■																																																								
Coordination with NHA (relocation of PAFs)																■	■	■																																																						
Public Consultation Meeting																						■	■	■	■	■	■	■																																												
Conduct of Parcellary Survey																							■	■	■	■	■	■	■	■	■																																									
Inventory of Affected Land, Structure, Trees, etc.																									■	■	■	■	■	■	■																																									
Valuation of Land, Structure, etc., and Compensation by Replacement Cost																												■	■	■	■																																											
Preparation of farm lands for land to land compensation																												■	■	■	■	■	■	■	■	■	■	■	■																																	
Preparation of Draft Final RAP																															■	■																																										
Submit Draft Final RAP to JICA																																■																																								
Approval of Final RAP																																	■																																							
Formation of CRIC/MRIC																										■	■																																													
Validation of Affected Properties																													■	■	■	■																																								
Disclosure of Compensation Package to Affected Families																																	■	■	■	■	■	■	■																																	
Processing of Payment																																			■	■	■	■	■	■																																
Relocation																																					■	■	■	■																																
Demolition																																								■																																
Implementation of Livelihood Restoration Program																																					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■						
Internal Monitoring																																	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■						
External Monitoring																																	■			■			■			■			■			■			■			■			■			■			■			■						
Formation of Grievance Committee																																■	■																																							
Receive and Act on Complaints/Grievance																																		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■						
Commencement of Construction - End of Construction																																									■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■						

Source: JICA Study Team (2012)

9.6.9 Financial Arrangement

All necessary cost shall be arranged, budgeted and released by PMO-BOT of DPWH.

9.6.10 Estimated Cost

Acquisition cost of land and structure/improvement/trees, compensation cost, resettlement site development cost, RAP implementation cost, etc. are estimated as shown in **Table 9.6.10-1.**

TABLE 9.6.10-1 ESTIMATED RAP IMPLEMENTATION COST

Item	Cost Item	Amount (in Million Php)	Remarks
A. 0Compensation for Land, Structures and Trees	Land	3,529.615	• 118.84 ha. (Agri. Land = 64.71 ha., Road= 46.08 ha., Under Development=8.05 ha.) Based on current BIR Zonal Valuation
	Structure (Houses)	17.423	• 36 houses
	Other Structure	14.423	• 34 structure (commercial store, pig pen, fence, etc)
	Trees and Perennials	14.811	• 9,393 trees and perennials
	Sub-Total for (A)	**3,576.272**	
B. Other Compensations	Disturbance Allowance (crops)	4.374	• 64.71 ha.
	Income Loss	0.060	• 4 eatery and sari-sari stores
	Rental Subsidy	0.015	• 5 renters x Php 3,000.00
	Unemployed women	1.350	• 180 (150+30) households x 0.50 x Php15,000
	Allowance for vulnerable persons	0.810	• 180 (150+30) households x 0.30 x Php15,000
	Sub-Total for (B)	**6.609**	
C. Relocation Site Cost	-	**0**	• No informal Settler
D. RAP Implementation Cost	RAP monitoring cost	-	• Included in DPWH's Administration Cost (Php 192.48 Million) • Included in Consultancy Services Cost • (Php 2.42 Million)
	Parcellary Cost	-	• Included in Consultancy Services Cost • (Php 4.30 Million)
	Cost for Hiring Independent Asset Assessor	-	• Included in Consultancy Services Cost • (Php 4.84 Million)
	Cost for External Monitoring	1.600	• 8 times
	Cost for MRIC/CRIC	2.250	• Allowances and per diem of members
	Cost for Grievance Committee	0.750	• 1/3 of MRIC/CRIC Cost
	Cost for Livelihood Restoration Program (LRP)	1.000	• LRP for 50 households
	Cost for Public Meetings	0.600	• 20 times
	Sub-Total for (D)	**6.200**	

Item	Cost Item	Amount (in Million Php)	Remarks
Total (A + B + C + D)		**3,589.081**	
E. Contingency	5%	**179.454**	
Grand Total		**3,768.535**	

Source: JICA Study Team (2012)

Estimated cost of land, structures and trees by city/municipality is shown in **Table 9.6.10-2.**

TABLE 9.6.10-2 COST OF LAND, STRUCTURE AND TREES BY CITY/MUNICIPALITY

Unit: Pesos

Affected City/Municipality	Land	Structures	Trees
Silang, Cavite	427,440,000	16,928,130	16,252,014
Biñan, Laguna	953,400,000	14,917,675	1,656,940
Sta. Rosa, Laguna	1,780,800,000	0	874,885
Total	3,161,640,000	31,845,805	18,783,809

Source: JICA Study Team (2012)

9.6.11 Monitoring and Evaluation

9.6.11.1 Monitoring Agents

(1) Internal Monitoring

An Internal Monitoring Agent (IMA) will be commissioned by the PMO-BOT to undertake independent internal monitoring and evaluation.

The tasks of the IMA are to:

a) Regularly supervise and monitor the implementation of the RAP in coordination with the concerned CRIC/MRIC. The findings will be documented in the quarterly report to be submitted to the PMO and ESSO, and PMO-BOT in turn will submit the report to JICA.

b) Verify that the re-inventory baseline information of all PAFs has been carried out and that the valuation of assets lost or damaged, the provision of compensation and other entitlements, and relocation, if any, has been carried out in accordance with the LARRIP and the respective RAP Reports.

c) Ensure that the RAP is implemented as designed and planned.

d) Verify that funds for implementing the RAP are provided by the PMO-BOT in a timely manner and in amounts sufficient for the purpose.

e) Record all grievances and their resolution and ensure that complaints are dealt with promptly.

All activities in RAP implementation will require for quality and quantity results which are time bounded. The PMO-BOT will be responsible for the internal monitoring of the actual implementation jointly with ESSO of DPWH against the planned activities, time frame, budget and entitlement that will be done on an on-going basis throughout the subproject construction and in the livelihood period of the affected households.

(2) External Monitoring

An External Monitoring Agent (EMA) will be commissioned by the PMO-BOT to undertake independent external monitoring and evaluation. The EMA for the Project will be either a qualified individual or a consultancy firm with qualified and experienced staff. The Terms of Reference of the engagement of the EMA shall be prepared by the DPWH and shall be acceptable to the JICA prior to the engagement.

The tasks of the EMA shall be the following:

a) Verify results of internal monitoring;
b) Verify and assess the results of the information campaign for PAFs rights and entitlements;
c) Verify that the compensation process has been carried out with the procedures communicated with the PAFs during the consultations;
d) Assess whether resettlement objectives have been met; specifically, whether livelihoods and living standards have been restored or enhanced;
e) Assess efficiency, effectiveness, impact and sustainability of resettlement and RAP implementation drawing lessons as a guide to future resettlement and indigenous peoples' policy making and planning;
f) Ascertain whether the resettlement were appropriate to meet the objectives, and whether the objectives were suited to PAF conditions;
g) Suggest modification in the implementation procedures of the RAP, if necessary, to achieve the principles and objectives of the Resettlement Policy;
h) Review on how compensation rates were evaluated; and
i) Review of the handling of compliance and grievances cases.

External monitoring and evaluation will be of two kinds: 1) random observation visits and 2) consultation with PAFs, both at their current residence area and at their relocation site.

9.6.11.2 Stages and Frequency of Monitoring

The stages and monitoring frequency of the contract packages by the IMA and EMA as follows.

(1) Inception Report

This is the first activity that both IMA and EMA shall undertake to determine whether or not the RAP was carried out as planned and according to this Policy.

The IMA / EMA will submit an Inception Report and Compliance Report one month after receipt of Notice to Proceed for the engagement. The engagement of the IMA/EMA shall be scheduled to meet the Policy's requirement of concluding RAP implementation activities at least one (1) month prior to the start of civil works.

(2) IMA Monthly Monitoring

The IMA will be required to conduct a monthly monitoring of RAP implementation activities.

(3) IMA Final Evaluation

Final evaluation of the implementation of the LARRIP will be conducted three months after the completion of payments of compensation to PAFs.

(4) IMA Post-Resettlement Semi-Annual Monitoring and Evaluation

This activity will be undertaken every 6 months until the construction works end, to determine whether the social and economic conditions of the PAFs after the implementation of the project have improved.

When the PAF are found that their living standard worsens, or whose present means of livelihood became not-viable, DPWH, in coordination with other appropriate institutions, will provide assistances, such as skills and livelihood trainings.

(5) EMA Semi-Annual Monitoring

This activity will be undertaken every 6 months until the construction works end to follow-up whether the social and economic conditions of the PAFs after the implementation of the project have improved.

When the PAF are found that their living standard worsens, or whose present means of livelihood became not-viable, DPWH, in coordination with other appropriate institutions, will provide assistances, such as skills and livelihood trainings.

(6) IMA/EMA Final Evaluation and Proposal Report

Final Evaluation and Proposal Report will be submitted one month after the completion of the construction work.

9.6.11.3 Schedule of Implementation of RAP and Monitoring

PMO-BOT through Project Consultant in coordination with the ESSO shall establish a schedule for the implementation of RAP and the required monitoring taking into account the project's implementing schedule. It is expected that one month prior to the start of the civil works, all RAP activities have been determined by the IMA and EMA as having been concluded.

TABLE 9.6.11-1 RAP MONITORING SCHEDULE

	Internal Monitoring Agent	External Monitoring Agent
RAP Implementation Period (June 2014 to May 2015: 12 months)	• Inception Report (1) • Monthly Monitoring and Reporting (20) • Final evaluation (1)	• Inception Report (1) • Semi-Annual Report
Construction Period (May 2015 – June 2017 26 months)	• Semi-Annual Monitoring and Reporting (9) • Final Evaluation Report (1)	• Semi-Annual Report (9) • Final Report (1)

Source: JICA Study Team (2012)

9.6.11.4 Reporting

The IMA and the EMA are accountable to the PMO-PJHL and also report to the ESSO. The PMO-BOT submits copy of their reports to JICA.

9.6.11.5 Monitoring Indicator

Monitoring indicators are shown in **Table 9.6.11-2.**

TABLE 9.6.11-2 MONITORING INDICATORS

Monitoring Indicators	Basis for Indicators / Check List
1. For the IMA	
1. Budget and timeframe	☐ Have all land acquisition and resettlement staff been appointed and mobilized for the field and office work on schedule? ☐ Have capacity building and training activities been completed on schedule? ☐ Are settlement implementation activities being achieved against the agreed implementation plan? ☐ Are funds for resettlement being allocated to resettlement agencies on time? ☐ Have funds been disbursed according to the RAP? ☐ Has the social preparation phase taken place as scheduled? ☐ Have all lands been acquired and occupied in time for project implementation?
2. Delivery of Compensation and Entitlements	☐ Have all PAFs received entitlements according to numbers and categories of loss set out in the entitlement matrix? ☐ Have PAFs received payments for affected structures on time? ☐ How many PAFs opted to donate their land to the government? ☐ How many PAFs did not receive payment because their title is covered by the provisions of Sec. 112 of CA 141? ☐ How many landholdings were subjected to quit claim? Easement? ☐ How many PAFs accepted the first offer at zonal valuation? ☐ How many PAFs rejected the first offer and accepted the second offer? ☐ How many PAFs resorted to expropriation? ☐ How many PAFs have received housing as per relocation options in the RPAP? ☐ Have relocation sites been selected and developed as per agreed standards? ☐ Are the PAFs occupying the new houses? ☐ Is restoration proceeding for social infrastructure and services? ☐ Are income and livelihood restoration activities being implemented as set out in income restoration plan? For example utilizing replacement land, commencement of production, numbers of PAFs trained and provided with jobs, micro-credit disbursed, number of income generating activities assisted? ☐ Have affected businesses received entitlements including transfer and payments for net losses resulting from lost business and stoppage of production?

Monitoring Indicators	Basis for Indicators / Check List
3. Public Participation and Consultation	☐ Have consultations taken place as scheduled including meetings, groups, and community activities? Have appropriate resettlement leaflets been prepared and distributed? ☐ How many PAFs know their entitlements? How many know if they have been received? ☐ Have any PAFs used the grievance redress procedures? What were the outcomes? ☐ Have conflicts been resolved? ☐ Was the social preparation phase implemented?
4. Benefit monitoring	☐ What changes have occurred in patterns of occupation, production and resources use compared to the pre-project situation? ☐ What changes have occurred in income and expenditure patterns compared to pre-project situation? What have been the changes in cost of living compared to pre-project situation? Have PAFs' incomes kept pace with these changes? ☐ What changes have taken place in key social and cultural parameters relating to living standards? ☐ What changes have occurred for vulnerable groups?
2. For the EMA	
1. Basic information on PAP households	☐ Location ☐ Composition and structures, ages, education and skills levels ☐ Gender of household head ☐ Ethnic group ☐ Access of health, education, utilities and other social services ☐ Housing type ☐ Land use and other resource ownership patterns ☐ Occupation and employment patterns ☐ Income sources and levels ☐ Agricultural production data (for rural households) ☐ Participation in neighborhood or community groups ☐ Access to cultural sites and events ☐ Value of all assets forming entitlements and resettlements and resettlement entitlements
2. Restoration of living standards	☐ Were house compensation payments made free of depreciation, fees or transfer costs to the PAF? ☐ Have perceptions of "community" been restored? ☐ Have PAFs achieved replacement of key social cultural elements?

Monitoring Indicators	Basis for Indicators / Check List
3. Restoration of Livelihoods	☐ Were compensation payments made free of deduction for depreciation, fees or transfer costs to the PAF? ☐ Were compensation payments sufficient to replace lost assets? ☐ Was sufficient replacement land available of suitable standard? ☐ Have enterprises affected received sufficient assistance to re-establish themselves? ☐ Have vulnerable groups been provided income-earning opportunities? Are these effective and sustainable? ☐ Do jobs provided restore pre-project income levels and living standards?
4. Levels of PAP Satisfaction	☐ How much do PAFs know about resettlement procedures and entitlements? Do PAFs know their entitlements? ☐ Do they know if these have been met? ☐ How do PAFs assess the extent to which their own living standards and livelihood been restored? ☐ How much do PAFs know about grievance procedures and conflict resolution procedures? How satisfied are those who have used said mechanisms?
5. Effectiveness of Resettlement Planning	☐ Were the PAFs and their assets correctly enumerated? ☐ Was any land speculators assisted? ☐ Was the time frame and budget sufficient to meet objectives? ☐ Were entitlements too generous? ☐ Were vulnerable groups identified and assisted? ☐ How did resettlement implementers deal with unforeseen problems?
6. Other Impacts	☐ Were there unintended environmental impacts? ☐ Were there unintended impacts on employment or incomes?

Source: JICA Study Team (2012)

9.7 STAKEHOLDERS MEETING/ CONSULTATION MEETING

Total of fourteen (14) stakeholders meetings/consultation meetings were conducted between 15th and 29th of February 2012 in the Provinces of Cavite and Laguna.

9.7.1 Procedure of the Meeting

Total of fourteen (14) consultation meetings were held for EIS and RAP formations. There are three levels of meeting according to types of interest groups.

- **LGU level**: Two (2) Provincial level and three (3) City/Municipal level meetings
- **Barangay level**: Eight (8) Barangay level meetings with Project Affected Persons (PAPs)
- **Others**: One (1) Coordination meeting with SAMACA Farmer’s Organization in Barangay Carmen.

The Study Team consulted with the concerned Mayors of the affected areas and set the date of the stakeholder meeting. Official letters were sent to the concerned Mayors prior to at least one week before and Mayors informed about the Stakeholders meeting to concerned barangay captains requesting them to inform the concerned people within their jurisdiction.

Venue was selected based on the advice of Mayor in consideration of the following;

- Venue where easily accessible by the concerned people.
- Venue where the power point presentation for a better understanding of the presentation is possible.
- Venue where concerned people know and familiar with it.

The consultation meetings were undertaken to:

- Inform about the Project/CALAX including alternatives of project designs;
- Inform of and confirm the revised Scoping Matrix and concerns with the stakeholders;
- Inform and generate awareness and understanding of the concerned public about the project;
- Provide the stakeholders and avenue to ventilate salient issues and concerns regarding the project;
- Give an opportunity to the stakeholders to have an open discussion with the Preparers, Proponent, and LGUs about the project;
- Inform the stakeholders of their rights and privileges; and
- Enable the stakeholders to effectively participate and make informed and guided decisions.

Complete and proper documentations of the proceedings were strictly observed. All participants of each activity were noted and proceedings were recorded on a digital voice recorder. Photographs were likewise taken during the consultations.

Results of the Stakeholder meetings were summarized in the minutes of the meeting which were sent to concerned Mayors requesting them to distribute minutes to concerned Barangay Captains who are requested to post the minutes at the Barangay Hall.

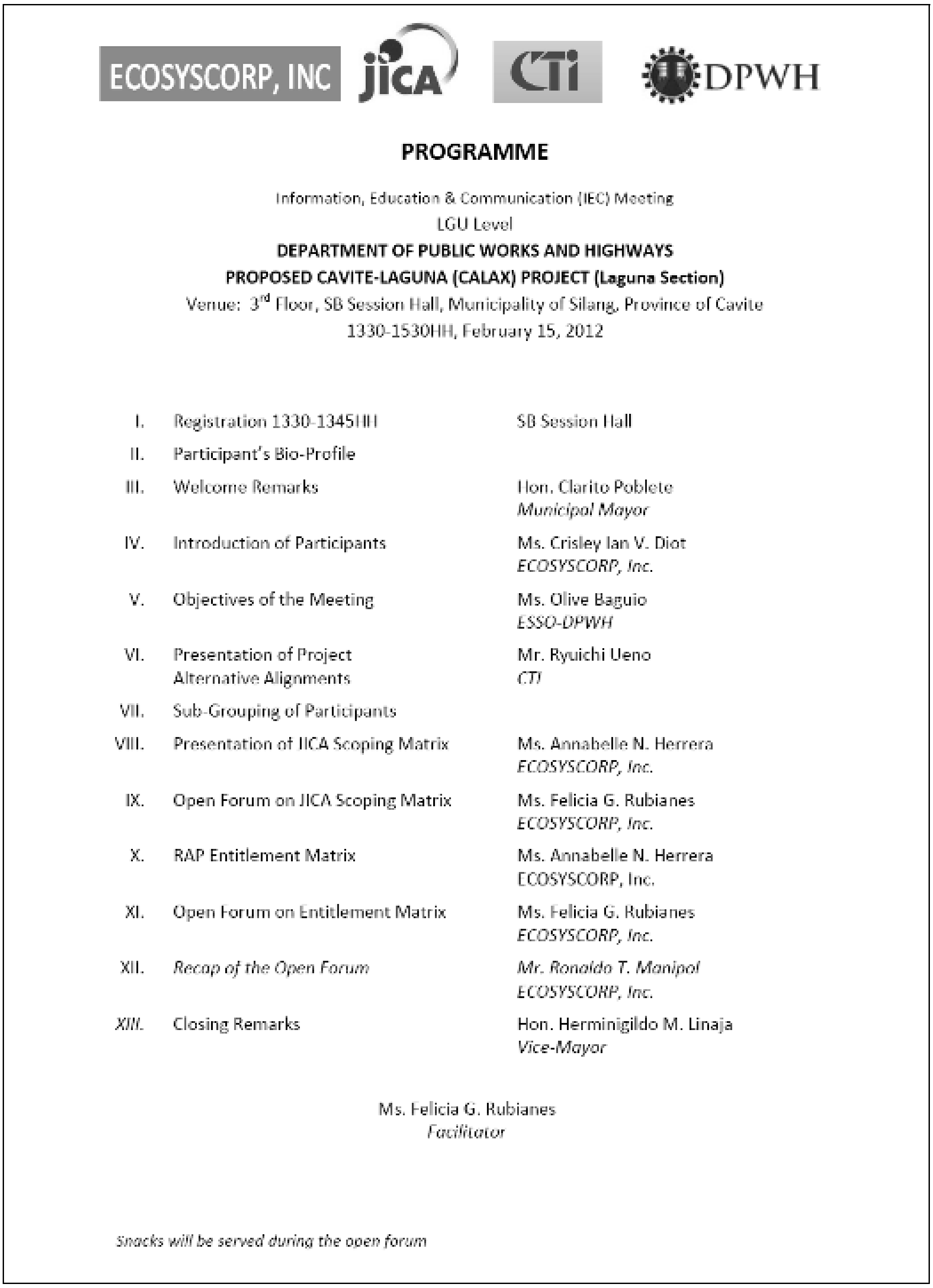
TABLE 9.7.1-1 MEETINGS CONDUCTED FOR THE PROPOSED CALAX PROJECT (LAGUNA SECTION)

Date/Time	Target Municipality	Main Participants
February 15, 2012	Cavite government	City Officials
February 15, 2012	Silang municipality and its barangays	PAPs, municipality officials, Barangay Officials, People's Organization, Farmer's Association, NGO, Homeowner's Association, Transport Group
February 17, 2012	Biñan city government and its barangays	City Officials, Barangay Officials, Farmer's Association, Senior citizen's association,, Homeowner's Association, Transport Group, women's group
February 17, 2012	Santa Rosa city government and its barangays	City Officials, Barangay Officials, Farmer's Association, Senior citizen's association,, Homeowner's Association, Transport Group, women's group
February 20, 2012	Barangays Sabutan and Biga in Silang	Barangay Officials, Farmer's Association, Senior citizen's association,, Land owners, Homeowner's Association, Women's group
February 20, 2012	Barangay Kaong in Silang	Barangay Officials, Farmer's Association, Senior citizen's association,, Land owners, Homeowner's Association, Women's group
February 21, 2012	Barangay Tibig in Silang	Senior Citizens Association Health Organization, Transport Group and Women's Organization; Human Rights Organization, Structure and Landowners (PAPs)
February 22, 2012	Barangay Carmen in Silang	SAMACA (NGO); SAMACA means "SamahanngMagsasakang Carmen" (Farmer's Organization in Brgy. Carmen)
February 23, 2012	Barangay Biñan, Malamig, Timbao and Loma of Biñan, Laguna	Barangay Officials of Barangay Biñan, Malamig, Timbao and Loma; Senior Citizens Association, Womens Organization, Farmers Organization, Youth Organization and Project Affected Persons (PAPs)
February 23, 2012	Barangays Pulong Sta. Cruz and Malitlit	Barangay Officials of Barangays Pulong Sta. Cruz and Malitlit; Senior Citizens Association Health Organization and Women's Organization
February 24, 2012	Barangays Munting Ilog, Carmen and Hukay in Silang	Barangay Officials of Barangays Munting Ilog, Carmen and Hukay, Senior Citizens Association, Women's Organization, Youth Organization, Farmers Organization, Transport Group and Project Affected Persons (PAPs)
February 24, 2012	Barangays Inchican in Silang	Barangay Officials of Barangays Inchican; Senior Citizens Association, Women's Organization, Health Organization, Farmer's Organization, Homeowners and Project Affected Persons (PAPs)
February 29, 2012	Provincial official of Laguna province	LGUs, CBOs
	Barangays Don Jose and Sto. Domingo in Sta. Rosa, Laguna	Barangay Officials of Barangays Sto. Domingo and Don Jose, Senior Citizens Association, Women's Organization, Youth Organization, Farmers Organization and Transport Group

Source: JICA Study Team (2012)

9.7.2 Program

An outline of consultation meeting is shown below.



ECOSYSCORP, INC JICA CTi DPWH

PROGRAMME

Information, Education & Communication (IEC) Meeting
LGU Level
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
PROPOSED CAVITE-LAGUNA (CALAX) PROJECT (Laguna Section)
Venue: 3rd Floor, SB Session Hall, Municipality of Silang, Province of Cavite
1330-1530HH, February 15, 2012

I.	Registration 1330-1345HH	SB Session Hall
II.	Participant's Bio-Profile	
III.	Welcome Remarks	Hon. Clarito Poblete *Municipal Mayor*
IV.	Introduction of Participants	Ms. Crisley Ian V. Diot *ECOSYSCORP, Inc.*
V.	Objectives of the Meeting	Ms. Olive Baguio *ESSO-DPWH*
VI.	Presentation of Project Alternative Alignments	Mr. Ryuichi Ueno *CTI*
VII.	Sub-Grouping of Participants	
VIII.	Presentation of JICA Scoping Matrix	Ms. Annabelle N. Herrera *ECOSYSCORP, Inc.*
IX.	Open Forum on JICA Scoping Matrix	Ms. Felicia G. Rubianes *ECOSYSCORP, Inc.*
X.	RAP Entitlement Matrix	Ms. Annabelle N. Herrera ECOSYSCORP, Inc.
XI.	Open Forum on Entitlement Matrix	Ms. Felicia G. Rubianes *ECOSYSCORP, Inc.*
XII.	*Recap of the Open Forum*	*Mr. Ronaldo T. Manipol* *ECOSYSCORP, Inc.*
XIII.	Closing Remarks	Hon. Herminigildo M. Linaja *Vice-Mayor*

Ms. Felicia G. Rubianes
Facilitator

Snacks will be served during the open forum

Source: JICA Study Team (2012)

A PROGRAM OF STAKEHOLDER MEETING

9.7.3 Attendants

COORDINATION MEETINGS

Date	Office	Findings	Venue
January 07, 2012	National Irrigation Authority (NIA)	No irrigation facilities to be affected by the proposed CALAx Project (Laguna Section)	Engr. Hilarion C. Cedenio Division Manager NIA Office, Pila, Laguna
January 16, 2012	Provincial Assessor's Office	Gathered data on landowners to be affected and obtained Schedule of Market Values for land and structures	Mr. Raymundo D. Salazar TreceMartires City, Cavite
January 16, 2012	Provincial Agriculture Office	Identified crops and other related data on farming	Engr. Mario Silan Department Head TreceMartires City, Cavite
January 16, 2012	Provincial Agrarian Reform Office	Identified list of registered tenants within the proposed project alignment	Mr. Reynaldo Penalba TreceMartires City, Cavite
January 17, 2012	National Historical Institute	Identified national historical sites and heritage within the project area	Arch. Wilkie B. Delumen, UAP,MM Supervising Restoration Architech ErmitaManila,
February 02, 2012	Environmental Remote Sensing and Geo Information Laboratory Forestry	Collected maps of Mt. Makiling	Mr. Edwin Combalicer Administrator College of Forestry, UP Los Banos, Laguna
January 12, 2012	City Assessor of Santa Rosa, City	Gathered data on landowner's to be affected and the Schedule of Market Values for land and structures	Ms. Nelly Gomez Ground Floor, New Government Center of Santa Rosa, Laguna
January 12, 2012	City Assessor of Biñan City, Laguna		Mr. Danilo Arzola Ground Floor, City Hall of Biñan City, Laguna
February 09, 2012	Municipal Assessor's Office of Silang, Cavite		Mr. Melvin Yambao Ground Floor, Municipal Hall of Silang, Cavite
January 31, 2012	Protected Areas and Wildlife Bureau	Collectes maps of Taal Protected Area	Mr. Diormedado Cocal DENR Diliman, Quezon City
January 12, 2012	Municipal Agriculture Office of Silang, Cavite	Identified crops and other related data on farming	Ms. Adelia Poblete 3rd Floor, Municipal Hall of Silang, Cavite
January 16, 2012	City Agriculture Office of Biñan City, Laguna		Mr. Antonio Aguilar Ground Floor, City Hall of Biñan City, Laguna
January 16, 2012	City Environment and Natural Resources Office	Identified possible location of dumpsite for unsuitable soils	Mr. Rodelio Lee Ground Floor, City Hall of Biñan City, Laguna

Source: JICA Study Team (2012)

INFORMATION EDUCATION AND COMMUNICATION MEETINGS

	Stakeholders	Venue	Number of Attendees		Date
			Male	Female	
IEC of LGUs	a) LGU Officials of Trece Martires, Cavite Province and DENR and Provincial Agriculturist	2nd Floor, Ceremonial Hall, Provincial Capitol, City of Trece Martires, Province of Cavite	3	5	February 15, 2012
	b) LGU Officials of Silang, Cavite, DA – Department of Agriculture, MCO – Municipal Cooperative Officer, MENRO – Municipal Environmental Natural Resources Office, Transport Group, Senior Citizens Group, Women's Sector, Farmer's Organization, Youth Sector and Business and Landowners Association	2nd Floor, SB Session Hall, municipal Hall of Silang, Province of Cavite	45	17	February 15, 2012
	c) LGU Officials of Biñan, Senior Citizens Association, Women's Organization and Youth Organization	3rd Floor, Function Room, City Hall of Biñan, Province of Laguna	16	1	February 17, 2012
	d) Department Officials of Sta. Rosa, Laguna, Barangay Officials, DA – Department of Agriculture, City Cooperative Officer, Housing Project Office, Transport Group, Senior Citizens Group, Women's Sector, Farmers Organization, Business and Landowners Association	5th Floor Session Hall, New Government Center Building, City of Sta. Rosa, Province of Laguna	11	8	February 17, 2012
	e) Provincial Department Officials of Laguna	2nd Floor, Governor's Conference Room, Sta. Cruz, Provincial Capitol of Laguna	7	6	February 29, 2012
IEC of PAPs	Purpose • To explain to the stakeholders the procedures involved in RAP preparation such as tagging, taking of photographs and socio-economic survey. • To explain the concept of "cut-off" date. • To present the project and the study being undertaken in identifying the alternative alignments. • To explain and identify the impacts of the project and concerns of the participants in the form of JICA scoping matrix. • To explicate the government laws and JICA standards in the entitlements of the PAPs. • To allow the PAPs to express their ideas and apprehension on the proposed project.	2nd Floor, Barangay Session Hall, Brgy. Sabutan, Municipality of Silang, Province of Cavite	13	12	February 20, 2012
		Barangay Hall of Kaong, Municipality of Silang, Province of Cavite	6	6	February 20, 2012
		Tibig Chapel, Barangay Tibig, Municipality of Silang, Province of Cavite	17	25	February 21, 2012
		Residence of Dorotea Contreras, Barangay Carmen, Municipality of Silang, Province of Cavite	4	1	February 22,2012
		Barangay Hall of Carmen, Municipality of Silang, Province of Cavite	29	8	February 24, 2012
		Barangay Malamig Youth Training Center, City of Biñan, Province of Laguna	12	11	February 23, 2012
		2nd Floor Barangay Session Hall, Barangay Pulong Sta. Cruz, City of Sta. Rosa, Province of Laguna	3	4	February 23, 2012
		Barangay Hall of Inchican, Municipality of Silang, Province of Cavite	2	9	February 24, 2012
		Barangay Session Hall, Baranagay Don Jose, Santa Rosa, Laguna	9	1	March 7, 2012

Source: JICA Study Team (2012)

9.7.4 Discussion

EIS and RAP were discussed in the same meeting.

Aside from IEC Meetings, the Consultant paid visits to the Office of Provincial Assessor of Cavite, City Assessors of Santa Rosa and Biñan and Municipal Assessors of Silang, Cavite to request for assistance in identifying owners of lots to be affected. The project was also presented to the different department and offices of the Local Government Unit such as Provincial Agrarian Reform Office (PARO), Provincial Agriculture Office, City Agriculture Office and Municipal Agricultural Office.

During these meetings, the project in terms of ROW width, type of surfacing, alignments, and target implementation schedule, among others, were presented to the PAPs. To familiarize them with the RAP preparation process, field activities that were undertaken namely: (i) linear mapping and tagging; (ii) taking of PAP's photograph in front of their houses/properties carrying a board showing the tag/control number of the affected structure/property; and (iii) conduct of socioeconomic.

The summary of issues and concerns raised during the said meetings are summarized in **Table 9.7.4-1**.

TABLE 9.7.4-1 SUMMARY OF ISSUES AND CONCERNS RAISED DURING IEC

Agencies/ Organization	Issues and Concerns	Issue Addressed to	Answer
LGUs of Binan PAPs of Tibig	Environmental concerns like vehicular gaseous emissions and noise problems	RAP Team	Mitigation measures will be proposed and implemented.
LGUs of Binan	Asking for more dialogues between JICA and LGUs before the start of the project	RAP Team	There will be more dialogues until the project is completed.
LGUs of Binan PAPs of Malamig	Benefits of the project	RAP Team	Reduction of traffic congestion, easier accessibility, economic development.
PAPs of Carmen, Tibig	Right to refuse the project	DPWH-ESSO	Yes.
PAPs of Carmen	Privatization of road; especially tollway	DPWH-ESSO	Project will be implemented under PPP scheme.
PAPs of Carmen LGUs of Sta. Rosa	Concerns on losing their livelihood; effects on agricultural lands	RAP Team	Rehabilitation Program will be implemented.
PAPs of Carmen	Payment issues between tenant and developer	RAP Team	The Government will compensate according to status of land ownership.
PAPs of Carmen, Inchican, Tibig, NGO	Request for increase in the disturbance compensation	DPWH-ESSO	It is difficult under the current law, however take note the opinion.
PAPs of	Requests for land to land	DPWH-ESSO	Land to land replacement is one of

Agencies/ Organization	Issues and Concerns	Issue Addressed to	Answer
Inchican, NGO	replacements of affected people		the options which the Government studies.
PAPs of Inchican	Possibility of selling their lands before the start of the project	DPWH-ESSO	The Government will talk to the land owner at the time of RAP preparation.
PAPs of Kaong, NGO	Issues on waiver from tenants who sold their lands to the developers	RAP Team	The Government will compensate according to status of land ownership.
PAPs of Kaong, Sabutan, Tibig LGUs of Laguna	Concerned on their land if it will be divided by the project; Accesibility of other land, service roads	RAP Team	Accessibility to divided land will be maintained.
PAPs of Kaong, Malamig	Start of RROW and payment	DPWH-ESSO	In 2014 and 2015
PAPs of Kaong, Sabutan, Tibig LGUs of Silang, Laguna	Issues with the alignment; Request changing the alignment to avoid their houses(Barangay Sabutan)	DPWH-ESSO	The proposed alignment achieves the minimal disturbance to people if the alignment changed, more people will be affected.
PAPs of Kaong	Concerns with the width of the road	DPWH-ESSO	ROW is 60m. proper accessibility will be provided between divided lands.
PAPs of Malamig, Sabutan LGUs of Silang	Compensation to crops, houses, trees, structures	RAP Team	It will be done in accordance with the law.
PAPs of Malamig LGUs of Cavite	Will they benefit from the tollway and toll fees	DPWH-ESSO	Economic development will be expected and more job chances will be created.
PAPs of Malamig	Social Impact concerns; long-term programs	RAP Team	Proper rehabilitation program will be implemented.
PAPs of Pulong Sta. Cruz	Employment during construction stage of the project	DPWH-ESSO	Yes, those who are affected will be prioritized.
PAPs of Pulong Sta. Cruz	Complete facility of the CALAx project like lighting, signboards, emergency hotline	DPWH-ESSO	Yes.
PAPs of Sabutan, Tibig	Concern on the project crossing the river	RAP Team	Bridges will be built with extra care.
PAPs of Sabutan	Feasibility of the project	DPWH-ESSO	Yes.
PAPs Sabutan, Tibig	Requesting for relocation	RAP Team	Relocation site is provided for informal settlers.
LGUs of Cavite	Issues on taxes; decrease in tax income	RAP Team	Replacement cost includes taxes.
LGUs of Cavite, Sta. Rosa	Issues on informal settlers; relocation and payment	RAP Team	Informal settlers will be treated based on the concerned laws.
LGUs of Laguna	Disturbance compensation and computation	RAP Team	Disturbance compensation will be estimated by D/D Consultant.
LGUs of Laguna PAPs of NGO	Payment for CLOA holders	RAP Team	Payment will be made in accordance with relevant laws.
LGUs od Sta. Rosa	May cause traffic	DPWH-ESSO	Proper traffic management will be implemented.

Agencies/ Organization	Issues and Concerns	Issue Addressed to	Answer
PAPs of Tibig	Complaining of favoring the developers	DPWH-ESSO	Project will benefit not only for developers but also people in the project area.
PAPs of Tibig	Issues on lack of proof of ownership of land	RAP Team	It will be a problem.

Source: JICA Study Team (2012)

<u>Meeting with Land Developers</u>

About 2/3 sections of the expressway (or 12 km section out of 18.1 km of expressway) pass through lands owned by land developers. Extensive dialogues were made with the following land developers;

- Greenfield Development Corp. ---- Owned land is affected, though no development is started yet.
- Ayala Land Inc ---- Laguna Blvd (private road) affected.
- Extraordinary Development Corp. ---- Owned land is affected, though no development is started yet.
- Stateland, Inc. ---- Owned land is affected, though no development is started yet. Majority of its land falls under Cavite section.

Their issues were as follows;

- Their development plan is affected and has to be changed.
- Proposed project is a full-access control expressway, thus they are not benefitted, since accessibility is only made at the interchanges.
- Proposed alignment should meet with their development plan as much as possible.
- How to develop Laguna Boulevard. should be fully discussed with Ayala Land Inc.
- Accessibility to land divided by the expressway should be provided.

DPWH sent a letter to all concerned Land Developers on February 29, 2012 requesting their response on the selected alignment. Two land developers, Greenfield Development Corp., and Stateland, Inc. responded to reconsider the alignment. Other developers did not make any response so that it was judged that they accepted the alignment.

Greenfield Development Corp. (GDC) requested to reconsider the alignment not to affect their master plan, then several meetings were held. The alignment was modified to suit the GDC's local road network and 50m road right-of-way will be planned in their master plan.

Stateland, Inc. (SI) requested to reconsider the interchange design, since it will affect SI's plan of access road to connect with Aguinaldo Highway. The interchange design was planned by Cavite Section Consultant (WB Consultant), therefore, DPWH together with the Cavite Section Consultant are discussing with SI regarding the interchange design.

Stakeholders Meeting on DFR

Stakeholders meeting on DFR was held on July 11, 2012 at Silang, Cavite Province inviting stakeholders of the Municipality of Silang, Cavite Province and cities of Sta. Rosa and Biñan of Laguna. **Table 9.7.4-2** shows the summary of issues and concerns raised by the stakeholders.

TABLE 9.7.4-2 SUMMARY OF ISSUES AND CONCERNS RAISED BY STAKEHOLDERS

Agency	Issues and Concerns	Issue Addressed to	Answer
LGU of Sta. Rosa	If noise barriers will be provided along the expressway and where	EIA Team	Yes. At noise sensitive receptor areas.
LGU of Sta. Rosa	If a faultline/s were identified.	EIA Team	Yes. West Valley Fault system.
LGU of Sta. Rosa	Assurance that the recommended mitigation measures will be implemented.	EIA Team	Monitoring Team will be formed.
LGU of Sta. Rosa	What type of funding will be set-up for monitoring and who will handle the fund? Who will shoulder the compensation in case of property damage during the implementation?	EIA Team	An Environmental Guarantee Fund and/or Environmental Management Fund will be set-up by the Proponent to ensure that any incident of property damages during implementation will be addressed.
LGU of Sta. Rosa	There are areas in sta. Rosa City that are prone to flooding. Since the flooding situation in the city was not included in the EIA study, it was suggested that flood Master Plan Study conducted by TCGI be factored in the mitigation measures.	EIA Team	Welcomed the suggestion, however, the alignment does not pass through the flood-prone area.
Land Developer	Surface run-off from proposed CALA Expressway may aggravate the existing flooding situation in Greenfields property at the end section of the CALAX, since all the water will be drained through the tributaries crossing SLEX where the drainage facilities were not improved during the rehabilitation of SLEX. Since the Greenfields property will be divided by the proposed expressway, the management	EIA Team	Since the flooding problem exists and not caused by the proposed expressway, solution must be considered with or without the proposed CALAX. There are two (2) solutions that will have to be considered – solution to the existing flooding problem and for the proposed project not to aggravate the existing problem. (*EIA Team Leader*)

Agency	Issues and Concerns	Issue Addressed to	Answer
	would like to know the measures to be adopted during the Detailed Engineering Design (DED) stage to address the effect of flooding at the end section of the alignment. (*representative from Greenfield*)		
LGU of Barangay Sabutan	Status of the resolution forwarded by the Barangay Council of Sabutan, Silang, Cavite, opposing the alignment section crossing the area, where a number of residential structures will be affected.	EIA Team	The letter has been forwarded to DPWH. But the council should also consider that if the alignment will be traversing other area instead od Sabutan, those to be affected will likewise refuse to be affected. It is quite impossible to find an open area where there will be no residents to be affected. It was reiterated that the section crossing the Sabutan area has the least number of structures to be affected.
LGU of Barangay Sabutan	The barangay council of Sabutan is requesting to re-align the section of the alignment to adjacent area to avoid the residential structures.	IEA Team	Expressway alignments follow curvature standards, thus re-alignment sections that will compromise the design of the highway will be quite difficult.
LGU of Barangay Sabutan	Based on the latest alignment map, changes have been made especially at the alignment section crossing the Stateland Property, which was not reflected in the previous alignment maps.	JICA Study Team	There are no changes in the alignment. During the initial presentation, the Stateland Property was not reflected but the alignment will cross the same area.
LGU of Sta. Rosa	Since DPWH was the implementing agency of SLEX and the Proponent of the proposed CALAX is also DPWH, it was suggested that a more effective drainage crossing the SLEX be reconsidered in the design so as not to aggravate the flooding problem that already exists.	EIA Team	Rehabilitation of the SLEX was done by BOT. the flooding study was included in the engineering study conducted by the JICA Study Team, and if the results of the study prove that the proposed CALAX will have significant impact to the existing flooding problem in Sta. Rosa, then it will be included in the design. All environmental aspects discussed in the EIA are based on factual data. Moreover, the expressway is elevated in Sta. Rosa, its impact on flooding will be minimal.
EMB-Region IV-A	Issues regarding the flooding problem in Santa Rosa City be	EMB,	The suggestion was noted; the representatives from the

Agency	Issues and Concerns	Issue Addressed to	Answer
	collected and coordinated with DPWH		DENR-EMB NCR and members of the EIARC are present and are taking down the important issues being raised.
		EIA Team	The existing flooding problem must be addressed whether the proposed CALAX is implemented or not.
LGU of Sta. Rosa	Suggested that a temporary water impounding area to be provided in the upstream portion of the rivers to prevent flash flood from occurring in the downstream area.	EIA Team	The Master Plan was conducted to solve the flooding problem in Santa Rosa. CALAX project is only dragged into the issue because there is an existing flooding problem.
		ESSO	Assured the participants that the flooding problem issue will be taken into consideration in the proposed CALAX. If the Laguna section has flood problem
		EIA Team	In the entire 18km of the expressway, only four (4) km of the alignment will cross Santa Rosa City with elevated structure. In addition, the map shows that not all the drainage systems will drain towards Santa Rosa. Therefore it is not likely that all the run-off from the upstream portions will be drained toward Santa Rosa or the Laguna Lake.
Barangay Captain of Tibig	If Alternate #3 is the final alignment.	JICA Study Team	It is the recommended alignment.
Barangay Captain of Tibig	During the consultation meeting, residents who will be most likely to be affected based on the maps presented to the barangay officials were invited. However, during the survey (tagging for the RAP), those invited during the meeting were not surveyed. It appears to the official that there was a change in the alignment from the time of the barangay consultation meeting to the time of survey. He is	EIA Team	There was no change in alignment. The exact alignment will only be determined during the conduct of the parcellary survey.

Agency	Issues and Concerns	Issue Addressed to	Answer
	apprehensive that his house might be affected by the time the project is implemented, because it is just approximately 60 meters from the area being surveyed.		
Barangay Captain of Sabutan	The surveyor did put the staking on the Stateland Property.	EIA Team	The staking activities conducted is not to determine the exact alignment. The parcellary survey during the DED will determine the final alignment.
Land Developer	Stateland stated for the record that they were never invited during the meetings conducted for the Laguna section. But they were invited in the meetings for the Cavite side. He also said that according to the Brgy. Captain the initial alignment was in place and that they believd Stateland Property is not affected by it. But as of the latest alignment, Stateland will be affected by the toll plaza (interchange) Stateland Property is not in favour of the toll plaza being constructed in their property, where it will affect their right-of-way. Stateland Property submitted a position paper to the DPWH secretary stating their opposition to the proposal and if there are other possible solutions to the conflict.	Study Team	Most of affected parts of the Stateland Property belong to the Cavite section and not Laguna section, which is why they were not invited in the meetings fro Laguna section.
Land Developer	As to what they know, initially, the Cavite section is up to Aguinaldo Highway. Later on the DPWH/Design Team decided that the interchange be part of the Cavite section, but before it was part of the Laguna section.	Study Team	Originally, the boundary between Laguna section and Cavite section are at Aguinaldo Highway. However, construction of the Cavite section needs an interchange at Aguinaldo Highway. Therefore, DPWH decided that the start of Laguna section be at after the interchange.
LGU of Municipality of Silang	Our major concern is the proposed interchanges, since these will have significant effect on the land use of the areas affected. The east Silang interchange is located in a barangay where the road (rough) at present is not yet linked to the National Road, but it can be	Study Team	The said area is being divided by rivers and the road parallel to the rivers provide access. The present access road will be maintained by an overpass or an underpass, therefore, service road is not planned.

Agency	Issues and Concerns	Issue Addressed to	Answer
	designed as a Provincial Road in the future. Further, the area will be divided by the alignment, especially the farmlands. There will be an issue of accessibility to the other side of the farmland. What the MPDC wanted to know is the possibility of the constructing the service roads as presented in the design. These service roads will provide access to the both sides of the divided properties. If the entire service roads presented in the design will be included in the construction of the project or is it a design to be implemented by the local government in the future. And how wide will the service roads be.		
LGU of Municipality of Silang	The MPDC suggested that the ROW for the service roads be separated from perimeter fence, so that when the time comes that the Municipality of Silang is able to shoulder the construction of the roads, the ROW is already cleared and outside the expressway.	ESSO	All the properties acquired by the DPWH is secured to its limit, which is why the suggestion of the MPDC is not workable. She suggested instead to the MPDC to formally write a letter of request to the DPWH secretary to resolve the issue.

Source: JICA Study Team

9.7.5 Interview Survey

In addition to various levels of stakeholders meetings, interview surveys were ndertaken. Number of households interviewed are shown in **Table 9.7.5-1** and **Table 9.7.5-2** and summarized as follows;

No. of Households Interviewed

Type – A	32
Type – B	31
Type – C	132
Total	195

For Type – C, residential, business, youth, transport, senior citizens and NGOs/POs sectors were interviewed.

Interview results were presented in the previous sections of this report.

TABLE 9.7.5-1 LIST OF IDENTIFIED PAPS AND NUMBER OF PAPS INTERVIEWED (DIRECTLY IMPACTED)

Municipality/ Barangay	**Residential Structure (Type A) (No.)**						**Farm Lands (Type B) (No.)**							
	Identified to be Affected			**Interviewed / % Interviewed**			**Identified to be Affected**				**Interviewed**			
	Owner	**Renter**	**Total**	**Owner**	**Renter**	**Total**	**Land owner**	**Tenant**	**Free Occupation with Permit**	**Total**	**Land owner**	**Tenant**	**Free Occupation with Permit**	**Total**
Silang, Cavite														
Sabutan	13	2	15	12	2	14	27	0	0	27	6	0	0	6
				92%	100%	93%					22%	0%	0%	22%
Kaong	1	1	2	1	1	2	2	2	0	4	1	1	0	2
				100%	100%	100%					50%	50%	0%	100%
Tibig	10	2	12	9	2	11	25	2	0	27	5	2	0	7
				90%	100%	91%					20%	100%	100%	26%
Carmen	0	0	0	0	0	0	0	0	19	19	0	0	16	16
				0%	0%	0%					0%	0%	84%	84%
Biñan, Laguna Timbao	7	0	7	5	0	5	0	0	0	0	0	0	0	0
				71%	0%	71%					0%	0%	0%	0%
Grand Total:	31	5	36	27	5	32	54	4	19	77	12	3	16	31
				87%	100%	89%					22%	75%	84%	40%

Source: JICA Study Team (2012)

TABLE 9.7.5-2 NUMBER OF INTERVIEWED HOUSEHOLDS OF INDIRECTLY AFFECTED SECTORS (TYPE C)

City/Municipality Barangay	Stakeholder Sectors (Indirectly impacted)						Total
	Residential	Business	Youth	Transport	Senior Citizens	NGOs/POs	
SILANG							
Biga	0	1	0	0	0	0	1
Biga 1	1	0	1	0	0	0	2
Biga First	0	0	0	1	0	0	1
Biluso	0	0	0	2	0	0	2
Cinco	0	1	0	1	0	0	2
Ibaba Tibig	0	0	1	0	0	0	1
Inchican	0	0	0	0	0	1	1
Kaong	1	1	1	5	5	0	13
Poblacion Silang	0	2	3	0	0	0	5
Poblacion	1	1	0	0	0	0	2
Poblacion 1	1	0	0	0	0	0	1
Pulong-Bunga	0	0	0	1	0	0	1
Sabutan	15	9	3	6	7	3	43
Sabutan Highway	0	1	0	0	0	0	1
Tibig	7	5	4	3	5	0	24
Timbao	1	0	0	0	0	0	1
Town Proper	0	0	2	0	0	0	2
Sub-Total 1	27	22	15	19	17	4	104
BIÑAN							
Biñan	0	0	0	1	0	0	1
Loma	1	0	3	1	0	1	6
Malamig	0	5	1	0	1	0	7
Timbao	1	0	0	0	1	1	3
Sub-Total 2	2	5	4	2	2	2	17
STA. ROSA							
Don Jose	2	1	0	0	1	2	
Pulong Sta. Cruz	0	0	0	0	0	1	
Sto. Domingo	4	0	0	0	0	0	
Sub-Total 3	6	1	0	0	1	3	11
TOTAL	35	28	19	21	20	9	132
% Distribution	26.5%	21.2%	14.4%	15.9%	15.2%	6.8%	100.0%
Note: NGO – Non-Government Organization; PO – People’s Organization							

Source: JICA Study Team (2012)

9.8 RECOMMENDATION

9.8.1 EIS

- Include obligation of priority employment of PAP and barangay residents below poverty line in the project contract with the selected contractor by DPWH during construction and the selected concessionaire during Operation and Maintenance Stage.
- In case of Reconsignment, a private entity that is in charge of the Project should require subcontracting company submission of their detail implementing structure; chart, schedule, member etc.
- All cost for Environmental Management including monitoring cost and follow up cost should be included the tender price (or it should be include the TOR).
- Contractor should take out a policy in Contractor's All Risk Insurance as remarked ANNEX A on previous EIS.
- DPWH should update LARRIPP and compensation/entitlement amount stipulated in it should be amended.

9.8.2 RAP

- Project specific RAP Implementation Framework must be prepared in D/D Stage before construction stage.
- Ensure a priority employment opportunity of PAPs who lives on farming whose base is the land lost for ROW/the project from the company that operate and maintain CALAX.
- Monitor and ensure fair and just compensation have been done to all PAPs with full consensus before CALAX construction tender is out by quarterly monitoring activities which is mandate for DPWH.
- In stakeholder meeting, many PAP's concerns not enough compensation. DPWH should hire the Independent Assessor in detailed design stage, and the proper compensation /entitlement amount should be determined by them for PAP's less grievance.
- Since many PAP's farmer request to compensate as land for land, DPWH should consider the land for land compensation as much as possible.

CHAPTER 10
PROJECT IMPLEMENTATION PLAN

10.1 IMPLEMENTATION STRATEGY

CALAX is composed of two Sections, namely Cavite section and Laguna Section as follows;

Cavite Section :	L = 28.9 km (studied by WB)
Laguna Section :	L = 18.1 km (studied by JICA)
Total	**L = 47.0 km**

Estimated construction cost and ROW acquisition cost are as follows;

Unit: Billion Php in 2012 Prices

	Civil Work Cost	ROW Cost	Total
Cavite Section	14.53	5.15	19.68
Laguna Section	12.28	3.59	15.87
Total	**26.81**	**8.74**	**35.55**

Note : Physical contingency and price escalation are not included.

As shown above, project scale in terms of cost involved is quite big.

DPWH wishes to implement the project through PPP scheme. There were four types of PPP modalities that were studied as presented in Section 8.2 of Chapter 8, and recommended Type 3 which is as follows;

Design and Construction :	Cavite Section by BOT with Subsidy for Construction Cost Laguna Section by Japan’s ODA
Operation and Maintenance :	Both Sections by a Concessionaire in charge of design and construction of Cavite section.

10.2 IMPLEMENTATION SCHEDULE

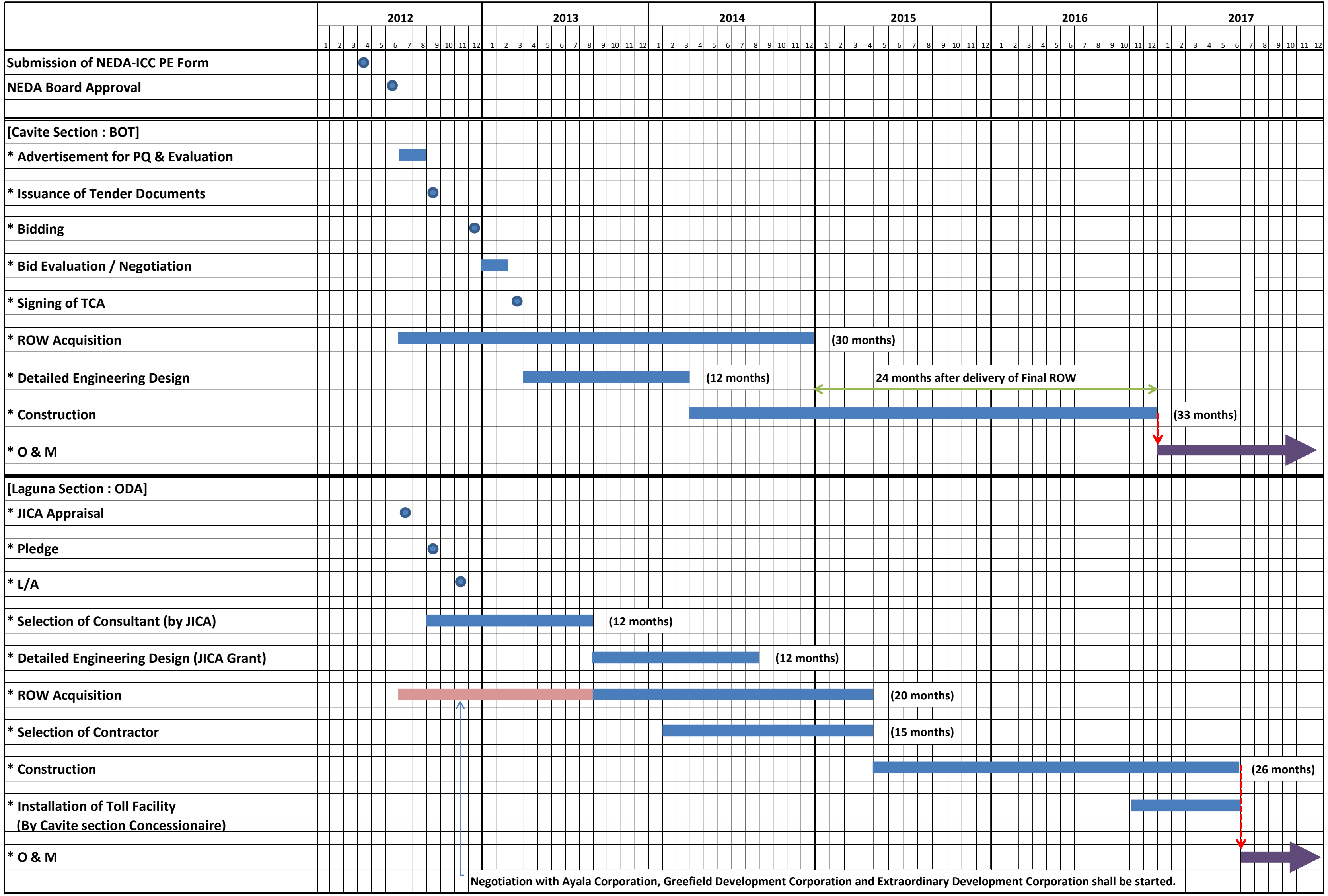
Implementation schedule is shown in **Table 10.2-1.**

<u>Cavite Section</u>

- Soon after the project is approved by NEDA Board (July 2012), Cavite Section will be advertized for the pre-qualification of interested investors/bidders.
- Bidding is expected to be held in December 2012.
- Toll Concession Agreement (TCA) is expected to be signed in March 2013.
- Since the parcellary survey is included in the current WB Consultant’s scope of work, ROW acquisition is expected to start by July 2012 (soon after the project is approved by NEDA Board). ROW acquisition is estimated to require 30 months.

TABLE 10.2-1 IMPLEMENTATION SCHEDULE: CAVITE SECTION BY BOT, LAGUNA SECTION BY ODA

Laguna Section - ODA : StandardYen Loan



Source: JICA Study Team

- Detailed Engineering Design will start by May 2013 and will be completed in April 2014.
- Construction is expected to start by April 2014 and will be completed in November 2016.
- Operation and Maintenance will start by December 2016.

Laguna Section

- Project Appraisal by JICA is expected in July 2012.
- Loan Agreement is expected to be signed in November 2012.
- Selection of Consultant for the detailed engineering design will start in September 2012 and end in August 2013.
- Detailed engineering design will start from September 2013 and be completed in August 2014.
- Selection of contractor will start February 2014 and be completed in April 2015.
- ROW Acquisition will start in September 2013 and be completed in April 2015 (20 months).
- DPWH should start negotiation with Ayala Corporation, Greenfield Development Corporation and Extraordinary Development Corporation for the land value to be paid to them soon after the Project is approved by NEDA Board.
- Construction will start May 2015 and be completed in June 2017 with the construction period of 26 months.
- Installation of toll facility will be done by the selected concessionaire for Cavite Section. It will start November 2016 and completed in June 2017.
- Completion of Laguna Section will be about 6 months behind that of the Cavite Section.

10.3 CIVIL WORK CONTRACT PACKAGING

Laguna Section is divided into two (2) contract packages considering the cost, scale of works and characteristics of works. Division of contract packages is shown in **Figure 10.3-1** and summarized as follows;

Contract Package 1	:	Km. 0 + 690 ~ Km. 10 + 600	(L = 9.91 km)
Contract Package 2	:	Km. 10 + 600 ~ Km. 18 + 810	(L = 8.21 km)

Table 10.3-1 shows major quantities by contract packages. **Table 10.3-2** shows civil work cost by contract package.

TABLE 10.3-1 MAJOR QUANTITIES BY CONTRACT PACKAGE

Items		Unit	Quantity		
			Package 1	Package 2	Total
1.00	**Earthworks**				
1.10	Roadway Excavation	cu.m	925,455.00	-	925,455.00
1.20	Embankment from Roadway Excavation	cu.m	582,501.00	342,954.00	925,455.00
2.00	**Subbase and Base Course**				
2.10	Aggregate Subbase Course	cu.m	91,898.00	108,703.00	200,601.00
2.20	Crushed Aggregate Base Course	cu.m	64,852.00	17,245.00	82,097.00
2.30	Cement Treated Base Course	cu.m	30,647.00	10,119.00	40,766.00
3.00	**Surface Course**				-
3.10	Bitumimous Concrete Binder Course (t=60mm)	sq.m	257,008.00	67,621.00	324,629.00
3.20	Bitumimous Concrete Surface Course (t=60mm)	sq.m	270,997.00	187,893.00	458,890.00
4.00	**Bridge Structure**				
4.10	Concrete Piles Cast in Drilled Holes (Ø1800mm)	l.m	2,406.00	7,783.00	10,189.00
4.20	Reinforcing Steel, Grade 60 (Bridge)	kg	15,989,512.00	23,895,495.00	39,885,007.00
4.30	Structural Concrete Class P38MPa for Coping	cu.m	8,603.00	26,049.00	34,652.00
4.40	Structural Concrete Class AA for Deck Slab	cu.m	18,184.97	39,725.03	57,910.00
4.50	Structural Concrete Class AA for Abutment	cu.m	7,038.40	1,936.60	8,975.00
4.60	AASHTO Girder Type V, L=35m	each	567.00	1,087.00	1,654.00
4.70	Structural Steel	kg	238,256.00	-	238,256.00
5.00	**Drainage and Slope Protection Structure**				
5.10	RCPC (Ø610mm)	l.m	7,672.00	3,288.00	10,960.00
5.20	Grouted Riprap Class A (Side Ditch)	cu.m	6,138.16	2,630.64	8,768.80
5.30	Single Metal Beam Guardrail	l.m	1,400.00	600.00	2,000.00
5.40	Double Metal Beam Guardrail	l.m	9,910.00	9,050.00	18,960.00
6.00	**Miscellaneous Structures**				
6.10	Warning Sign	each	18.00	27.00	45.00
6.20	Regulatory Sign	each	45.00	46.00	91.00
6.30	Reflectorial Thermoplastic Pavement Marking	sq.m	11,900.35	9,736.65	21,637.00

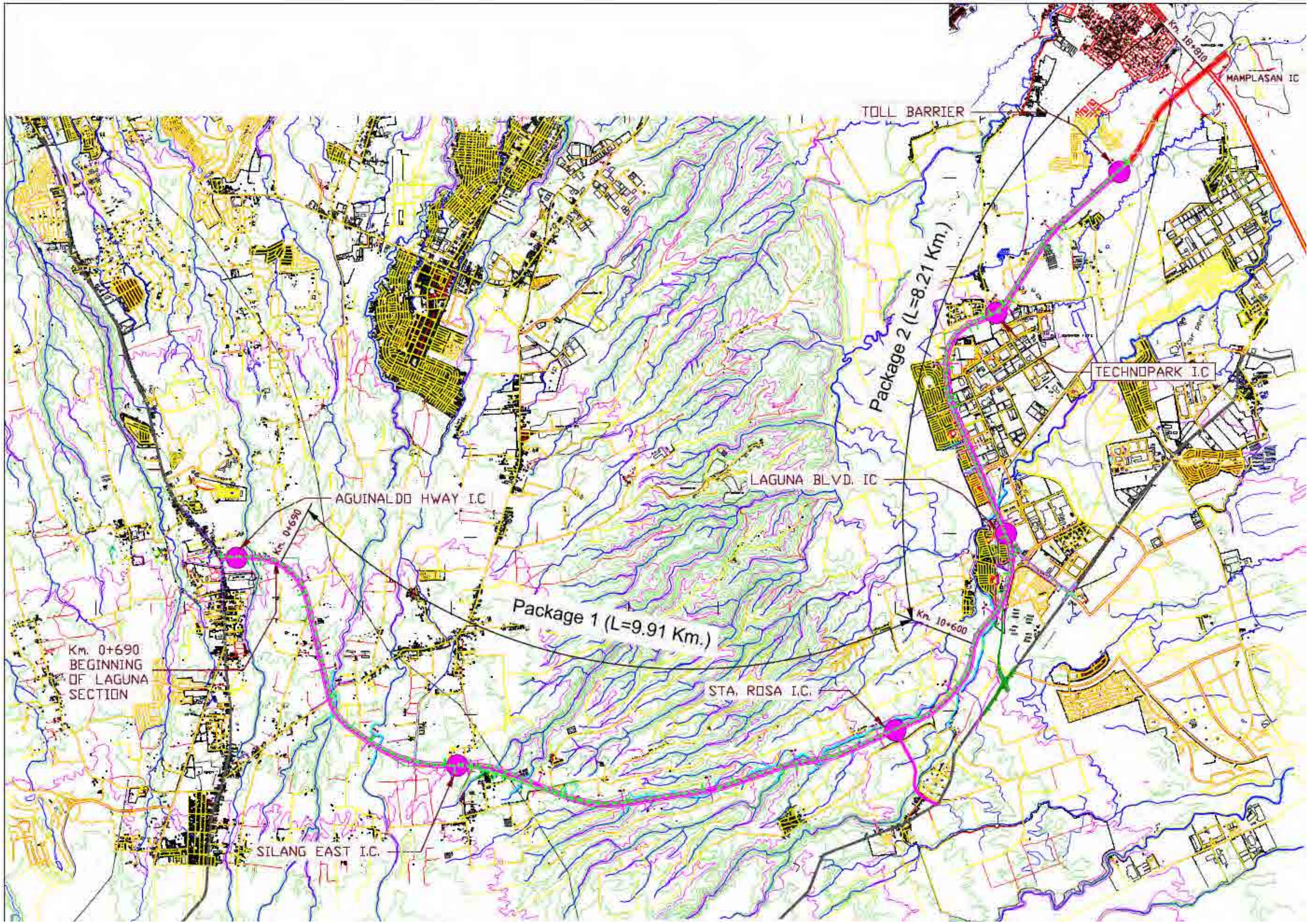


FIGURE 10.3-1 DIVISION OF CONTRACT PACKAGE

Table 10.3-2 (1) to **(3)** shows the civil work cost by contract package.

TABLE 10.3-2 (1) CIVIL WORK COST OF PACKAGE-1

		Package 1			
		Foreign Cost	**Local Cost**	**Tax**	**Total**
A	Facilities for Engineer	11.25	13.33	3.42	28.00
B	Other General Requirements	22.20	32.28	7.67	62.15
C	Earthworks	211.39	307.47	73.02	591.88
D	Subbase and Base Course	81.69	118.82	28.22	228.73
E	Surface Course	227.38	330.73	78.55	636.66
F	Bridge Structure Construction	997.36	1,450.71	344.54	2,792.61
G	Drainage and Slope Protection Structures	104.68	152.26	36.16	293.10
H	Miscellaneous Structures	57.49	83.62	19.86	160.97
	Total	**1,713.44**	**2,489.22**	**591.44**	**4,794.10**
I	Toll Plaza and Service Area	25.27	36.76	8.73	70.76
	Grand Total	**1,738.71**	**2,525.98**	**600.17**	**4,864.86**

TABLE 10.3-2 (2) CIVIL WORK COST OF PACKAGE-2

		Package 2			
		Foreign Cost	**Local Cost**	**Tax**	**Total**
A	Facilities for Engineer	16.88	20.00	5.12	42.00
B	Other General Requirements	35.66	51.88	12.32	99.86
C	Earthworks	39.33	57.22	13.59	110.14
D	Subbase and Base Course	49.84	72.50	17.22	139.56
E	Surface Course	254.79	370.61	88.02	713.42
F	Bridge Structure Construction	1,980.01	2,880.02	684.01	5,544.04
G	Drainage and Slope Protection Structures	157.18	228.63	54.30	440.11
H	Miscellaneous Structures	141.23	205.42	48.79	395.44
	Total	**2,674.92**	**3,886.28**	**923.37**	**7,484.57**
I	Toll Plaza and Service Area	172.36	250.71	59.54	482.61
	Grand Total	**2,847.28**	**4,136.99**	**982.91**	**7,967.18**

TABLE 10.3-2 (3) CIVIL WORK COST OF PACKAGE-1 + PACKAGE-2

		Package 2			
		Foreign Cost	**Local Cost**	**Tax**	**Total**
A	Facilities for Engineer	28.13	33.33	8.54	70.00
B	Other General Requirements	57.86	84.16	19.99	162.01
C	Earthworks	250.72	364.69	86.61	702.02
D	Subbase and Base Course	131.53	191.32	45.44	368.29
E	Surface Course	482.17	701.34	166.57	1,350.08
F	Bridge Structure Construction	2,977.37	4,330.73	1,028.55	8,336.65
G	Drainage and Slope Protection Structures	261.86	380.89	90.46	733.21
H	Miscellaneous Structures	198.72	289.04	68.65	556.41
	Total	**4,388.36**	**6,375.50**	**1,514.81**	**12,278.67**
I	Toll Plaza and Service Area	197.63	287.47	68.27	553.37
	Grand Total	**4,585.99**	**6,662.97**	**1,583.08**	**12,832.04**

10.4 CONSTRUCTION EXECUTION PLAN

10.4.1 Construction Schedule

Construction schedule of each contract package is shown in **Table 10.4.1-1.**

10.4.2 Major Materials To Be Used

Major materials to be used is shown in **Table 10.4.2-1**.

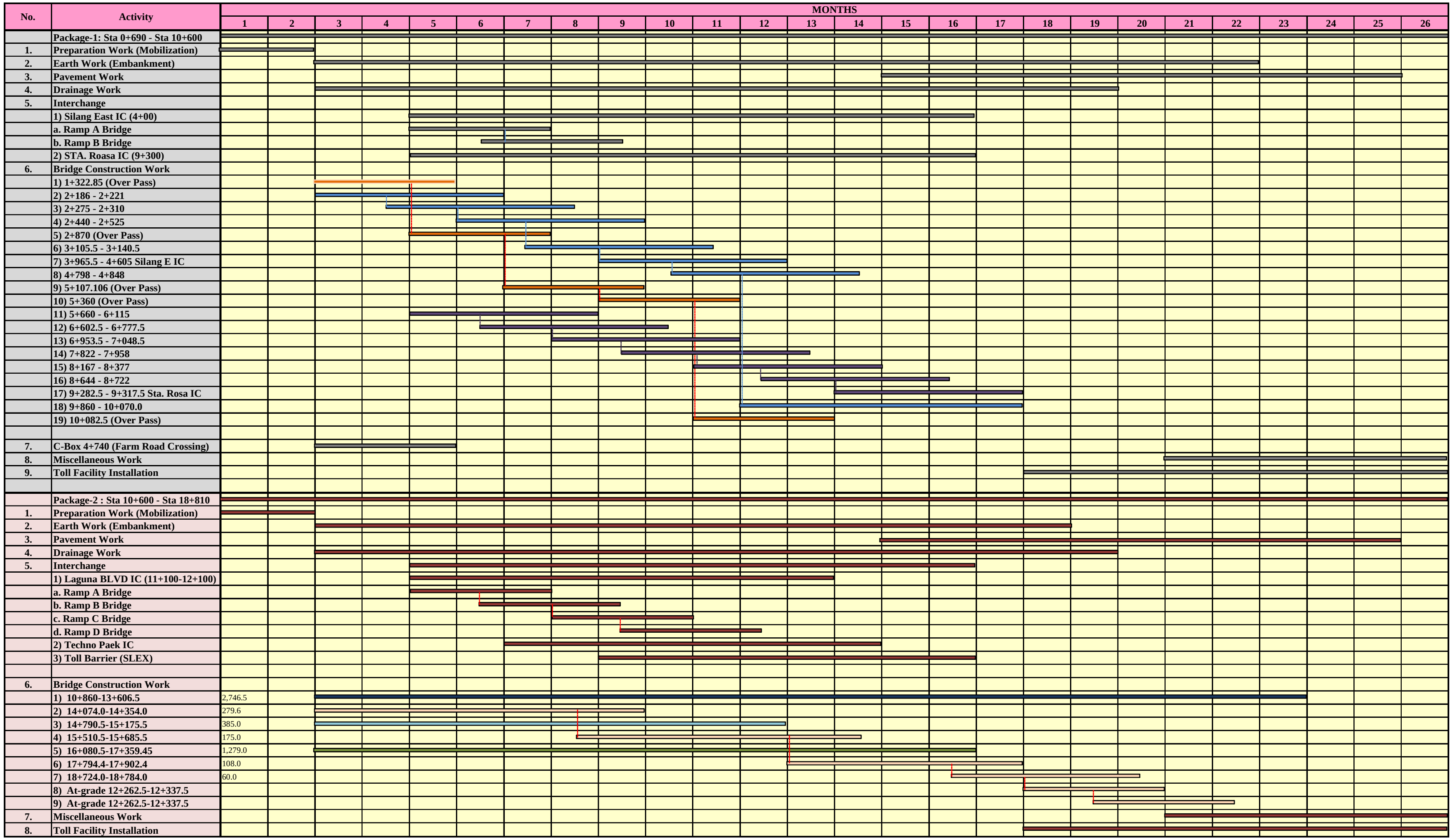
10.4.3 Major Equipment To Be Used

Major equipments to be used is shown in **Table 10.4.3-1**.

10.4.4 Construction Camps and Roads for Construction

Two construction camps per contract package will be established as shown in **Figure 10.4-1**. Roads to be used during construction are also shown in **Figure 10.4-1**. Area within the acquired road right-of-way (50m and 60 m) shall be fully utilized as temporary roads for construction.

TABLE 10.4.1-1 CALA EXPRESSWAY CONSTRUCTION SCHEDULE



No.	Activity	MONTHS 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
	Package-1: Sta 0+690 - Sta 10+600																										
1.	Preparation Work (Mobilization)																										
2.	Earth Work (Embankment)																										
3.	Pavement Work																										
4.	Drainage Work																										
5.	Interchange																										
	1) Silang East IC (4+00)																										
	a. Ramp A Bridge																										
	b. Ramp B Bridge																										
	2) STA. Roasa IC (9+300)																										
6.	Bridge Construction Work																										
	1) 1+322.85 (Over Pass)																										
	2) 2+186 - 2+221																										
	3) 2+275 - 2+310																										
	4) 2+440 - 2+525																										
	5) 2+870 (Over Pass)																										
	6) 3+105.5 - 3+140.5																										
	7) 3+965.5 - 4+605 Silang E IC																										
	8) 4+798 - 4+848																										
	9) 5+107.106 (Over Pass)																										
	10) 5+360 (Over Pass)																										
	11) 5+660 - 6+115																										
	12) 6+602.5 - 6+777.5																										
	13) 6+953.5 - 7+048.5																										
	14) 7+822 - 7+958																										
	15) 8+167 - 8+377																										
	16) 8+644 - 8+722																										
	17) 9+282.5 - 9+317.5 Sta. Rosa IC																										
	18) 9+860 - 10+070.0																										
	19) 10+082.5 (Over Pass)																										
7.	C-Box 4+740 (Farm Road Crossing)																										
8.	Miscellaneous Work																										
9.	Toll Facility Installation																										
	Package-2 : Sta 10+600 - Sta 18+810																										
1.	Preparation Work (Mobilization)																										
2.	Earth Work (Embankment)																										
3.	Pavement Work																										
4.	Drainage Work																										
5.	Interchange																										
	1) Laguna BLVD IC (11+100-12+100)																										
	a. Ramp A Bridge																										
	b. Ramp B Bridge																										
	c. Ramp C Bridge																										
	d. Ramp D Bridge																										
	2) Techno Paek IC																										
	3) Toll Barrier (SLEX)																										
6.	Bridge Construction Work																										
	1) 10+860-13+606.5	2,746.5																									
	2) 14+074.0-14+354.0	279.6																									
	3) 14+790.5-15+175.5	385.0																									
	4) 15+510.5-15+685.5	175.0																									
	5) 16+080.5-17+359.45	1,279.0																									
	6) 17+794.4-17+902.4	108.0																									
	7) 18+724.0-18+784.0	60.0																									
	8) At-grade 12+262.5-12+337.5																										
	9) At-grade 12+262.5-12+337.5																										
7.	Miscellaneous Work																										
8.	Toll Facility Installation																										

Source: JICA Study Team

TABLE 10.4.2-1 MAJOR MATERIAL LIST FOR CALAX

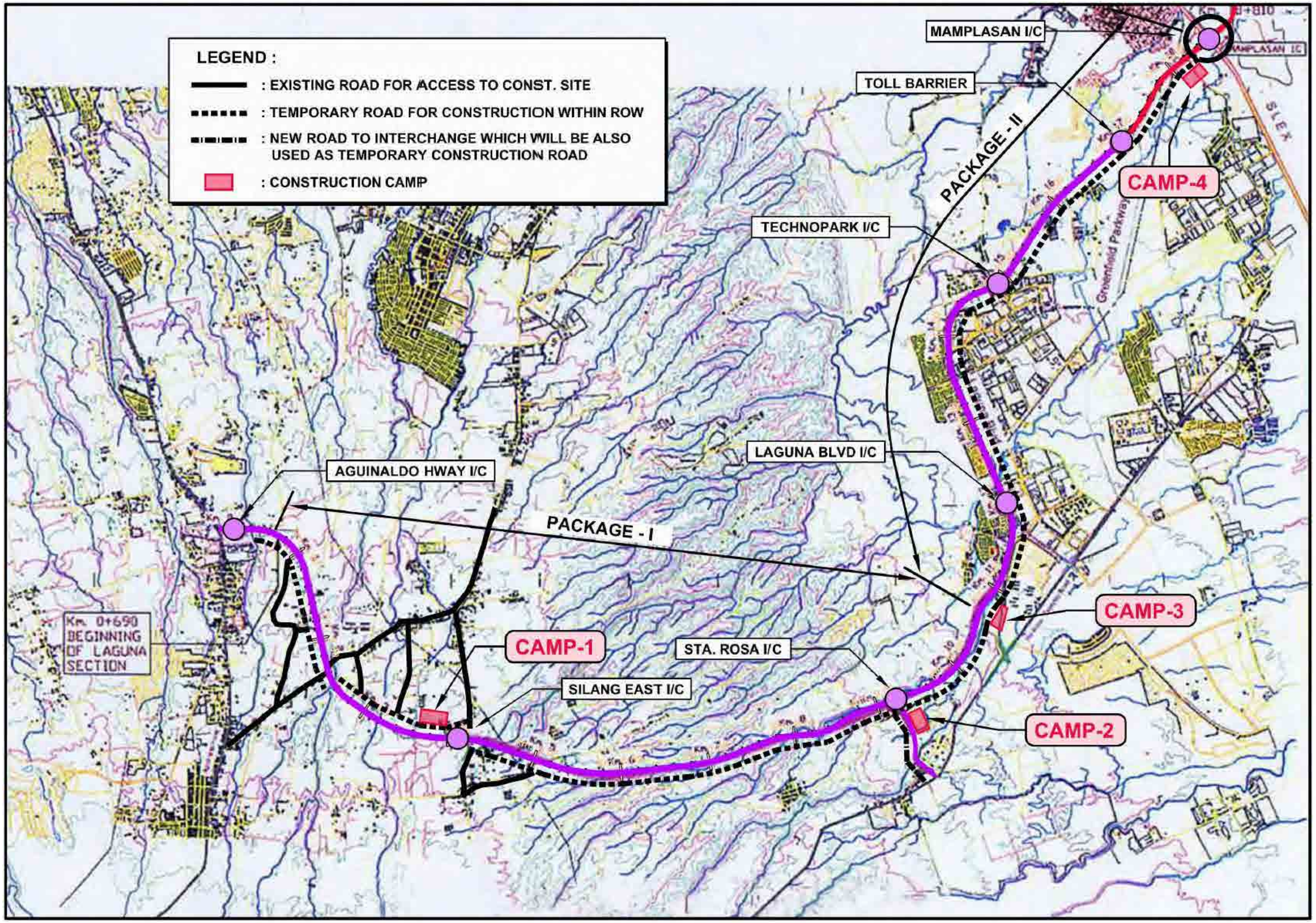
Material		Unit	Quantity				Remarks
			Package-1	Package-2	Service Road	Total	
1	Crushed Aggregate for Base and Sub base Course	cu.m	187,397.00	52,426.00	83,881.00	323,704.00	
2	Asphalt	ton	64,564.00	31,163.00		95,727.00	
3	Bituminous Tack Coat, Emulsified Asphalt, SS-1	ton	122.00	92.00		214.00	
4	Bituminous Prime Coat, MC-701	ton	717.00	228.00		945.00	
5	Fine Aggregate for Asphalt Pavement	cu.m	3,067.00	1,484.00		4,551.00	
6	Aggregate for Asphalt Pavement	cu.m	7,667.00	3,710.00		11,377.00	
7	Cement	ton	26,235.36	51,552.36	16,124.04	93,911.76	
8	Fine Aggregate for Concrete	cu.m	22,446.00	44,106.00	13,795.00	80,347.00	
9	Aggregate for Concrete	cu.m	38,479.00	75,610.00	23,649.00	137,738.00	
10	Reinforcing Steel, Grade 60 (Bridge)	kg	15,989,512.00	23,598,954.00	296,541.00	39,885,007.00	
11	Prestressing Steel	kg	375,657.00	1,293,936.00		1,669,593.00	
12	Structure Steel,	kg	238,256.00			238,256.00	
13	DOUBLE METAL BEAM GUARDRAIL (w/Post)	l.m	9,910.00	9,050.00		18,960.00	
14	Single Metal Beam Guardrail (w/Post)	l.m	1,400.00	600.00		2,000.00	
15	Rolled Gutter (Median) 600mm x 200mm	l.m	7,672.00	3,288.30		10,960.30	
16	Fiber Optic	l.m	9,910.00	8,307.00		18,217.00	
17	RCPC, 610 mm dia.	l.m	7,672.00	2,192.00	1,096.00	10,960.00	
18	RCPC, 1200 mm dia.	l.m	1,400.00	400.00	200.00	2,000.00	

Source: JICA Study Team

TABLE 10.4.3-1 MAJOR EQUIPMENT TO BE USED

Equipment	Capacity	Package-1	Package-2	Service Road	Total Requirement Number	Remarks
Dump Track	11 ton	50	30	5	85	
Wheel Loder	1.53 m3	4	2	1	7	
Motor Grader 14G	3m/200HP	2	2	1	5	
Vibratory Roller	11 ton, 125 Hp	2	2		4	
Tired Roller	12.6 ton	2	2		4	
Crawler Tractor (w/Bulldozer)	Cataerpilar D7G PS	4	2	1	7	
Hydraulic Excavator	1.0 m3	10	3	2	15	
Backhoe	0.6 m3	6	4	1	11	
Vibratory Plate Compactor	7 Hp	10	6	1	17	
Track Crane	160 ton, 300Hp	3	6	1	10	
Crawler Crane	60T/275Hp	3	5	1	9	
Drill Rig for Pile	CWV Model TRM35/31 φ1.5〜2.5	3	4	1	8	
Concrete transit Mixer	5 m3	12	20	5	37	
Concrete Pump	60 yd3	2	3	1	6	
Concrete Plant	40m3/hr	1	1		2	
Track Mounted Crane	21-25t, 200Hp	3	3	1	7	
Concrete Vibrator	Gasoline type	10	20	5	35	
Semi Trailer	20 ton	5	5	1	11	
Asphalt Paver	4.7 m, 112 Hp	2	2		4	
Asphalt Distributor	5 ton	2	2		4	
Asphalt Plant	60 t/hr	1	1		2	
Lane Marker	8 ton Track	1	1		2	
Steel girder and structure prefabrication equipment		1			1	
Industrial x-ray equipment at site		1			1	
Ultrasonic Examination Equipment at site		1	1		2	

Source: JICA Study Team



Source: JICA Study Team

FIGURE 10.4-1 PROPOSED CONSTRUCTION ROADS AND CAMPS

10.5 CONSULTANCY SERVICES

The following consultancy services are required for the Project;

- Detailed Engineering Design
- Tender Assistance for Selection of Contractor
- Construction Supervision

Independent Consultant hired by the Government and Cavite Section Concessionaire shall be involved for the detailed engineering design, construction supervision and installation of toll facility of Laguna Section (cost of hiring Independent Consultant is not included in the Laguna Section).

1) Detailed Engineering Design

Major scope of work for the consultancy services are as follows;

- Finalization of the expressway alignment with due consultation with the concerned land developers.
- Engineering surveys (topographic survey, soils/material survey, geo-technical survey)
- Detailed engineering design
- Preparation of tender documents
- Preparation of RAP
- Parcellary survey

2) Tender Assistance for Selection of Contractor

- Provide assistance to DPWH in the all process of selecting contractor.
- Monitoring of RAP implementation.

3) Construction Supervision

- Overall construction supervision.
- Keep and compile all records including material test results, inspection results, problems encountered, etc., which shall be provided to Cavite Section Concessionaire for their maintenance purposes.
- Prepare an asset register in including condition assessment.
- Monitoring of environmental requirements.

10.6 PROCUREMENT PLAN

Consultancy services and civil work contractor will be procured through the following method in accordance with JICA Guidelines for Procurement under Japanese ODA Loans, March 2009.

1) Consultancy Services

Consultancy services will be procured by two (2) steps, Pre-qualification and Tendering, under the International Competitive Bidding (ICB). Quality- and Cost-Based (QCBS) method will be adopted.

2) Civil Work Contractor

Civil work contractor will be provided by 2 steps, Pre-qualification and Tendering, under the International Competitive Bidding (ICB).

10.7 ORGANIZATIONAL STRUCTURE

Overall project implementation organization for Laguna Section is shown in **Figure 10.7-1.**

Implementing agency is the Department of Public Works and Highways (DPWH).

Implementing office is the Project Management Office – Build-Operate-Transfer (PMO-BOT). Organization chart of PMO-BOT is shown in **Figure 10.7-2**.

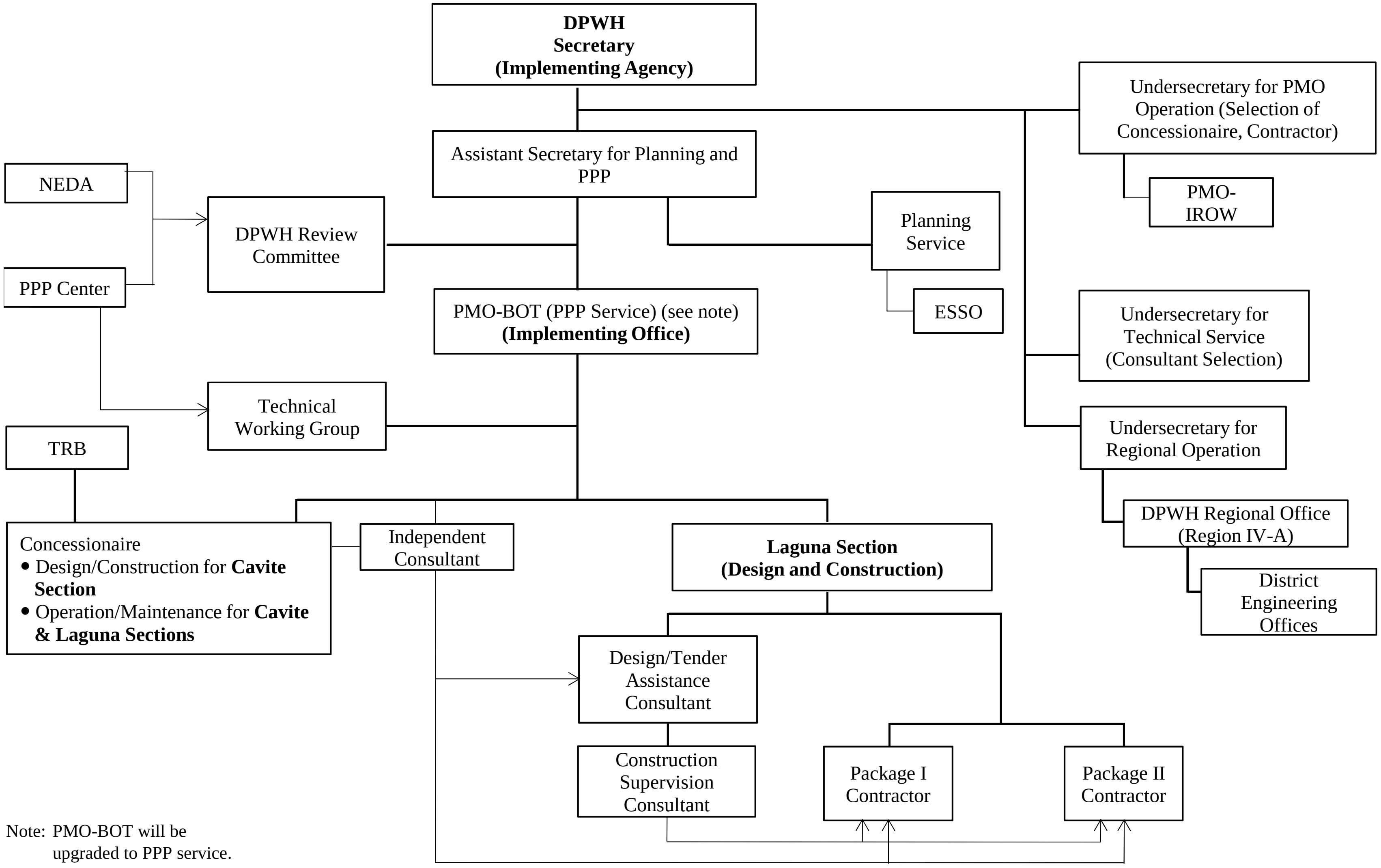
PMO-BOT is currently implementing or preparing the following projects;

- Daang Hari – SLEX Connector Road (Detailed Design is on-going.)
- TPLEX (under Construction)
- NLEX – SLEX Connector Road (under evaluation of the unsolicited proposal)
- NAIAX (preparation for bid)
- CALAX – Cavite Section (preparation for bid)

It is necessary for PMO-BOT to reinforce its staff from other PMOs who have experiences of Japan's ODA projects such as PMO-PJHL and PMO-URPO. Environmental and RAP related staff should be also reinforced.

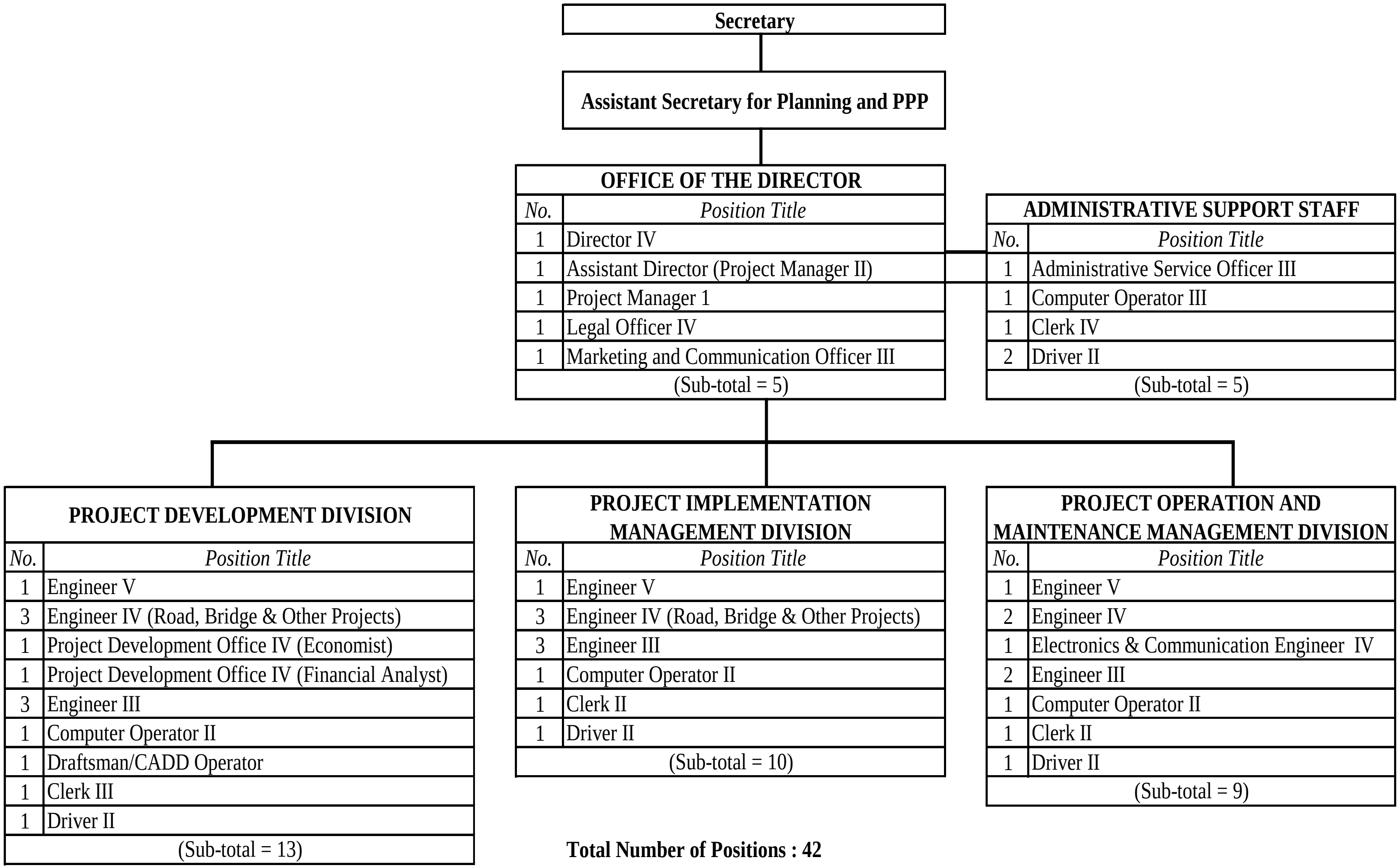
For the successful implementation, DPWH created a DPWH Review Team headed by the Assistant Secretary for Planning and PPP with members of Directors of PMO-BOT, Bureau of Design (BOD), Bureau of Construction (BOC), PMO-IROW, PMO-FS as well as members of PPP Center and NEDA.

DPWH also created a Technical Working Group headed by the Director of PMO-BOT with members of PMO-FS, PMO-BOT, BOD, BOC, PMO-IROW, and PPP Center.



Note: PMO-BOT will be upgraded to PPP service.

Figure 10.7-1 PROJECT IMPLEMENTATION ORGANIZATION



OFFICE OF THE DIRECTOR

No.	*Position Title*
1	Director IV
1	Assistant Director (Project Manager II)
1	Project Manager 1
1	Legal Officer IV
1	Marketing and Communication Officer III
(Sub-total = 5)	

ADMINISTRATIVE SUPPORT STAFF

No.	*Position Title*
1	Administrative Service Officer III
1	Computer Operator III
1	Clerk IV
2	Driver II
(Sub-total = 5)	

PROJECT DEVELOPMENT DIVISION

No.	*Position Title*
1	Engineer V
3	Engineer IV (Road, Bridge & Other Projects)
1	Project Development Office IV (Economist)
1	Project Development Office IV (Financial Analyst)
3	Engineer III
1	Computer Operator II
1	Draftsman/CADD Operator
1	Clerk III
1	Driver II
(Sub-total = 13)	

PROJECT IMPLEMENTATION MANAGEMENT DIVISION

No.	*Position Title*
1	Engineer V
3	Engineer IV (Road, Bridge & Other Projects)
3	Engineer III
1	Computer Operator II
1	Clerk II
1	Driver II
(Sub-total = 10)	

PROJECT OPERATION AND MAINTENANCE MANAGEMENT DIVISION

No.	*Position Title*
1	Engineer V
2	Engineer IV
1	Electronics & Communication Engineer IV
2	Engineer III
1	Computer Operator II
1	Clerk II
1	Driver II
(Sub-total = 9)	

Total Number of Positions : 42

Figure 10.7-2 ORGANIZATIONAL CHART OF PMO-BOT

10.8 FINANCIAL PLAN

10.8.1 Project Cost

Table 10.8.1-1 shows the project cost by JICA portion and others. Total JICA portion is estimated at Php 13,410.69 Million which is 67.0% of the total project cost.

TABLE 10.8.1-1 PROJECT COST

Million Peso
(Million Yen)

Breakdown of Cost	Foreign Currency Portion			Local Currency Portion			Total		
	Total	JICA Portion	Others	Total	JICA Portion	Others	Total	JICA Portion	Others
Civil works	4,388.35	4,388.35 (¥8,206.21)		6,375.49	6,375.49 (¥11,922.17)		10,763.84	10,763.84 (¥20,128.38)	0.00
Price Escalation	373.33	373.33 (¥698.12)		649.65	649.65 (¥1,214.84)		1,022.97	1,022.97 (¥1,912.96)	0.00
Physical Contingency	219.42	219.42 (¥410.31)		318.77	318.77 (¥596.11)		538.19	538.19 (¥1,006.42)	0.00
Consulting Service	617.83	617.83 (¥1,155.34)		146.49	146.49 (¥273.94)		764.32	764.32 (¥1,429.27)	0.00
Land Acquisition	0.00			3,543.96		3,543.96	3,543.96	0.00	3,543.96
Administration Cost	0.00			207.43		207.43	207.43	0.00	207.43
VAT	0.00			1,996.86		1,996.86	1,996.86	0.00	1,996.86
Import Tax	0.00			265.91		265.91	265.91	0.00	265.91
Interest During Construction	0.00			356.56		356.56	356.56	0.00	356.56
Commitment Charge	0.00			65.45		65.45	65.45	0.00	65.45
Total	**5,598.92**	**5,598.92** (¥10,469.98)	**0.00**	**13,926.56**	**7,490.40** (¥14,007.05)	**6,436.16**	**19,525.48**	**13,089.32** (¥24,477.03)	**6,436.16**

Note:

Physical Contingency	:	5%
Foreign Exchange Rate	:	US$ 1 = 79.7 Yen = 42.7 Pesos
Price Escalation	:	Foreign – 2.1 % per annum Local – 2.5 % per annum

10.8.2 Annual Fund Requirement

In accordance with the implementation schedule, the annual fund requirement was estimated as shown in **Table 10.8.2-2** and is summarized in **Table 10.8.2-1**.

TABLE 10.8.2-1 SUMMARY OF ANNUAL FUND REQUIREMENT

Million Peso
(Million Yen)

Breakdown of Cost	**Total**		
	Total	**JICA Portion**	**Others**
Year			
2012	0.00	0.00 (¥0.00)	0.00
2013	513.69	67.22 (¥125.70)	446.47
2014	2,634.76	188.35 (¥352.21)	2,446.41
2015	5,752.99	3,887.02 (¥7,268.73)	1,865.97
2016	6,941.64	5,920.45 (¥11,071.24)	1,021.19
2017	3,682.40	3,026.28 (¥5,659.14)	656.13
2018	0.00	0.00 (¥0.00)	0.00
Total	**19,525.48**	**13,089.32** **(¥24,477.03)**	**6,436.16**

Note:
Physical Contingency : 5%
Foreign Exchange Rate : US$ 1 = 79.7 Yen = 42.7 Pesos
Price Escalation : Foreign – 2.1 % per annum
Local – 2.5 % per annum

TABLE 10.8.2-2 ANNUAL FUND REQUIREMENT(1/2)

Project Cost

	2013	2014	2015	2016	2017	2018	Total
1. Civil Works							
Foreign Exchange Costs			1,350.26	2,025.39	1,012.70		4,388.35
Local Costs			1,961.69	2,942.53	1,471.27		6,375.49
Tax			466.10	699.14	349.57		1,514.81
Total			**3,778.05**	**5,667.07**	**2,833.53**		**12,278.65**
2.Price Escalation							
Foreign Exchange Costs			86.87	175.57	110.89		373.33
Local Costs			150.84	305.47	193.34		649.65
Tax			35.84	72.58	45.94		154.36
Total			**273.54**	**553.62**	**350.17**		**1,177.33**
3.Physical Contingency (5%)							
Foreign Exchange Costs			67.51	101.27	50.63		219.42
Local Costs			98.08	147.13	73.56		318.77
Tax			23.30	34.96	17.48		75.74
Total			**188.90**	**283.35**	**141.68**		**613.93**
4.Sub-Total							
Foreign Exchange Costs			1,504.64	2,302.23	1,174.22		4,981.09
Local Costs			2,210.61	3,395.13	1,738.17		7,343.91
Tax			525.24	806.68	412.99		1,744.91
Total			**4,240.49**	**6,504.04**	**3,325.38**		**14,069.91**
5.Consulting Services							
5.1 Detailed Eng. Design							
Foreign Exchange Costs	56.89	113.79					170.68
Local Costs	5.85	11.70					17.55
Tax	7.53	15.06					22.59
Total	**70.27**	**140.55**					**210.82**
5.2Tender Assistance							
Foreign Exchange Costs		41.09	20.55				61.64
Local Costs		5.70	2.85				8.55
Tax		5.61	2.81				8.42
Total		**52.41**	**26.20**				**78.61**
5.3 Construction Supervision							
Foreign Exchange Costs			98.89	148.33	74.17		321.39
Local Costs			31.48	47.22	23.61		102.30
Tax			15.65	23.47	11.73		50.85
Total			**146.01**	**219.02**	**109.51**		**474.54**
5.4 Consultant Base Cost(5.1~5.3)							
Foreign Exchange Costs	56.89	154.88	119.44	148.33	74.17		553.71
Local Costs	5.85	17.40	34.33	47.22	23.61		128.40
Tax	7.53	20.67	18.45	23.47	11.73		81.86
Total	**70.27**	**192.95**	**172.22**	**219.02**	**109.51**		**763.97**
5.5 Price Escalation for Consultant							
Foreign Exchange Costs	1.19	6.57	7.68	12.86	8.12		36.43
Local Costs	0.15	0.88	2.64	4.90	3.10		11.67
Tax	0.19	1.05	1.42	2.44	1.54		6.63
Total	**1.53**	**8.50**	**11.74**	**20.20**	**12.77**		**54.73**
5.6 Physical Contingency for Consultant(5%)							
Foreign Exchange Costs	2.84	7.74	5.97	7.42	3.71		27.69
Local Costs	0.29	0.87	1.72	2.36	1.18		6.42
Tax	0.38	1.03	0.92	1.17	0.59		4.09
Total	**3.51**	**9.65**	**8.61**	**10.95**	**5.48**		**38.20**
5.7 Sub-Total							
Foreign Exchange Costs	60.93	169.20	133.09	168.61	86.00		617.83
Local Costs	6.29	19.15	38.68	54.48	27.89		146.49
Tax	8.09	22.75	20.79	27.08	13.86		92.59
Total	**75.32**	**211.10**	**192.57**	**250.17**	**127.75**		**856.90**

TABLE 10.8.2-2 ANNUAL FUND REQUIREMENT(2/2)

6.1 Land Acquisition Cost							
Foreign Exchange Costs							0.00
Local Costs	320.45	1,922.68	961.34				3,204.47
Tax	38.45	230.72	115.36				384.54
Total	**358.90**	**2,153.41**	**1,076.70**				**3,589.01**
6.2 Price Escalation for Land Acquisition Cost							
Foreign Exchange Costs							0.00
Local Costs	8.01	97.34	73.92				179.27
Tax	0.96	11.68	8.87				21.51
Total	**8.97**	**109.02**	**82.79**				**200.78**
6.3 Physical Contingency(5%)							
Foreign Exchange Costs							0.00
Local Costs	16.02	96.13	48.07				160.22
Tax	1.92	11.54	5.77				19.23
Total	**17.95**	**107.67**	**53.84**				**179.45**
6.4 Sub-Total							
Foreign Exchange Costs	0.00	0.00	0.00				0.00
Local Costs	344.48	2,116.15	1,083.33				3,543.96
Tax	41.34	253.94	130.00				425.28
Total	**385.82**	**2,370.09**	**1,213.33**				**3,969.24**
7.1 Administrative Cost							
Foreign Exchange Costs							0.00
Local Costs	38.50	38.50	38.50	38.50	38.50		192.50
Tax							0.00
Total	**38.50**	**38.50**	**38.50**	**38.50**	**38.50**		**192.50**
7.2 Price Escalation for Administrative Cost							
Foreign Exchange Costs							0.00
Local Costs	0.96	1.95	2.96	4.00	5.06		14.93
Tax							0.00
Total	**0.96**	**1.95**	**2.96**	**4.00**	**5.06**		**14.93**
7.3 Sub-Total							
Foreign Exchange Costs	0.00	0.00	0.00	0.00	0.00		0.00
Local Costs	39.46	40.45	41.46	42.50	43.56		207.43
Tax	0.00	0.00	0.00	0.00	0.00		0.00
Total	**39.46**	**40.45**	**41.46**	**42.50**	**43.56**		**207.43**
8. Total Cost(1-7)							
Foreign Exchange Costs	60.93	169.20	1,637.73	2,470.84	1,260.22		5,598.92
Local Costs	390.23	2,175.75	3,374.08	3,492.11	1,809.62		11,241.79
Tax	49.43	276.69	676.03	833.76	426.85		2,262.77
Total	**500.60**	**2,621.64**	**5,687.84**	**6,796.71**	**3,496.69**		**19,103.48**
9.Interest During Construction							
Foreign Exchange Costs	0.01	0.02	21.10	53.35	69.80	0.00	144.28
Local Costs	0.00	0.00	30.95	78.49	102.83	0.00	212.28
Total	**0.01**	**0.03**	**52.06**	**131.84**	**172.63**	**0.00**	**356.56**
10.Comittment Charge							
Foreign Exchange Costs	5.60	5.60	5.60	5.60	5.60		27.99
Local Costs	7.49	7.49	7.49	7.49	7.49		37.45
Total	**13.09**	**13.09**	**13.09**	**13.09**	**13.09**	**0.00**	**65.45**
11. GRAND TOTAL							
Foreign Exchange Costs	**66.54**	**174.82**	**1,664.43**	**2,529.79**	**1,335.62**	**0.00**	**5,771.19**
Local Costs	**397.72**	**2,183.24**	**3,412.52**	**3,578.09**	**1,919.94**	**0.00**	**11,491.52**
Tax	**49.43**	**276.69**	**676.03**	**833.76**	**426.85**	**0.00**	**2,262.77**
Total	**513.69**	**2,634.76**	**5,752.99**	**6,941.64**	**3,682.40**	**0.00**	**19,525.48**

	2013	2014	2015	2016	2017	2018	Total
A. Yen Loan Portion							
Foreign Exchange Costs	60.93	169.20	1,637.73	2,470.84	1,260.22	0.00	5,598.92
Local Costs	6.29	19.15	2,249.29	3,449.61	1,766.06	0.00	7,490.40
Total	**67.22**	**188.35**	**3,887.02**	**5,920.45**	**3,026.28**	**0.00**	**13,089.32**

Note:Price Escalation Rate: Foreign 2.1% per year, Local 2.5% per year

CHAPTER 11
OPERATION AND EFFECT INDICATORS

11.1 SELECTED OPERATION AND EFFECT INDICATORS

In order to enable project monitoring and evaluation on the basis of consistent indicators, operation and effect indications are introduced for ODA loan projects.

Operation and effect indicators are basically equivalent to the outcome indicators and performance indicators used by the World Bank. For this study, they are defined as follows:

1) **Operation indicators**: quantitative measure of the operational status of project.
2) **Effect indicators**: quantitative measure of the effects generated by a project.

In order to set the appropriate indicators, the following criteria should be considered.

1) **Validity**: This determines whether the set of indictors would really be able to measure the achievement of the project purpose.
2) **Reliability**: The set indicators data must yield the same results, regardless of how many times they are measured and regardless of who makes the measurements.
3) **Ease of access**: The indicator data set for the project must be easy to access and must not be too many, considering the cost and time required to gather them.

In view of project objective and expected effects, the following indicators were selected:

Operation and Effect Indicators		**Data Collection Method**
Operation Indicators	Traffic Volume of CALAX (Laguna Section) (veh./day)	Traffic count survey
	Toll Revenue	Data collection from Operator
Effect Indicators	Traffic Congestion Rate (Volume/Capacity Rate)	Calculation based on Traffic count survey
	Travel Time Saving (veh.-hour/day)	Calculation based on Travel Time Survey
	Travel Time Cost Saving (Peso/Year)	Calculation based on Time Cost and Travel Time Survey

The project will definitely contribute to the reduction of traffic accidents. However, it is difficult to estimate present rate of traffic accidents along Expressway. It is also difficult to estimate how many traffic accidents will be reduced due to this project. Although reduction of traffic accidents is an important indicator, it is not adopted in the study due to the current non-availability of data.

11.2 TRAFFIC VOLUME OF CALAX (LAGUNA SECTION)

Based on the traffic assignment result, future traffic volumes are shown as follows.

TABLE 11.2-1 (1) ESTIMATED TRAFFIC VOLUME OF CALAX (AGUINALDO IC ~ SILANG EAST IC)

Unit: Vehicle/day

	Year 2017	Year 2020	Year 2030
Class-1 (Car)	15,051	20,360	30,174
Class-2 (Bus, Truck)	5,454	6,493	8,829
Class-3 (Trailer)	2,919	3,294	4,432
Total	23,424	30,147	43,425

TABLE 11.2-1 (2) ESTIMATED TRAFFIC VOLUME OF CALAX (SILANG EAST IC – STA. ROSA TAGAYTAY IC)

	Year 2017	Year 2020	Year 2030
Class-1 (Car)	13,999	18,470	25,631
Class-2 (Bus, Truck)	5,755	6,454	8,425
Class-3 (Trailer)	3383	3,625	4,758
Total	23,137	28,549	38,814

TABLE 11.2-1 (3) ESTIMATED TRAFFIC VOLUME OF CALAX (STA. ROSA TAGAYTAY IC-LAGUNA BLVD. IC)

	Year 2017	Year 2020	Year 2030
Class-1 (Car)	15,612	21,156	35,467
Class-2 (Bus, Truck)	6,712	7,526	10,168
Class-3 (Trailer)	3,619	3,885	5,212
Total	25,943	32,567	50,847

TABLE 11.2-1 (4) ESTIMATED TRAFFIC VOLUME OF CALAX (LAGUNA BLVD IC-TECHNO PARK IC)

	Year 2017	Year 2020	Year 2030
Class-1 (Car)	15,228	19,206	37,498
Class-2 (Bus, Truck)	6,379	7,256	10,607
Class-3 (Trailer)	3,328	3,521	4,515
Total	24,935	29,983	52,620

TABLE 11.2-1 (5) ESTIMATED TRAFFIC VOLUME OF CALAX (TECHNOPARK IC – MAIN TOLL BARRIER)

	Year 2017	Year 2020	Year 2030
Class-1 (Car)	14,917	18,705	35,348
Class-2 (Bus, Truck)	6,222	7,105	10,186
Class-3 (Trailer)	3,297	3,518	4,343
Total	24,436	29,328	49,877

11.3 TOLL REVENUE OF CALAX

Based on future traffic demand and assumed toll rate, toll revenue will be estimated.

TABLE 11.3-1 (1) ESTIMATED TOLL REVENUE (YEAR 2017)

	Total Vehicle length of CALAX(Laguna) (Veh-*km)	Assumed Toll Rate (P/km)	Revenue (Thousand Peso)
Class-1 (Car)	253,047	5.0	1,265
Class-2 (Bus, Truck)	102,418	10.0	1,024
Class-3 (Trailer)	56,064	15.0	841
Total	411,529		3,130

TABLE 11.3-1 (2) ESTIMATED TOLL REVENUE (YEAR 2020)

	Total Vehicle length of CALAX(Laguna) (Veh-*km)	Assumed Toll Rate (P/km)	Revenue (Thousand Peso)
Class-1 (Car)	332,298	5.4	1,794
Class-2 (Bus, Truck)	117,067	10.8	1,264
Class-3 (Trailer)	60,624	16.2	982
Total	509,990		4,040

11.4 TRAFFIC CONGESTION RATE (V/C RATE)

If CALAX is constructed, traffic of Aguinaldo Highway, Governor's drive and Sta.Rosa-Tagaytay Road will be reduced or maintained at present traffic level. Based on traffic assignment result, future traffic congested rate are estimated.

TABLE 11.4-1 ESTIMATED TRAFFIC CONGESTION RATE OF W/O CALAX CASE (VOLUME / CAPACITY RATE)

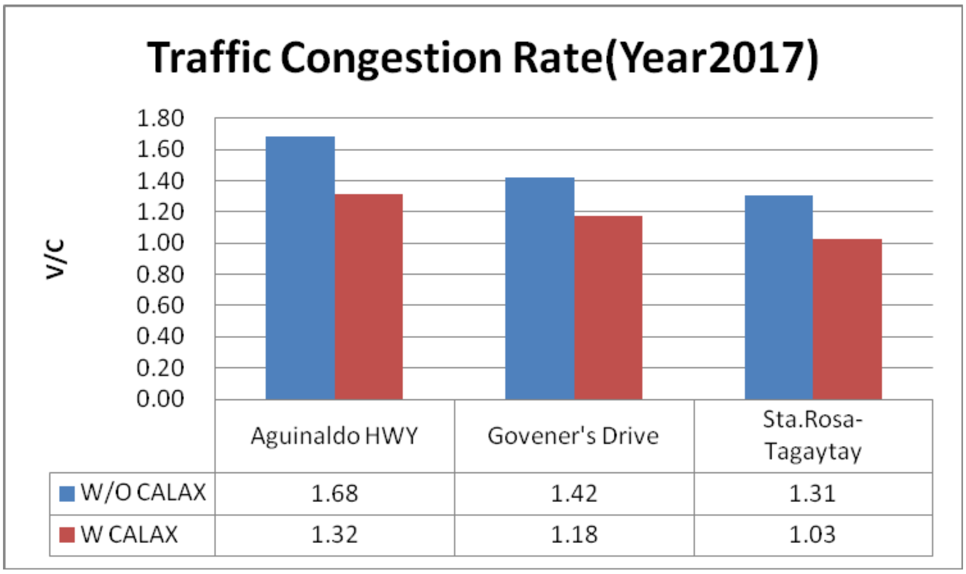
Road Name	Indicator	Present	Without CALAX Case	
		Year 2011	Year 2017	Year 2020
Aguinaldo Highway (Imus)	Volume(PCU/day)	39,923	50,515	56,823
	Capacity(PCU/day)	30,000	30,000	30,000
	Volume / Capacity Rate	1.33	1.68	1.89
Governor's Drive (Carmona)	Volume(PCU/day)	33,643	42,569	47,884
	Capacity(PCU/day)	30,000	30,000	30,000
	Volume / Capacity Rate	1.12	1.42	1.60
Sta.Rosa-Tagaytay Road (Sta. Rosa)	Volume(PCU/day)	20,631	26,104	29,364
	Capacity(PCU/day)	20,000	20,000	20,000
	Volume / Capacity Rate	1.03	1.31	1.47

Note: Volume in year 2011 is based on traffic count survey including Tricycle and Motorbike. Annual growth rate is 4% per year. Capacity is assumed by JICA Study Team based on existing road condition.

TABLE 11.4-2 ESTIMATED TRAFFIC CONGESTION RATE OF WITH CALAX CASE (VOLUME / CAPACITY RATE)

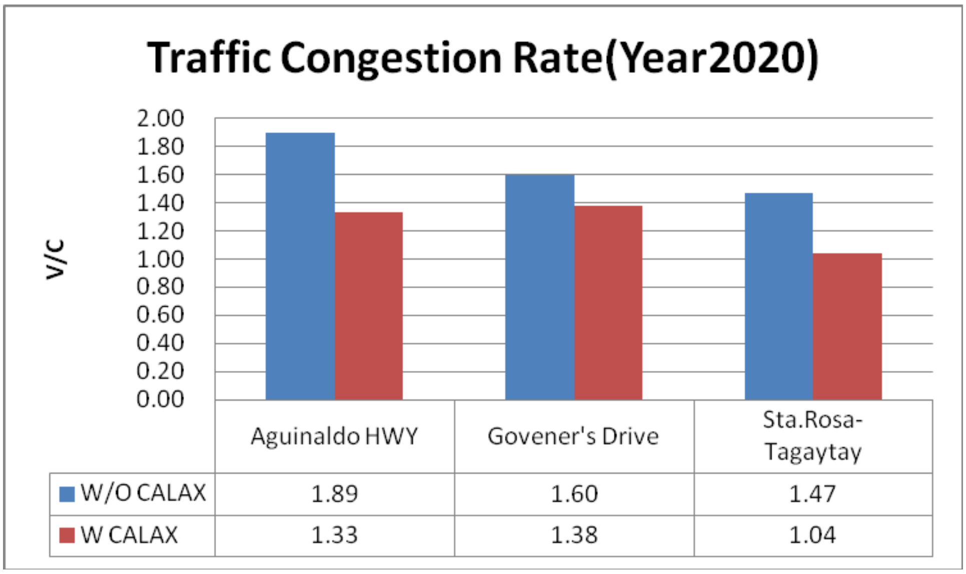
Road Name	Indicator	Present	With CALAX Case	
		Year 2011	Year 2017	Year 2020
Aguinaldo Highway (Imus)	Volume(PCU/day)	39,923	39,500	39,969
	Capacity(PCU/day)	30,000	30,000	30,000
	Volume / Capacity Rate	1.33	1.32	1.33
Governor's Drive (Carmona)	Volume(PCU/day)	33,643	35,270	41,382
	Capacity(PCU/day)	30,000	30,000	30,000
	Volume / Capacity Rate	1.12	1.18	1.38
Sta.Rosa-Tagaytay Road (Sta. Rosa)	Volume(PCU/day)	20,631	20,530	20,738
	Capacity(PCU/day)	20,000	20,000	20,000
	Volume / Capacity Rate	1.03	1.03	1.04

Note: Volume of year 2017 and 2020 is estimated by traffic assignment model. Capacity is assumed by JICA Study Team based on existing road condition.



	Aguinaldo HWY	Govener's Drive	Sta.Rosa-Tagaytay
🟦 W/O CALAX	1.68	1.42	1.31
🟥 W CALAX	1.32	1.18	1.03

FIGURE 11.4-1 ESTIMATED TRAFFIC CONGESTION RATE (YEAR 2017)



	Aguinaldo HWY	Govener's Drive	Sta.Rosa-Tagaytay
🟦 W/O CALAX	1.89	1.60	1.47
🟥 W CALAX	1.33	1.38	1.04

FIGURE 11.4-2 ESTIMATED TRAFFIC CONGESTION RATE (YEAR 2020)

11.5 TRAVEL TIME SAVING

If CALAX were constructed, travel time from Silang, or Tagaytay to Metro Manila will be reduced. Based on the travel speed survey and the following assumptions, travel time is estimated.

- CALAX Average Speed: 90 km/hr.

TABLE 11.5-1 ESTIMATED TRAVEL TIME CASE-1 (SILANG - MANILA)

Route	Section	Length (km)	Speed (km/h)	Travel Time (Hr:Min.)	Remarks
	Section: from Silang to Metro Manila(NAIA) Morning Peak				
Route A	Aguinaldo HWY + Coastal Rd	33.8	31	1:05 (31 min. saving)	2011 Data
Route B	Aguinaldo HWY+ Governor’s Drive + SLEX	44.7	38	1:11 (37 min. saving)	2011 Data
Route C	CALAX(Silang - Mamplasan) + SLEX	43.9	78	0:34	CALAX Sec. 90km/h
	Section: from Metro Manila(NAIA) to Silang Evening Peak				
Route A	Aguinaldo HWY + Coastal Rd	33.8	26	1:18 (42 min. saving)	2011 Data
Route B	Aguinaldo HWY+ Governor’s Drive + SLEX	44.7	38	1:11 (35 min. saving)	2011 Data
Route C	CALAX (Silang - Mamplasan) + SLEX	43.9	73	0:36	CALAX Sec. 90km/h

Note see the each route in Figure 11.5-1

TABLE 11.5-2 ESTIMATED TRAVEL TIME CASE-2 (TAGAYTAY - MANILA)

Route	Section	Length (km)	Speed (km/h)	Travel Time (Hr:Min.)	Remarks
	Section: from Tagaytay to Metro Manila(NAIA) Morning Peak				
Route A	Aguinaldo HWY + Coastal Rd	51.6	37	1:24 (31min. saving)	2011 Data
Route B	Sta. Rosa-Tagaytay Rd+ SLEX	55.8	54	1:02 (9 min. saving)	2011 Data
Route C	Aguinaldo HWY + CALAX (Silang - Mamplasan) + SLEX	61.7	70	0:53	CALAX Sec. 90km/h
	Section: from Metro Manila(NAIA) to Tagaytay Evening Peak				
Route A	Aguinaldo HWY + Coastal Rd	51.6	30	1:44 (20min. saving)	2011 Data
Route B	Sta. Rosa-Tagaytay Rd+ SLEX	55.8	36	1:33 (9 min. saving)	2011 Data
Route C	Aguinaldo HWY + CALAX (Silang - Mamplasan) + SLEX	61.7	44	1:24	CALAX Sec. 90km/h

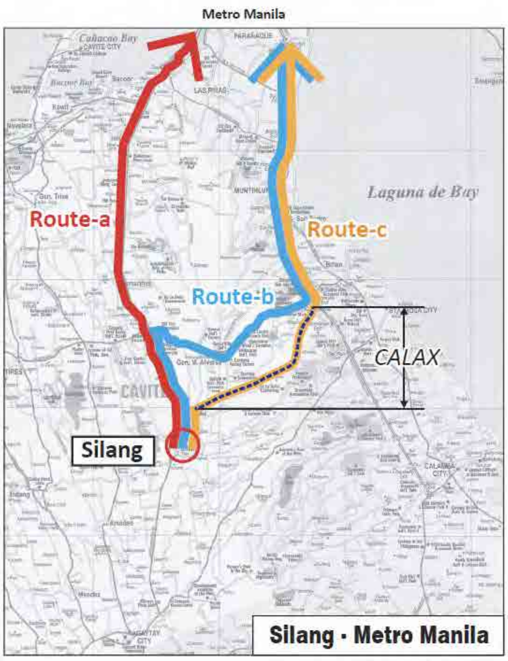
Note see the each route in Figure 11.5-1

TABLE 11.5-3 ESTIMATED TRAVEL TIME CASE-3 (INDUSTRIAL PARK- MANILA)

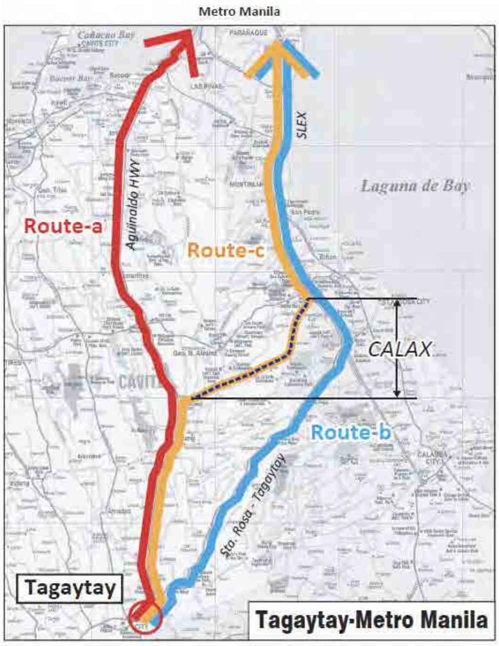
Route	Section	Length (km)	Speed (km/h)	Travel Time (Hr:Min.)	Remarks
	Section: from Industrial Park to Metro Manila(NAIA) Morning Peak				
Route A	Tirona HWY + Coastal Rd	39.4	31	1:18 (39min. saving)	2011 Data
Route B	Governor's Drive+ Aguinaldo + Coastal Rd	31.8	30	1:04 (25min. saving)	2011 Data
Route C	Governor's Drive + SLEX	42.7	46	0:55 (16min. saving)	2011 Data
Route D	CALAX+ SLEX	51.9	79	0:39	CALAX Sec. 90km/h
	Section: from Metro Manila(NAIA) to Industrial Park Evening Peak				
Route A	Tirona HWY + Coastal Rd	39.4	29	1:22 (12min. saving)	2011 Data
Route B	Governor's Drive + Aguinaldo + Coastal Rd	31.8	23	1:22 (12min. saving)	2011 Data
Route C	Governor's Drive + SLEX	42.7	31	1:23 (13min. saving)	2011 Data
Route D	CALAX + SLEX	51.9	44	1:10	CALAX Sec. 90km/h

Note see the each route in Figure 11.5-1

Case-1



Case-2



Case-3

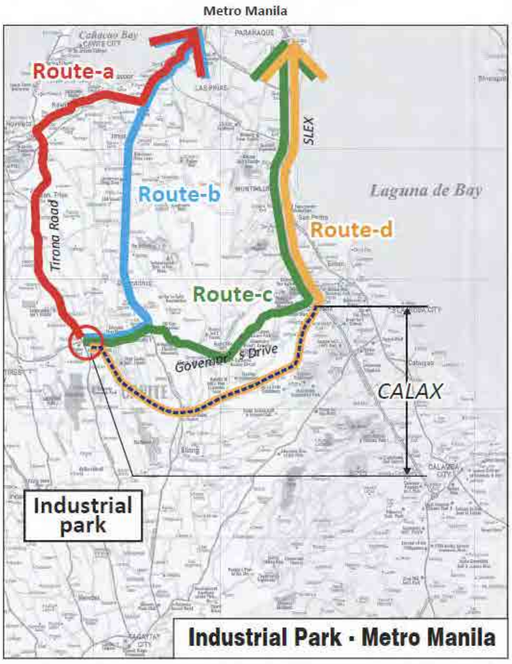


FIGURE 11.5-1 ROUTE MAP OF COMPARISON TRAVEL TIME

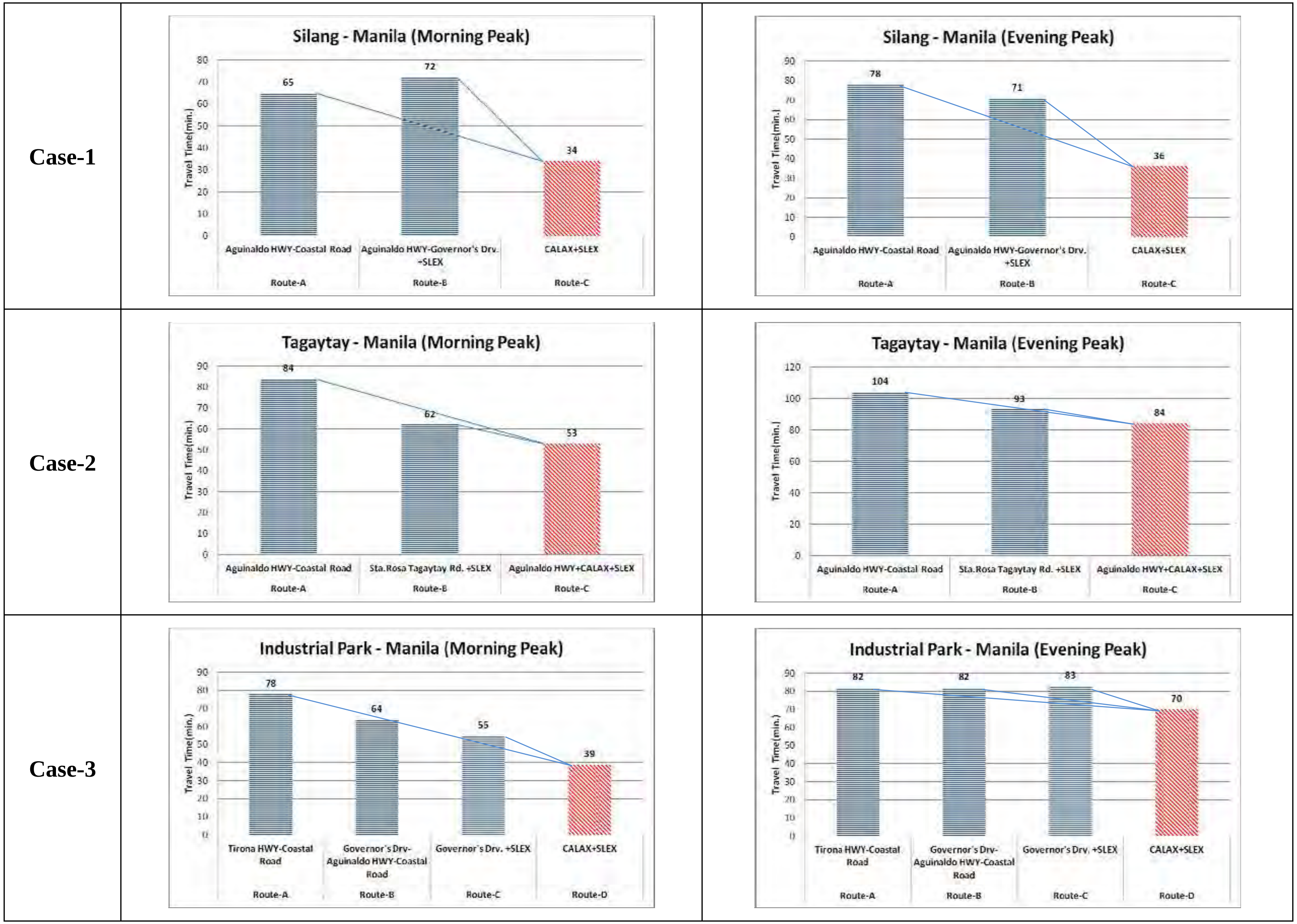


FIGURE 11.5-2   ESTIMATED TRAVEL TIME

Based on the above travel time saving per route and traffic assignment, total travel time savings are estimated as shown in **Table 11.5-4** and **Table 11.5-5**.

TABLE 11.5-4 MAJOR ROUTE TRAVEL TIME SAVING (YEAR 2017)

Route	Travel Time Reduction	Conversion Traffic to CALAX(Y2017)	Travel Time Saving
Via Aguinaldo HWY	31 minutes	15,100 veh/day	7,801 hours/day
Via Governor's Drive	37 minutes	4,500 veh/day	2,775 hours/day
Via Sta. Rosa-Tagaytay	9 minutes	7,000 veh/day	1,050 hours/day
Total			11,626 hours/day

TABLE 11.5-5 MAJOR ROUTE TRAVEL TIME SAVING (YEAR 2020)

Route	Travel Time Reduction	Conversion Traffic to CALAX(Y2020)	Travel Time Saving
Via Aguinaldo HWY	31 minutes	15,300 veh/day	7,905 hours/day
Via Governor's Drive	37 minutes	5,600 veh/day	3,453 hours/day
Via Sta. Rosa-Tagaytay	9 minutes	9,300 veh/day	1,395 hours/day
Total			12,753 hours/day

The travel time savings presented above are only conversion traffic from Aguinaldo Highway, Governor's Drive and Sta. Rosa-Tagaytay Road to CALAX. There is actually other travel time savings from conversion of traffic coming from other roads to CALAX and decongestion of ordinary roads. Since it will be difficult to quantify the whole traffic saving time at post facto evaluation, only major travel time savings are estimated.

11.6 TRAVEL COST SAVING

Travel time saving was converted to cost. Unit rate of time cost by vehicle type are as follow:

TABLE 11.6-1 UNIT TRAVEL TIME COST

Vehicle Type	Unit Travel Time Cost(Peso/min/veh)			Vehicle Share (%)
	Year 2012	Year 2017	Year 2020	
Passenger Car	7.81	9.50	10.69	57%
Jeepney	8.52	10.37	11.66	25%
Bus	31.97	38.90	43.75	6%
Truck	1.44	1.75	1.97	12%
Average		10.55	11.87	

Inflation rate: 4% per year

Source: JICA Study Team

Travel time cost saving of 2017 will be 3.82 Billion Peso / year.

*Travel time cost saving = 11,626 (hrs/day)*10.55 (Peso/min/veh) *60(min)*365(day)*

= 2.69 billion (Peso/year)

As the same calculation, travel time cost saving of 2020 will be 3.32 Billion Peso / year.

11.7 OPERATION AND EFFECT INDICATORS

Summarized Operation and effect indicators are shown in **Table 11.7-1**.

TABLE 11.7-1 OPERATION AND EFFECT INDICATORS

	Indicators	**Road Name**	**Baseline (2011)**	**Target (2020)**	**Data Collection Method**
Operation Indicators	Traffic Volume (vehicle /day)	CALAX (Aguinaldo IC ~ East Silang IC)	-	30,147	Traffic count survey
		CALAX (East Silang – Sta. Rosa Tagaytay IC)		28,549	
		CALAX (Tagaytay IC-Laguna Blvd. IC)		32,567	
		CALAX (Laguna Blvd. IC-Techno Park IC)		29,983	
		CALAX (Techno Park IC-Main Toll Barrier)		29,328	
	Toll Revenue (Thousand Peso/day)	CALAX (Laguna Section)		4,040	Data collection from Operator
Effect Indicators	Traffic Congestion Rate (V/C Rate)	Aguinaldo Highway (Imus)	1.33	1.33	Calculation based on Traffic count survey
		Governor's Drive (Carmona)	1.12	1.38	
		Sta.Rosa-Tagaytay Road(Sta.Rosa)	1.03	1.04	
	Travel Time (hr:min)	Silang – NAIA (Morning Peak)			Travel Time Survey
		Via Aguinaldo + Coastal Rd	1:05	Via CALAX and SLEX 0:34	
		Via Govener's Dr +SLEX	1:11		
	Travel Time Saving (hours/day)	Aguinaldo Highway, Governor's Drive and Sta. Rosa-Tagaytay Road to CALAX	-	12,753	Calculation based on Travel Time Survey
	Travel Time Cost Saving (Peso/year)		-	3.32 billion	Calculation based on Time Cost and Travel Time Survey