Appendix 7

Information and Data of Existing Outfall

Data Collection Survey for Sewerage Systems in West Metro Manila

Outfall Location

Date Surveyed: 13 & 17 May 2016 City/Town: **Las Pinas** Weather: Fair - Cloudy - Rainy

Notes:

N1 - Water Depth (Full / PartlyFull)
N2 - Water Depth (Half)
N3 - Water Depth (Low / Below Half)
N4 - Water Flow (Stagnant)
N5 - Water Flow (Flowing)
N6 - Water Color (Clear)
N7 - Water Color (Brown)
N8 - Water Color (Dark/Murky)
N9 - Water Odor (None)
N10 - Water Odor (Foul)
N11 - with floating trash/garbage
U/S - upstream
D/S - downstream
OF - outfall
LP - Las Pinas
LPR - Las Pinas River
IC - Ilet Creek

Outfall Identification
LP-OF000
outfall number
City/Municipality

OUTFALL INFORMATION																							
Main River	Tributary River/Waterway	Coordinates									Findings/Observations											Other Remarks	Photo Reference No.
		ID	UTM		N (Latitude)			E (Longitude)			N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11		
			N	E	Deg.	Min.	Sec.	Deg.	Min.	Sec.													
Zapote River		LP-OF1	1600478.96	281172.44	14	28	5.59	120	58	11.43	X			X				X		X	X	4.00m wide box culvert crossing Diego Cera Avenue, catchment area - residential & commercial, on-going construction of sluiceway and bridge D/S of box culvert	4088, 4089
Las Piñas River		LP-OF2/LSP-OF003	1601179.76	282053.89	14	28	28.64	120	58	40.65												0.30m dia pipe culvert, no water flowing, catchment area - residential	4091
Las Piñas River		LP-OF3/LSP-OF004	1601180.74	282046.71	14	28	28.67	120	58	40.41												0.30m dia pipe culvert, no water flowing, catchment area - residential	4091
Las Piñas River		LP-OF4/LSP-OF007	1601159.01	282175.62	14	28	28.00	120	58	44.72	X			X				X			X	0.50m wide concrete box conduit located U/S of Pulang Lupa bridge, under the house, cannot confirm depth of channel, catchment area - residential	4095, 4096
Las Piñas River		LP-OF5/LSP-OF008	1601259.87	282520.67	14	28	31.38	120	58	56.21												0.60m dia pipe culvert U/S of bridge, no water flowing, about 80% clog at the outlet, catchment area - residential	4098, 4099
Las Piñas River		LP-OF6/LSP-OF009	1601283.69	282503.81	14	28	32.15	120	58	55.64												0.60m dia pipe culvert D/S of bridge, no water flowing, catchment area - open area	4100, 4101
	LPR Tributary River-2	LP-OF7	1601798.64	283024.73	14	28	49.05	120	59	12.88			X					X		X		0.70m dia pipe culvert located D/S of bridge, outlet partly submerge, catchment area - open area	4102, 4103
	LPR Tributary River-2	LP-OF8	1601790.41	283016.57	14	28	48.78	120	59	12.61			X					X		X		0.70m dia pipe culvert located D/S of bridge, outlet partly submerge, catchment area - open area	4104, 4105
	LPR Tributary River-2	LP-OF9	1601780.55	283054.22	14	28	48.47	120	59	13.87			X					X		X		0.70m dia pipe culvert located U/S of bridge, outlet partly submerge, catchment area - open area	4107
	LPR Tributary River-2	LP-OF10	1601770.46	283047.85	14	28	48.14	120	59	13.66			X					X		X		0.70m dia pipe culvert U/S of bridge, outlet partly submerge, catchment area - open area	4108

Data Collection Survey for Sewerage Systems in West Metro Manila

Outfall Location

Date Surveyed: 13 & 17 May 2016 City/Town: **Las Pinas** Weather: Fair - Cloudy - Rainy

Notes:

N1 - Water Depth (Full / PartlyFull)
N2 - Water Depth (Half)
N3 - Water Depth (Low / Below Half)
N4 - Water Flow (Stagnant)
N5 - Water Flow (Flowing)
N6 - Water Color (Clear)
N7 - Water Color (Brown)
N8 - Water Color (Dark/Murky)
N9 - Water Odor (None)
N10 - Water Odor (Foul)
N11 - with floating trash/garbage
U/S - upstream
D/S - downstream
OF - outfall
LP - Las Pinas
LPR - Las Pinas River
IC - Ilet Creek

Outfall Identification

LP-OF000

outfall number

City/Municipality

OUTFALL INFORMATION																								
Main River	Tributary River/Waterway	ID	Coordinates								Findings/Observations											Other Remarks	Photo Reference No.
			UTM		N (Latitude)			E (Longitude)			N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11		
			N	E	Deg.	Min.	Sec.	Deg.	Min.	Sec.													
	LPR Tributary River-3 (Balot River)	LP-OF11	1601231.65	283143.75	14	28	30.64	120	59	17.02												0.70m dia pipe culvert located D/S of bridge, no water flowing, catchment area - open area	4110, 4111
	LPR Creek C	LP-OF12	1600857.39	281972.27	14	28	18.13	120	58	38.02			X					X		X		0.40m dia pipe culvert located D/S of box culvert, partly submerge, catchment area - residential & commercial	4115, 4116
	LPR Creek C	LP-OF13	1600819.17	281947.97	14	28	16.88	120	58	37.22			X					X		X		0.30m dia pipe culvert located U/S of box culvert, partly submerge, catchment area - residential & commercial	4117, 4118
Zapote River		LP-OF14/ZP-OF003	1599384.89	280997.39	14	27	29.95	120	58	5.91			X									0.30m dia pipe culvert along the concrete revetment, small amount of water flowing, catchment area - residential	4123
Zapote River		LP-OF15/ZP-OF004	1599401.54	280991.25	14	27	30.49	120	58	5.70												0.30m dia pipe culvert along the concrete revetment, no water flowing, catchment area - residential	4124
Zapote River		LP-OF16	1599333.31	281058.94	14	27	28.29	120	58	7.98												on-going construction of Zapote River bank protection and drainage outlet under DPWH, pipe culvert size range from 0.60m to 0.90m diameter (Contractor: EF Chua Construction)	4125, 4126, 4128, 4129, 4130, 4133, 4134, 4145, 4146, 4147, 4148
Zapote River		LP-OF17	1599311.65	281074.33	14	27	27.59	120	58	8.50													
Zapote River		LP-OF18	1599288.42	281094.19	14	27	26.84	120	58	9.17													
Zapote River		LP-OF19	1599262.39	281118.23	14	27	26.00	120	58	9.98													
Zapote River		LP-OF20	1599253.08	281127.43	14	27	25.70	120	58	10.29													
Zapote River		LP-OF21	1599195.53	281170.06	14	27	23.84	120	58	11.73													
Zapote River		LP-OF22	1599166.85	281179.99	14	27	22.91	120	58	12.07													
Zapote River		LP-OF23	1599139.12	281187.53	14	27	22.01	120	58	12.33													
Zapote River		LP-OF24	1599109.52	281197.16	14	27	21.05	120	58	12.66													
Zapote River		LP-OF25	1599082.99	281208.01	14	27	20.19	120	58	13.03													
Zapote River		LP-OF26	1599054.30	281218.84	14	27	19.26	120	58	13.40													
Zapote River		LP-OF27	1599025.32	281228.17	14	27	18.32	120	58	13.72													
Zapote River		LP-OF28	1598999.74	281235.13	14	27	17.49	120	58	13.96													
Zapote River		LP-OF29	1598970.21	281237.56	14	27	16.53	120	58	14.05													
Zapote River		LP-OF30	1598942.27	281233.42	14	27	15.62	120	58	13.92												on-going construction of Zapote	4125, 4126, 4128, 4129, 4130,

Data Collection Survey for Sewerage Systems in West Metro Manila

Outfall Location

Date Surveyed: 13 & 17 May 2016 City/Town: **Las Pinas** Weather: Fair - Cloudy - Rainy

Notes:

N1 - Water Depth (Full / PartlyFull)
N2 - Water Depth (Half)
N3 - Water Depth (Low / Below Half)
N4 - Water Flow (Stagnant)
N5 - Water Flow (Flowing)
N6 - Water Color (Clear)
N7 - Water Color (Brown)
N8 - Water Color (Dark/Murky)
N9 - Water Odor (None)
N10 - Water Odor (Foul)
N11 - with floating trash/garbage
U/S - upstream
D/S - downstream
OF - outfall
LP - Las Pinas
LPR - Las Pinas River
IC - Ilet Creek

Outfall Identification

LP-OF000

outfall number

City/Municipality

OUTFALL INFORMATION																								
Main River	Tributary River/Waterway	ID	Coordinates								Findings/Observations											Other Remarks	Photo Reference No.
			UTM		N (Latitude)			E (Longitude)			N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11		
			N	E	Deg.	Min.	Sec.	Deg.	Min.	Sec.													
Zapote River		LP-OF31	1598911.61	281224.46	14	27	14.62	120	58	13.63												River bank protection and drainage outlet under DPWH, pipe culvert size range from 0.60m to 0.90m diameter (Contractor: EF Chua Construction)	4133, 4134, 4145, 4146, 4147, 4148
Zapote River		LP-OF32	1598884.27	281221.83	14	27	13.73	120	58	13.55													
Zapote River		LP-OF33	1598858.23	281211.71	14	27	12.88	120	58	13.22													
Zapote River		LP-OF34	1598835.32	281195.63	14	27	12.13	120	58	12.69													
Zapote River		LP-OF35	1598812.75	281174.76	14	27	11.39	120	58	12.00													
Zapote River		LP-OF36	1598782.10	281165.50	14	27	10.39	120	58	11.70													
Zapote River		LP-OF37	1598754.14	281162.86	14	27	9.48	120	58	11.62													
Zapote River		LP-OF38	1598721.19	281169.46	14	27	8.41	120	58	11.85													
Zapote River		LP-OF39	1598694.65	281180.91	14	27	7.55	120	58	12.24													
Zapote River		LP-OF40	1598668.48	281185.47	14	27	6.70	120	58	12.40													
Zapote River		LP-OF41	1598600.39	281168.39	14	27	4.48	120	58	11.85													
Zapote River		LP-OF42	1598572.80	281159.16	14	27	3.58	120	58	11.55													
Zapote River		LP-OF43	1598543.95	281153.81	14	27	2.64	120	58	11.38													
Zapote River		LP-OF44	1598514.42	281155.95	14	27	1.68	120	58	11.46													
Zapote River		LP-OF45/ZP-OF006	1598484.58	281158.08	14	27	0.71	120	58	11.54													
Zapote River		LP-OF46	1598456.85	281165.62	14	26	59.81	120	58	11.80													
Zapote River		LP-OF47	1598431.81	281180.98	14	26	59.00	120	58	12.32													
Zapote River		LP-OF48	1598405.31	281188.23	14	26	58.14	120	58	12.57													
Zapote River		LP-OF49	1598370.62	281183.43	14	26	57.01	120	58	12.42													
Zapote River		LP-OF50	1598347.59	281180.53	14	26	56.26	120	58	12.33													
Zapote River		LP-OF51	1598300.66	281168.13	14	26	54.73	120	58	11.93													
Zapote River		LP-OF52	1598269.95	281164.87	14	26	53.73	120	58	11.83													
Zapote River		LP-OF53	1598237.39	281161.28	14	26	52.67	120	58	11.72													
Zapote River		LP-OF54	1598219.55	281162.92	14	26	52.09	120	58	11.78													
Zapote River		LP-OF55/ZP-OF007	1598185.98	281169.82	14	26	51.00	120	58	12.02													
Zapote River		LP-OF56/ZP-OF008	1598154.00	281171.33	14	26	49.96	120	58	12.08												on-going construction of Zapote River bank protection and drainage outlet under DPWH, pipe culvert size range from 0.60m to 0.90m diameter (Contractor: EF Chua	4125, 4126, 4128, 4129, 4130, 4133, 4134, 4145, 4146, 4147, 4148
Zapote River		LP-OF57	1598049.84	281234.82	14	26	46.59	120	58	14.23													

Data Collection Survey for Sewerage Systems in West Metro Manila

Outfall Location

Date Surveyed: 13 & 17 May 2016 City/Town: **Las Pinas** Weather: Fair - Cloudy - Rainy

Notes:

N1 - Water Depth (Full / PartlyFull)
N2 - Water Depth (Half)
N3 - Water Depth (Low / Below Half)
N4 - Water Flow (Stagnant)
N5 - Water Flow (Flowing)
N6 - Water Color (Clear)
N7 - Water Color (Brown)
N8 - Water Color (Dark/Murky)
N9 - Water Odor (None)
N10 - Water Odor (Foul)
N11 - with floating trash/garbage
U/S - upstream
D/S - downstream
OF - outfall
LP - Las Pinas
LPR - Las Pinas River
IC - Ilet Creek

Outfall Identification

LP-OF000

outfall number

City/Municipality

OUTFALL INFORMATION																							
Main River	Tributary River/Waterway	Coordinates									Findings/Observations											Other Remarks	Photo Reference No.
		ID	UTM		N (Latitude)			E (Longitude)			N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11		
			N	E	Deg.	Min.	Sec.	Deg.	Min.	Sec.													
Zapote River		LP-OF58	1597993.58	281269.67	14	26	44.77	120	58	15.41												diameter (Contractor: EP Chua Construction)	
Zapote River		LP-OF59	1597971.96	281280.56	14	26	44.07	120	58	15.78													
Zapote River		LP-OF60	1597931.43	281310.76	14	26	42.76	120	58	16.80													
Zapote River		LP-OF61	1597916.87	281322.62	14	26	42.29	120	58	17.20													
Zapote River		LP-OF62	1597889.96	281342.15	14	26	41.42	120	58	17.86													
Zapote River		LP-OF63	1597824.35	281391.60	14	26	39.30	120	58	19.53													
Zapote River		LP-OF64	1597797.22	281399.75	14	26	38.42	120	58	19.81													
Zapote River		LP-OF65	1597769.22	281403.10	14	26	37.51	120	58	19.93													
Zapote River		LP-OF66	1597741.53	281405.25	14	26	36.61	120	58	20.01													
Zapote River		LP-OF67/ZP-OF009	1597708.32	281406.75	14	26	35.53	120	58	20.07													
Zapote River		LP-OF68	1597673.02	281435.20	14	26	34.39	120	58	21.03													
Zapote River		LP-OF69	1597633.76	281460.62	14	26	33.12	120	58	21.89													
Zapote River		LP-OF70	1597598.84	281481.28	14	26	31.99	120	58	22.59													
Zapote River		LP-OF71	1597567.37	281494.19	14	26	30.97	120	58	23.03													
Zapote River		LP-OF72	1597527.63	281502.82	14	26	29.68	120	58	23.33													
Zapote River		LP-OF73	1597491.07	281501.00	14	26	28.49	120	58	23.28													
Zapote River		LP-OF74/ZP-OF010	1597446.81	281500.01	14	26	27.05	120	58	23.26													
Zapote River		LP-OF75	1597419.22	281525.53	14	26	26.16	120	58	24.12													
Zapote River		LP-OF76	1597387.70	281544.43	14	26	25.14	120	58	24.76													
Zapote River		LP-OF77	1597349.71	281565.06	14	26	23.91	120	58	25.46													
Zapote River		LP-OF78	1597314.57	281575.84	14	26	22.77	120	58	25.83													
	ZR Creek B (Sin Nombre Creek)	LP-OF79/ZP-OF005	1598636.32	281206.75	14	27	5.66	120	58	13.12												2.0m wide x 2.0m high concrete box conduit outlet draining at ZR Creek B located U/S of bridge, no water flowing, outlet of Alabang-Zapote Septage Treatment Plant	4131, 4132
	ZR Creek B (Sin Nombre Creek)	LP-OF80	1598633.23	281209.42	14	27	5.56	120	58	13.21												0.90m dia pipe culvert located U/S of bridge, no water flowing, catchment area - factory	4131, 4132

Data Collection Survey for Sewerage Systems in West Metro Manila

Outfall Location

Date Surveyed: 13 & 17 May 2016 City/Town: **Las Pinas** Weather: Fair - Cloudy - Rainy

Notes:

N1 - Water Depth (Full / PartlyFull)
N2 - Water Depth (Half)
N3 - Water Depth (Low / Below Half)
N4 - Water Flow (Stagnant)
N5 - Water Flow (Flowing)
N6 - Water Color (Clear)
N7 - Water Color (Brown)
N8 - Water Color (Dark/Murky)
N9 - Water Odor (None)
N10 - Water Odor (Foul)
N11 - with floating trash/garbage
U/S - upstream
D/S - downstream
OF - outfall
LP - Las Pinas
LPR - Las Pinas River
IC - Ilet Creek

Outfall Identification

LP-OF000

outfall number

City/Municipality

OUTFALL INFORMATION																								
Main River	Tributary River/Waterway	ID	Coordinates								Findings/Observations											Other Remarks	Photo Reference No.
			UTM		N (Latitude)			E (Longitude)			N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11		
			N	E	Deg.	Min.	Sec.	Deg.	Min.	Sec.													
Zapote River		LP-OF81	1597214.53	281729.54	14	26	19.56	120	58	30.99												cannot confirm outfall size located at the D/S of Molino Dam, only saw flowing water, covered with trees and vegetation, no access, catchement area - residential	4140, 4143
Zapote River		LP-OF82/ZP-OF026	1594870.69	283392.41	14	25	3.79	120	59	27.18			X					X		X		0.60m wide x 1.00m high concrete box conduit located D/S of bridge, small amount of water flowing, trash piled up at the outlet portion	4151
Zapote River		LP-OF83/ZP-OF027	1594872.76	283401.42	14	25	3.86	120	59	27.48												cannot confirm outfall size covered with roots of trees, located D/S of bridge, only saw flowing water, catchement area - residential & commercial	4152, 4153
Zapote River		LP-OF84/ZP-OF028	1594855.24	283401.26	14	25	3.29	120	59	27.48												0.60m dia pipe culvert located U/S of bridge, no water flowing, catchment area - residential & commercial	4154, 4155
	IC Creek C/Pasong Baka Creek	LP-OF85	1594857.94	283408.48	14	25	3.38	120	59	27.72												0.70m dia pipe culvert located U/S of bridge, no water flowing, catchment area - residential & commercial	4156, 4157
	IC Creek C/Pasong Baka Creek	LP-OF86	1594857.61	283410.87	14	25	3.37	120	59	27.80			X					X		X		0.60m dia pipe culvert located U/S of bridge, small amount of water flowing, catchment area - residential & commercial	4158, 4159, 4161
	LPR Tributary River-1 (Kay Kanti Creek)	LP-OF95	1601043.63	281560.25	14	28	24.07	120	58	24.21		X						X		X		0.60m dia pipe culvert located U/S of bridge, outlet half sumerge, catchment area - residential	4183, 4184
	LPR Tributary River-1 (Kay Kanti Creek)	LP-OF96	1601042.18	281550.35	14	28	24.02	120	58	23.88			X					X		X		0.40m wide x 0.40m high concrete box conduit, partly submerge outlet, catchment area - residential	4185, 4186

Data Collection Survey for Sewerage Systems in West Metro Manila

Outfall Location

Date Surveyed: 13 & 17 May 2016 City/Town: **Las Pinas** Weather: Fair - Cloudy - Rainy

Notes:

N1 - Water Depth (Full / PartlyFull)
N2 - Water Depth (Half)
N3 - Water Depth (Low / Below Half)
N4 - Water Flow (Stagnant)
N5 - Water Flow (Flowing)
N6 - Water Color (Clear)
N7 - Water Color (Brown)
N8 - Water Color (Dark/Murky)
N9 - Water Odor (None)
N10 - Water Odor (Foul)
N11 - with floating trash/garbage
U/S - upstream
D/S - downstream
OF - outfall
LP - Las Pinas
LPR - Las Pinas River
IC - Ilet Creek

Outfall Identification

LP-OF000

outfall number

City/Municipality

OUTFALL INFORMATION																							
Main River	Tributary River/Waterway	Coordinates									Findings/Observations											Other Remarks	Photo Reference No.
		ID	UTM		N (Latitude)			E (Longitude)			N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11		
			N	E	Deg.	Min.	Sec.	Deg.	Min.	Sec.													
	LPR Creek E (Tartar Creek)	LP-OF97/TR-OF010	1598060.34	283220.48	14	26	47.50	120	59	20.51			X					X				0.70m dia pipe culvert located U/S of box culvert, small amount of water flowing, catchment area - residential, commercial, & open areas	4190, 4191
	LPR Creek E (Tartar Creek)	LP-OF98/TR-OF011	1598081.56	283219.77	14	26	48.19	120	59	20.48												0.70m dia pipe culvert located D/S of box culvert, no water flowing, catchment area - residential & commercial	4193, 4194
	LPR Creek E (Tartar Creek)	LP-OF99/TR-OF012	1598086.78	283219.82	14	26	48.36	120	59	20.48												0.60m dia pipe culvert located D/S of box culvert, no water flowing, catchment area - residential & commercial	4195
	LPR Creek E (Tartar Creek)	LP-OF100/TR-OF013	1598090.47	283220.15	14	26	48.48	120	59	20.49												1.20m dia pipe culvert located D/S of box culvert, no water flowing, catchment area - residential & commercial	4196, 4197
	LPR Creek E (Tartar Creek)	LP-OF101/TR-OF014	1598061.02	283212.70	14	26	47.52	120	59	20.25			X		X			X				0.70m dia pipe culvert located U/S of box culvert, small amount of water flowing, catchment area - residential & commercial	4198
Las Piñas River	(Kay Almirante Creek)	LP-OF102/KA-OF002	1598743.06	283680.60	14	27	9.84	120	59	35.67			X		X							0.70m dia pipe culvert located U/S of CAA Bridge, small amount of water flowing, catchment area - residential & commercial	4199, 4200
Las Piñas River	(Kay Almirante Creek)	LP-OF103/KA-OF003	1598755.04	283681.61	14	27	10.23	120	59	35.70			X		X							0.70m dia pipe culvert located U/S of CAA Bridge, small amount of water flowing, catchment area - residential & commercial	4199, 4200
Las Piñas River	(Kay Almirante Creek)	LP-OF104/KA-OF004	1598754.91	283662.13	14	27	10.22	120	59	35.05			X		X	X						1.00m wide x 1.00m high concrete box conduit, small amount of water flowing, catchment area - residential & comercial	4204, 4205

Data Collection Survey for Sewerage Systems in West Metro Manila

Outfall Location

Date Surveyed: 13 & 17 May 2016 City/Town: **Las Pinas** Weather: Fair - Cloudy - Rainy

Notes:

N1 - Water Depth (Full / PartlyFull)
N2 - Water Depth (Half)
N3 - Water Depth (Low / Below Half)
N4 - Water Flow (Stagnant)
N5 - Water Flow (Flowing)
N6 - Water Color (Clear)
N7 - Water Color (Brown)
N8 - Water Color (Dark/Murky)
N9 - Water Odor (None)
N10 - Water Odor (Foul)
N11 - with floating trash/garbage
U/S - upstream
D/S - downstream
OF - outfall
LP - Las Pinas
LPR - Las Pinas River
IC - Ilet Creek

Outfall Identification

LP-OF000

outfall number

City/Municipality

OUTFALL INFORMATION																							
Main River	Tributary River/Waterway	Coordinates									Findings/Observations											Other Remarks	Photo Reference No.
		ID	UTM		N (Latitude)			E (Longitude)			N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11		
			N	E	Deg.	Min.	Sec.	Deg.	Min.	Sec.													
Las Piñas River	(Kay Almirante Creek)	LP-OF105/KA-OF005	1598742.63	283660.53	14	27	9.82	120	59	35.00			X		X							0.76m dia pipe culvert located D/S of CAA Bridge, small amount of water flowing, catchment area - residential & commercial	4206, 4207
Las Piñas River	(Manarigo Creek)	LP-OF106/MN-OF002	1599434.66	283022.24	14	27	32.15	120	59	13.49												0.10m dia pipe culvert located U/S of bridge, no water flowing, catchment area - residential	4210
Las Piñas River	(Manarigo Creek)	LP-OF107/MN-OF003	1599440.93	283008.82	14	27	32.35	120	59	13.04			X					X				0.60m dia pipe culvert located D/S of bridge, small amount of water flowing water flowing, catchment area - residential	4212, 4213
Las Piñas River	(Manarigo Creek)	LP-OF108/MN-OF004	1599433.58	283005.76	14	27	32.11	120	59	12.94												0.60m dia pipe culvert located D/S of bridge, no water flowing, catchment area - residential, school	4214, 4213
Las Piñas River	(Manarigo Creek)	LP-OF109/MN-OF005	1599441.29	283002.83	14	27	32.36	120	59	12.84			X									cannot confirm size of outfall, covered with vegetation/grass, small amount of water flowing, catchment area - residential	4217
Las Piñas River	(Naga Creek)	LP-OF110/NG-OF008	1600128.87	282699.73	14	27	54.64	120	59	2.52												0.90m dia pipe culvert located U/S of bridge, no water flowing, bridge and drainage under construction, catchment area - residential	4221, 4222
Las Piñas River	(Naga Creek)	LP-OF111/NG-OF009	1600140.82	282703.43	14	27	55.03	120	59	2.64												0.90m dia pipe culvert located D/S of bridge, outlet under water, bridge and drainage under construction, catchment area - residential	4220
Las Piñas River	(Naga Creek)	LP-OF112/NG-OF010	1600119.46	282720.62	14	27	54.34	120	59	3.22												0.90m dia pipe culvert located U/S of bridge, outlet partly submerge, bridge and drainage under construction, catchment area - residential	4224

Data Collection Survey for Sewerage Systems in West Metro Manila

Outfall Location

Date Surveyed: 13 & 17 May 2016 City/Town: **Las Pinas** Weather: Fair - Cloudy - Rainy

Notes:

N1 - Water Depth (Full / PartlyFull)
N2 - Water Depth (Half)
N3 - Water Depth (Low / Below Half)
N4 - Water Flow (Stagnant)
N5 - Water Flow (Flowing)
N6 - Water Color (Clear)
N7 - Water Color (Brown)
N8 - Water Color (Dark/Murky)
N9 - Water Odor (None)
N10 - Water Odor (Foul)
N11 - with floating trash/garbage
U/S - upstream
D/S - downstream
OF - outfall
LP - Las Pinas
LPR - Las Pinas River
IC - Ilet Creek

Outfall Identification

LP-OF000

outfall number

City/Municipality

OUTFALL INFORMATION																							
Main River	Tributary River/Waterway	Coordinates									Findings/Observations											Other Remarks	Photo Reference No.
		ID	UTM		N (Latitude)			E (Longitude)			N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11		
			N	E	Deg.	Min.	Sec.	Deg.	Min.	Sec.													
Las Piñas River	(Naga Creek)	LP-OF113/NG-OF011	1600131.43	282722.22	14	27	54.73	120	59	3.27												0.90m dia pipe culvert located D/S of bridge, outlet under water, bridge and drainage under construction, catchment area - residential, Note: Photo 4232 show manhole of OF186	4232
Las Piñas River	(Naga Creek)	LP-OF114/NG-OF012	1600071.69	282734.87	14	27	52.79	120	59	3.71												0.70m dia pipe culvert located U/S of bridge, small amount of water flowing, bridge and drainage under construction, catchment area - residential	4228, 4229
Las Piñas River	(Naga Creek)	LP-OF115/NG-OF013	1600068.77	282751.92	14	27	52.70	120	59	4.28												0.90m dia pipe culvert located U/S of bridge, no water flowing, Naga bridge and drainage under construction, catchment area - residential	4230, 4231
	LPR Creek B (Marulas Creek)	LP-OF116/ML-OF001	1601097.91	283215.67	14	28	26.31	120	59	19.46												cannot confirm size of outlet, covered with vegetation/grass, catchment area - residential	4236, 4237
	LPR Creek B (Marulas Creek)	LP-OF117/ML-OF002	1601106.47	283220.24	14	28	26.59	120	59	19.61												cannot confirm size of outlet, partly covered by stone masonry wall, catchment area - residential	4238, 4239
	LPR Creek B (Marulas Creek)	LP-OF118/ML-OF003	1601118.63	283235.62	14	28	26.99	120	59	20.12												cannot confirm size of outlet, covered with vegetation/grass, catchment area - residential	4242, 4243

Data Collection Survey for Sewerage Systems in West Metro Manila

Outfall-Las Pinas (FS)

Summary

Almanza Creek	15	AL	- Almanza Creek
Balot River	4	BL	- Balot River
Kay Almirante Creek	50	KA	- Kay Almirante Creek
Kay Kanti Creek	2	KK	- Kay Kanti Creek
Las Pinas River	12	TL	- Talon Creek
Manarigo Creek	12	TR	- TartarCreek
Marulas Creek	15	TT	- Tungtong Creek
Naga Creek	30	ZP	- Zapote River
Pasong Baka Creek	23	LSP	- Las Pinas River
Sin Nombre Creek	1	MN	- Manarigo Creek
Talon	40	PB	- Pasong Baka Creek
Tartar	14	SN	- Sin Nombre Creek
Tungtong Creek	8	CF	- Creek F
Zapote River	31		
Creek F	5		
Total	262		

OUTFALL INFORMATION		
River/Creek	ID	Total
Almanza Creek	AL-OF001	15
	AL-OF002	
	AL-OF003	
	AL-OF004	
	AL-OF005	
	AL-OF006	
	AL-OF007	
	AL-OF008	
	AL-OF009	
	AL-OF010	
	AL-OF011	
	AL-OF012	
	AL-OF013	
	AL-OF014	
	AL-OF015	
Balot River	BL-OF001	4
	BL-OF002	
	BL-OF003	
	BL-OF004	
Kay Almirante Creek	KA-OF001	50
	KA-OF002/LP-OF102	
	KA-OF003/LP-OF103	
	KA-OF004/LP-OF104	
	KA-OF005/LP-OF105	
	KA-OF006	
	KA-OF007	
	KA-OF008	
	KA-OF009	
	KA-OF010	
	KA-OF011	
	KA-OF012	
	KA-OF013	
	KA-OF014	
	KA-OF015	
	KA-OF016	
	KA-OF017	
	KA-OF018	
	KA-OF019	
	KA-OF020	
	KA-OF021	
	KA-OF022	
	KA-OF023	

OUTFALL INFORMATION		
River/Creek	ID	Total
	KA-OF024	
	KA-OF025	
	KA-OF026	
	KA-OF027	
	KA-OF028	
	KA-OF029	
	KA-OF030	
	KA-OF031	
	KA-OF032	
	KA-OF033	
	KA-OF034	
	KA-OF035	
	KA-OF036	
	KA-OF037	
	KA-OF038	
	KA-OF039	
	KA-OF040	
	KA-OF041	
	KA-OF042	
	KA-OF043	
	KA-OF044	
	KA-OF045	
	KA-OF046	
	KA-OF047	
	KA-OF048	
	KA-OF049	
	KA-OF050	
Kay Kanti Creek	KK-OF001	2
	KK-OF002	
Las Pinas River	LSP-OF001	12
	LSP-OF002	
	LSP-OF003/LP-OF2	
	LSP-OF004/LP-OF3	
	LSP-OF005	
	LSP-OF006	
	LSP-OF007/LP-OF4	
	LSP-OF008/LP-OF5	
	LSP-OF009/LP-OF6	
	LSP-OF010	
	LSP-OF011	
	LSP-OF012	
Manarigo Creek	MN-OF001	12
	MN-OF002/LP-OF106	
	MN-OF003/LP-OF107	
	MN-OF004/LP-OF108	
	MN-OF005/LP-OF109	
	MN-OF006	
	MN-OF007	
	MN-OF008	
	MN-OF009	
	MN-OF010	
	MN-OF011	
	MN-OF012	
Marulas Creek	ML-OF001/LP-OF116	15
	ML-OF002/LP-OF117	
	ML-OF003/LP-OF118	
	ML-OF004	
	ML-OF005	
	ML-OF006	
	ML-OF007	
	ML-OF008	
	ML-OF009	

OUTFALL INFORMATION		
River/Creek	ID	Total
	ML-OF010	
	ML-OF011	
	ML-OF012	
	ML-OF013	
	ML-OF014	
	ML-OF015	
Naga Creek	NG-OF001	30
	NG-OF002	
	NG-OF003	
	NG-OF004	
	NG-OF005	
	NG-OF006	
	NG-OF007	
	NG-OF008/LP-OF110	
	NG-OF009/LP-OF111	
	NG-OF010/LP-OF112	
	NG-OF011/LP-OF113	
	NG-OF012/LP-OF114	
	NG-OF013/LP-OF115	
	NG-OF014	
	NG-OF015	
	NG-OF016	
	NG-OF017	
	NG-OF018	
	NG-OF019	
	NG-OF020	
	NG-OF021	
	NG-OF022	
	NG-OF023	
	NG-OF024	
	NG-OF025	
	NG-OF026	
	NG-OF027	
	NG-OF028	
	NG-OF029	
	NG-OF030	
Pasong Baka Creek	PB-OF001	23
	PB-OF002	
	PB-OF003	
	PB-OF004	
	PB-OF005	
	PB-OF006	
	PB-OF007	
	PB-OF008	
	PB-OF009	
	PB-OF010	
	PB-OF011	
	PB-OF012	
	PB-OF013	
	PB-OF014	
	PB-OF015	
	PB-OF016	
	PB-OF017	
	PB-OF018	
	PB-OF019	
	PB-OF020	
	PB-OF021	
	PB-OF022	
	PB-OF023	
Sin Nombre Creek	SN-OF001	1
Talon	TL-OF001	40
	TL-OF002	

OUTFALL INFORMATION		
River/Creek	ID	Total
	TL-OF003	
	TL-OF004	
	TL-OF005	
	TL-OF006	
	TL-OF007	
	TL-OF008	
	TL-OF009	
	TL-OF010	
	TL-OF011	
	TL-OF012	
	TL-OF013	
	TL-OF014	
	TL-OF015	
	TL-OF016	
	TL-OF017	
	TL-OF018	
	TL-OF019	
	TL-OF020	
	TL-OF021	
	TL-OF022	
	TL-OF023	
	TL-OF024	
	TL-OF025	
	TL-OF026	
	TL-OF027	
	TL-OF028	
	TL-OF029	
	TL-OF030	
	TL-OF031	
	TL-OF032	
	TL-OF033	
	TL-OF034	
	TL-OF035	
	TL-OF036	
	TL-OF037	
	TL-OF038	
	TL-OF039	
	TL-OF040	
Tartar	TR-OF001	14
	TR-OF002	
	TR-OF003	
	TR-OF004	
	TR-OF005	
	TR-OF006	
	TR-OF007	
	TR-OF008	
	TR-OF009	
	TR-OF010/LP-OF97	
	TR-OF011//LP-OF98	
	TR-OF012/LP-OF99	
	TR-OF013/LP-OF100	
	TR-OF014/LP-OF101	
Tungtong Creek	TT-OF001	8
	TT-OF002	
	TT-OF003	
	TT-OF004	
	TT-OF005	
	TT-OF006	
	TT-OF007	
	TT-OF008	
Zapote River	ZP-OF001	31
	ZP-OF002	

OUTFALL INFORMATION		
River/Creek	ID	Total
	ZP-OF003/LP-OF14	
	ZP-OF004/LP-OF15	
	ZP-OF005//LP-OF79	
	ZP-OF006/LP-OF45	
	ZP-OF007/LP-OF55	
	ZP-OF008/LP-OF56	
	ZP-OF009/LP-OF67	
	ZP-OF010/LP-OF74	
	ZP-OF011	
	ZP-OF012	
	ZP-OF013	
	ZP-OF014	
	ZP-OF015	
	ZP-OF016	
	ZP-OF017	
	ZP-OF018	
	ZP-OF019	
	ZP-OF020	
	ZP-OF021	
	ZP-OF022	
	ZP-OF023	
	ZP-OF024	
	ZP-OF025	
	ZP-OF026/LP-OF82	
	ZP-OF027/LP-OF83	
	ZP-OF028/LP-OF84	
	ZP-OF029	
	ZP-OF030	
	ZP-OF031	
Creek F	CF-OF001	5
	CF-OF002	
	CF-OF003	
	CF-OF004	
	CF-OF005	

Data Collection Survey for Sewerage Systems in West Metro Manila

Outfall Location

Date Surveyed: 11-May-16 City/Town: **Imus** Weather: Fair - Cloudy - Rainy

Notes:

N1 - Water Depth (Full / PartlyFull)
N2 - Water Depth (Half)
N3 - Water Depth (Low / Below Half)
N4 - Water Flow (Stagnant)
N5 - Water Flow (Flowing)
N6 - Water Color (Clear)
N7 - Water Color (Brown)
N8 - Water Color (Dark/Murky)
N9 - Water Odor (None)
N10 - Water Odor (Foul)
N11 - with floating trash/garbage
U/S - upstream
D/S - downstream
OF - outfall
IM - Imus
IR - Imus River
BCR - Bacoor River
BR - Baluctot River

Outfall Identification
IM-OF000
outfall number
City/Municipality

OUTFALL INFORMATION																							
Main River	Tributary River/Waterway	ID	Coordinates								Findings/Observations											Other Remarks	Photo Reference No.
			UTM		N (Latitude)			E (Longitude)			N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11		
			N	E	Deg.	Min.	Sec.	Deg.	Min.	Sec.													
	IR Tributary River 1	IM-OF10	1597594.48	277005.45	14	26	30.55	120	55	53.19												0.80m x 0.80m concrete box located along the new concrete revetment, D/S of river confluence, no water	3903
	IR Tributary River 1	IM-OF11	1597580.43	277064.04	14	26	30.11	120	55	55.15												1.20m dia. concrete pipe, located beside the cemetery area, no water	3904
	IR Tributary River 1	IM-OF12	1597662.75	276934.46	14	26	32.75	120	55	50.80												2-1.20m dia. concrete pipe, located along the new concrete revetment D/S of river confluence, no water	3906, 3907
Imus River		IM-OF13	1596491.59	277845.79	14	25	54.92	120	56	21.57												0.70m dia. concrete pipe, located along the concrete revetment, no water flowing, partly covered by	3908, 3909
Imus River		IM-OF14	1596326.42	277958.15	14	25	49.58	120	56	25.37			X		X	X						0.60m dia. concrete pipe, U/S of Bridge of Isabel II, small amount of water flowing	3911
Imus River		IM-OF15	1596322.28	277940.14	14	25	49.44	120	56	24.77												0.30m dia. concrete pipe, D/S of Bridge of Isabel II, no water flowing	3914
Imus River		IM-OF16	1596322.92	277869.14	14	25	49.98	120	56	22.40			X		X	X						0.90m dia. concrete pipe, D/S of Bridge of Isabel II, small amount of water flowing	3913
	IR Tributary River 1	IM-OF17/C-E-404	1596441.06	277139.17	14	25	53.07	120	55	58.00			X		X	X						0.50m x 0.50m concrete box U/S of the bridge, located in Brgy. Medicion 1-A	3917
	IR Tributary River 1	IM-OF18/C-E-401	1597275.16	276960.93	14	26	20.15	120	55	51.80			X		X	X						0.60m dia. concrete pipe, D/S of bridge	3918, 3919
	IR Tributary River 1	IM-OF19/C-E-402	1597277.84	276971.14	14	26	20.24	120	55	52.14												0.30m dia. concrete pipe, D/S of bridge, no water flowing	3920
	IR Creek B	IM-OF20	1596029.06	277180.41	14	25	39.68	120	55	59.50			X		X			X				1.20m dia. concrete pipe, located near the bridge	3923
	IR Creek B	IM-OF21/C-E-407	1596028.77	277178.31	14	25	39.67	120	55	59.43												0.40m dia. concrete pipe, no water flowing	3923
Imus River		IM-OF22	1595600.96	278227.00	14	25	26.06	120	56	34.56			X		X			X				0.60m dia. concrete pipe, U/S of Imus bridge, small amount of water flowing	3925, 3926

Data Collection Survey for Sewerage Systems in West Metro Manila

Outfall Location

Date Surveyed: 11-May-16 City/Town: **Imus** Weather: Fair - Cloudy - Rainy

Notes:

N1 - Water Depth (Full / PartlyFull)
N2 - Water Depth (Half)
N3 - Water Depth (Low / Below Half)
N4 - Water Flow (Stagnant)
N5 - Water Flow (Flowing)
N6 - Water Color (Clear)
N7 - Water Color (Brown)
N8 - Water Color (Dark/Murky)
N9 - Water Odor (None)
N10 - Water Odor (Foul)
N11 - with floating trash/garbage
U/S - upstream
D/S - downstream
OF - outfall
IM - Imus
IR - Imus River
BCR - Bacoor River
BR - Baluctot River

Outfall Identification
IM-OF000
outfall number
City/Municipality

OUTFALL INFORMATION																							
Main River	Tributary River/Waterway	Coordinates									Findings/Observations											Other Remarks	Photo Reference No.
		ID	UTM		N (Latitude)			E (Longitude)			N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11		
			N	E	Deg.	Min.	Sec.	Deg.	Min.	Sec.													
Imus River		IM-OF23	1595631.86	278244.05	14	25	27.07	120	56	35.12			X		X			X				0.90m dia. concrete pipe U/S of Imus bridge, small amount of water	3929, 3930, 3931
Imus River		IM-OF24	15995631.86	278244.05	14	25	27.07	120	56	35.12												1.20m dia. concrete pipe U/S of Imus bridge, no water flowing	3929, 3930, 3931
Imus River		IM-OF25	1595645.87	278225.00	14	25	27.52	120	56	34.48												0.50m x 0.50m concrete box D/S of Imus bridge, no flowing water	3932
Imus River		IM-OF26	1595633.65	278181.15	14	25	27.11	120	56	33.02												0.30m dia. CP D/S of Imus bridge, no flowing water	3933
Imus River		IM-OF27	1595640.50	278171.92	14	25	27.33	120	56	32.71												0.60m dia. concrete pipe D/S of Imus bridge, no flowing water	3933, 3934
Imus River		IM-OF28	1595651.99	278158.54	14	25	27.70	120	56	32.26												0.60m dia. concrete pipe D/S of Imus bridge, no flowing water	3933, 3934
Imus River		IM-OF29	1594452.08	278543.61	14	24	48.78	120	56	45.47												0.40m x 0.40m concrete box located along the concrete revetment, no flowing water	3937
Imus River		IM-OF30	1593709.60	278344.62	14	24	24.57	120	56	39.05			X		X			X				1.20m dia. concrete pipe D/S of bridge	3938, 3939
Imus River		IM-OF31	1593693.06	278337.88	14	24	24.03	120	56	38.83			X		X	X						1.20m dia. concrete pipe U/S of bridge	3940, 3941
	Ylang-ylang River	IM-OF32	1593467.10	279443.01	14	24	17.00	120	57	15.78												0.80m x 0.80m concrete box (old irrigation check structure), no	3942
	Ylang-ylang River	IM-OF33	1593475.97	279447.89	14	24	17.29	120	57	15.94			X		X			X				0.40m dia. concrete pipe U/S of bridge, small amount of water	3943
	Ylang-ylang River	IM-OF34	1593480.83	279454.82	14	24	17.45	120	57	16.17			X		X			X				0.20m dia. concrete pipe U/S of bridge, small amount of water	3944
	Ylang-ylang River	IM-OF35	1593496.39	279467.54	14	24	17.96	120	57	16.59												0.40m dia. concrete pipe U/S of bridge, no water flowing	3945
	Ylang-ylang River	IM-OF36	1593498.42	279446.59	14	24	18.02	120	57	15.89			X		X			X				0.40m dia. concrete pipe D/S of bridge, small amount of water	3946
	Ylang-ylang River	IM-OF37	1591502.14	280306.26	14	23	13.33	120	57	45.17												1.0m x 1.0m concrete U/S of the bridge, no water flowing, near on-going housing development	3953, 3954
	Ylang-ylang River	IM-OF38	1591527.70	280300.79	14	23	14.16	120	57	44.89												1.0m x 1.0m concrete box D/S of the bridge, no water flowing, near on-going housing development	3957, 3958

Data Collection Survey for Sewerage Systems in West Metro Manila

Outfall Location

Date Surveyed: 11-May-16 City/Town: **Imus** Weather: Fair - Cloudy - Rainy

Notes:

N1 - Water Depth (Full / PartlyFull)
N2 - Water Depth (Half)
N3 - Water Depth (Low / Below Half)
N4 - Water Flow (Stagnant)
N5 - Water Flow (Flowing)
N6 - Water Color (Clear)
N7 - Water Color (Brown)
N8 - Water Color (Dark/Murky)
N9 - Water Odor (None)
N10 - Water Odor (Foul)
N11 - with floating trash/garbage
U/S - upstream
D/S - downstream
OF - outfall
IM - Imus
IR - Imus River
BCR - Bacoor River
BR - Baluctot River

Outfall Identification
IM-OF000
outfall number
City/Municipality

OUTFALL INFORMATION																							
Main River	Tributary River/Waterway	Coordinates									Findings/Observations											Other Remarks	Photo Reference No.
		ID	UTM		N (Latitude)			E (Longitude)			N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11		
			N	E	Deg.	Min.	Sec.	Deg.	Min.	Sec.													
	BR Creek A-3	IM-OF39	1590249.99	278612.83	14	22	32.11	120	56	49.03												0.90m dia. concrete U/S of bridge, no water flowing	3964
	BR Creek A-3	IM-OF40	1590275.54	278608.86	14	22	32.94	120	56	48.89												0.90m dia. concrete pipe D/S of bridge, no water flowing	3966
	IR Creek B	IM-OF41	1588697.85	276650.11	14	21	41.05	120	55	44.00			X					X				cannot confirm size of outfall covered by tree and grass	3974, 3975
	IR Creek B	IM-OF42	1588700.69	276676.20	14	21	41.15	120	55	44.87												concrete pipe, partly covered by grass, no water flowing	3976
	IR Creek B	IM-OF43/C-E-449	1588722.60	276667.11	14	21	41.86	120	55	44.56												concrete pipe, no water flowing, about 0.46m dia partly covered by some grasses	3978, 3979
	IR Creek B	IM-OF44	1590320.45	276989.22	14	22	33.93	120	55	54.83			X		X		X					1.20m dia concrete pipe located U/S of the bridge, small amount of water flowing	3980
	IR Creek B	IM-OF45	1590323.11	276966.77	14	22	34.01	120	55	54.08												cannot confirm size of outfall covered house, no flowing water	3982
	IR Creek B	IM-OF46	1590337.26	276965.39	14	22	34.47	120	55	54.03												0.61m dia concrete pipe located D/S of the bridge, no water flowing	3983
	IR Creek B	IM-OF47	1590338.55	276993.28	14	22	34.52	120	55	54.96												1.20m dia concrete pipe located D/S of the bridge, no water flowing	3984, 3985

Data Collection Survey for Sewerage Systems in West Metro Manila

Outfall-Imus (FS)

Summary

Imus River	13	IM	- Imus
IR Tributary River 1	5	IR	- Imus River
IR Creek B	19	OF	- Outfall
Along Alapan Street	1		
Along Advincula Road	4		
Along Patndig Araw Road	1		
Along Malagasang II Road	6		
Total	49		

OUTFALL INFORMATION		
River/Creek	ID	Total
Imus River	C-E-321	13
	C-E-322	
	C-E-323	
	C-E-324	
	C-E-325	
	C-E-326	
	C-E-328	
	C-E-360	
	C-E-371	
	C-E-372	
	C-E-373	
	C-E-374	
	C-E-381	
IR Tributary River 1	C-E-401	5
	C-E-402	
	C-E-403	
	C-E-404	
	C-E-405	
IR Creek B	C-E-407	19
	C-E-408	
	C-E-411	
	C-E-413	
	C-E-414	
	C-E-417	
	C-E-442	
	C-E-443	
	C-E-444	
	C-E-445	
	C-E-453	
	C-E-454	
	C-E-455	
	C-E-446	
	C-E-447	
	C-E-448/IM-OF43	
	C-E-449	
	C-E-450	
	C-E-451	
Along Alapan Street	C-E-154	1
Along Advincula Road	C-D-112	4
	C-D-113	
	C-D-114	
	C-D-151	
Along Patndig Araw Road	C-E-470	1
Along Malagasang II Road	C-D-152	6
	C-D-153	
	C-E-471	
	C-E-472	
	C-E-473	
	C-E-474	

Data Collection Survey for Sewerage Systems in West Metro Manila

Outfall Location

Date Surveyed: 11 & 13 May 2016 City/Town: Kawit Weather: Fair - Cloudy - Rainy

Notes:

N1 - Water Depth (Full / PartlyFull)
N2 - Water Depth (Half)
N3 - Water Depth (Low / Below Half)
N4 - Water Flow (Stagnant)
N5 - Water Flow (Flowing)
N6 - Water Color (Clear)
N7 - Water Color (Brown)
N8 - Water Color (Dark/Murky)
N9 - Water Odor (None)
N10 - Water Odor (Foul)
N11 - with floating trash/garbage
U/S - upstream
D/S - downstream
OF - outfall
KW - Kawit
SJR - San Juan River

Outfall Identification

KW-OF000

outfall number

City/Municipality

OUTFALL INFORMATION																							
Main River	Tributary River/Waterway	Coordinates									Findings/Observations											Other Remarks	Photo Reference No.
		ID	UTM		N (Latitude)			E (Longitude)			N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11		
			N	E	Deg.	Min.	Sec.	Deg.	Min.	Sec.													
San Juan River	SJR Tributary River 3	KW-OF1	1598029.07	274438.62	14	26	43.93	120	54	27.38												0.40m x 1.00m channel D/S of bridge, no water flowing, catchment area - residential	3991, 3992
	SJR Tributary River 3	KW-OF2	1597980.59	274428.89	14	26	42.35	120	54	27.07	X			X				X				1.00m wide box culvert U/S of bridge, cannot verify depth of outfall, almost fully submerge, catchment area - residential	3993, 3994
	SJR Tributary River 3	KW-OF3	1598020.09	274412.17	14	26	43.63	120	54	26.50		X		X				X				0.30m dia pipe culvert D/S of bridge, half submerged, catchment area - park	3996, 3997
	SJR Tributary River 3	KW-OF4	1598169.09	274423.12	14	26	48.48	120	54	26.82			X		X			X				0.60m wide x 1.50m high open channel U/S of bridge, catchment area - residential	4005, 4006
	SJR Tributary River 3	KW-OF5	1598165.67	274394.03	14	26	48.36	120	54	25.85			X					X				0.30m dia pipe culvert U/S of bridge, partly submerged, catchment area - park	4007
	SJR Tributary River 3	KW-OF6	1597763.34	273945.46	14	26	35.14	120	54	11.00			X	X				X		X	X	0.60m wide x 1.00m high channel outlet with concrete gate U/S of Tabon bridge, catchment area -	4010
	SJR Tributary River 3	KW-OF7	1597755.59	273952.58	14	26	34.89	120	54	11.24			X	X				X		X	X	0.60m wide x 1.20m high channel U/S of Tabon bridge, partly submerge, catchment area -	4011, 4012
	SJR Tributary River 3	KW-OF8	1597746.50	273946.50	14	26	34.58	120	54	11.04			X	X				X		X		0.50m wide x 1.00m high channel D/S of Tabon bridge, partly submerge, catchment area -	4016
	SJR Tributary River 3	KW-OF9	1597755.73	273937.90	14	26	34.89	120	54	10.75			X	X				X		X		0.50m wide x 1.50m high channel D/S of Tabon bridge, partly submerge, catchment area -	4017
	SJR Tributary River 6	KW-OF10	1597199.15	273045.41	14	26	16.52	120	53	41.13			X	X				X				1.00m wide x 1.00m high open channel D/S of Panamitan bridge, catchment area - residential	4020, 4021, 4022
	SJR Tributary River 6	KW-OF11	1597181.83	273056.63	14	26	15.96	120	53	41.51			X	X				X		X	X	0.80m wide x 1.50m high open channel U/S of Panamitan bridge, catchment area - residential	4023

Data Collection Survey for Sewerage Systems in West Metro Manila

Outfall Location

Date Surveyed: 11 & 13 May 2016 City/Town: Kawit Weather: Fair - Cloudy - Rainy

Notes:

N1 - Water Depth (Full / PartlyFull)
N2 - Water Depth (Half)
N3 - Water Depth (Low / Below Half)
N4 - Water Flow (Stagnant)
N5 - Water Flow (Flowing)
N6 - Water Color (Clear)
N7 - Water Color (Brown)
N8 - Water Color (Dark/Murky)
N9 - Water Odor (None)
N10 - Water Odor (Foul)
N11 - with floating trash/garbage
U/S - upstream
D/S - downstream
OF - outfall
KW - Kawit
SJR - San Juan River

Outfall Identification

KW-OF000

KW: City/Municipality
OF: outfall number

OUTFALL INFORMATION

Main River	Tributary River/Waterway	Coordinates									Findings/Observations											Other Remarks	Photo Reference No.
		ID	UTM		N (Latitude)			E (Longitude)			N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11		
			N	E	Deg.	Min.	Sec.	Deg.	Min.	Sec.													
	SJR Tributary River 6	KW-OF12	1597192.08	273078.90	14	26	16.30	120	53	42.25			X	X				X				0.80m wide bottom & 1.00m wide top x 2.00m high open channel U/S of Panamitan bridge, partly submerge, outlet under the house, catchment area - residential	4024, 4025
	SJR Creek B	KW-OF15	1597512.39	274394.36	14	26	27.11	120	54	26.06			X	X				X		X		1.0m wide x 1.50m high channel D/S of bridge, partly submerge, catchment area - residential	4046, 4047
	SJR Creek B	KW-OF16	1597484.39	274363.25	14	26	26.19	120	54	25.03		X		X				X		X		0.90m dia pipe culvert D/S of bridge, half submerge, catchment area - residential	4048, 4049
	SJR Creek B	KW-OF17	1597454.17	274372.56	14	26	25.21	120	54	25.35												0.90m dia pipe culvert U/S of bridge, no water flowing, partly clog with trash, catchment area - residential	4051, 4052
	SJR Creek D	KW-OF18/C-D-331	1596766.53	272549.49	14	26	2.30	120	53	24.71			X		X			X				2 - 0.60m dia pipe culvert D/S of bridge, small amount of water flowing, catchment area - residential	4060, 4062
San Juan River		KW-OF24	1597658.39	272515.44	14	26	31.30	120	53	23.30												0.60m wide x 1.50m high channel, no water flowing, catchment area - residential	4078, 4079
	SJR Creek F	KW-OF25	1596519.54	273334.89	14	25	54.50	120	53	51.00												0.90m dia pipe culvert D/S of Batong Dalig bridge, no water flowing, catchment area - residential, commercial & open area	4081
	SJR Creek F	KW-OF26	1596508.32	273318.31	14	25	54.13	120	53	50.45												0.90m dia pipe culvert D/S of Batong Dalig bridge, no water flowing, catchment area - residential, commercial & open area	4082

Data Collection Survey for Sewerage Systems in West Metro Manila

Outfall-Kawit (FS)

Summary

Imus River	5
San Juan River	1
SJR Creek A	1
SJR Creek D	6
SJR Creek F	2
SJR Tributary River 3	5
SJR Tributary River 6	2
Total	22

SJR - San Juan River
KW - Kawit
OF - outfall

OUTFALL INFORMATION		
River/Creek	ID	Total
Imus River	C-E-101	5
Imus River	C-E-301	
Imus River	C-E-302	
Imus River	C-E-303	
Imus River	C-E-801	
San Juan River	C-D-222	1
SJR Creek A	C-D-106	1
SJR Creek D	C-D-331/KW-OF18	6
SJR Creek D	C-D-332	
SJR Creek D	C-D-333	
SJR Creek D	C-D-334	
SJR Creek D	C-D-335	
SJR Creek D	C-D-336	
SJR Creek F	C-D-323	2
SJR Creek F	C-D-324	
SJR Tributary River 3	C-D-212	5
SJR Tributary River 3	C-D-221	
SJR Tributary River 3	C-D-223	
SJR Tributary River 3	C-D-224	
SJR Tributary River 3	C-D-225	
SJR Tributary River 6	C-D-321	2
SJR Tributary River 6	C-D-322	

IMG_4088

IMG_4089

IMG_4091

IMG_4095

IMG_4096

IMG_4098

IMG_4099

IMG_4100

IMG_4101

IMG_4102

IMG_4103

IMG_4104

IMG_4105

IMG_4107

IMG_4108

IMG_4110

IMG_4111

IMG_4115

IMG_4116

IMG_4117

IMG_4118

IMG_4123

IMG_4124

IMG_4125

IMG_4126

IMG_4128

IMG_4129

IMG_4130

IMG_4131

IMG_4132

IMG_4133

IMG_4134

IMG_4140

IMG_4143

IMG_4145

IMG_4146

IMG_4147

IMG_4148

IMG_4151

IMG_4152

IMG_4153

IMG_4154

IMG_4155

IMG_4156

IMG_4157

IMG_4158

IMG_4159

IMG_4161

IMG_4166

IMG_4167

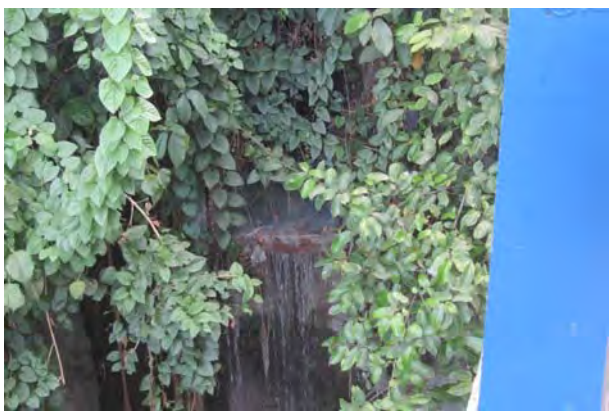
IMG_4172

IMG_4173

IMG_4174

IMG_4175

IMG_4176



IMG_4177

IMG_4180

IMG_4181

IMG_4182

IMG_4183

IMG_4184

IMG_4185

IMG_4186

IMG_4190

IMG_4191

IMG_4193

IMG_4194

IMG_4195

IMG_4196

IMG_4197

IMG_4198

IMG_4199

IMG_4200

IMG_4204

IMG_4205

IMG_4206

IMG_4207

IMG_4210

IMG_4212

IMG_4213

IMG_4214

IMG_4217

IMG_4220

IMG_4221

IMG_4222

IMG_4224

IMG_4228

IMG_4229

IMG_4230

IMG_4231

IMG_4232

IMG_4236

IMG_4237

IMG_4238

IMG_4239

IMG_4242

IMG_4243

IMG_3884

IMG_3885

IMG_3886

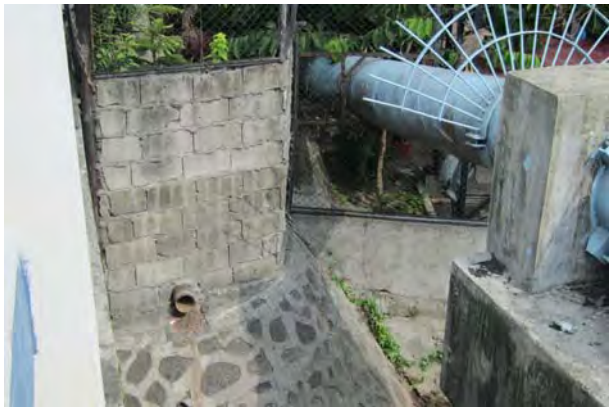
IMG_3887

IMG_3888

IMG_3889

IMG_3890

IMG_3891



IMG_3892

IMG_3893

IMG_3895

IMG_3896

IMG_3897

IMG_3898

IMG_3899

IMG_3900

IMG_3901

IMG_3902

IMG_3903

IMG_3904

IMG_3906

IMG_3907

IMG_3908

IMG_3909

IMG_3911

IMG_3913

IMG_3914

IMG_3917

IMG_3918

IMG_3919

IMG_3920

IMG_3923

IMG_3925

IMG_3926

IMG_3929

IMG_3930

IMG_3931

IMG_3932

IMG_3933

IMG_3934

IMG_3937

IMG_3938

IMG_3939

IMG_3940

IMG_3941

IMG_3942

IMG_3943

IMG_3944

IMG_3945

IMG_3946

IMG_3953

IMG_3954

IMG_3957

IMG_3958

IMG_3964

IMG_3966

IMG_3974

IMG_3975

IMG_3976

IMG_3978

IMG_3979

IMG_3980

IMG_3982

IMG_3983

IMG_3984

IMG_3985

IMG_4249

IMG_4250

IMG_4252

IMG_4256

IMG_4258

IMG_4259

IMG_4260

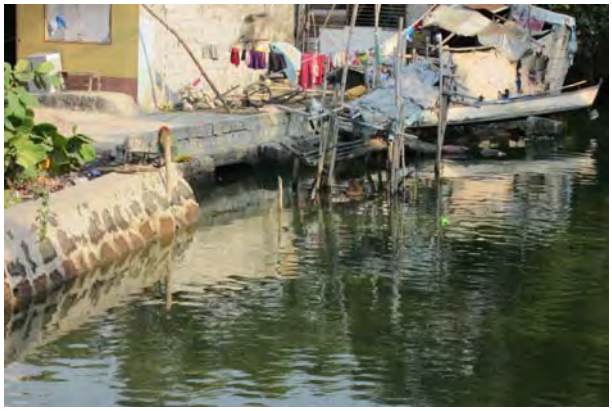
IMG_4261

IMG_4262

IMG_3991

IMG_3992

IMG_3993



IMG_3994

IMG_3996

IMG_3997

IMG_4005

IMG_4006

IMG_4007

IMG_4010

IMG_4011

IMG_4012

IMG_4016

IMG_4017

IMG_4020

IMG_4021

IMG_4022

IMG_4023

IMG_4024

IMG_4025

IMG_4033

IMG_4034

IMG_4040

IMG_4046

IMG_4047

IMG_4048

IMG_4049

IMG_4051

IMG_4052

IMG_4060

IMG_4062

IMG_4066

IMG_4067

IMG_4068

IMG_4069

IMG_4071

IMG_4072

IMG_4073

IMG_4078

IMG_4079

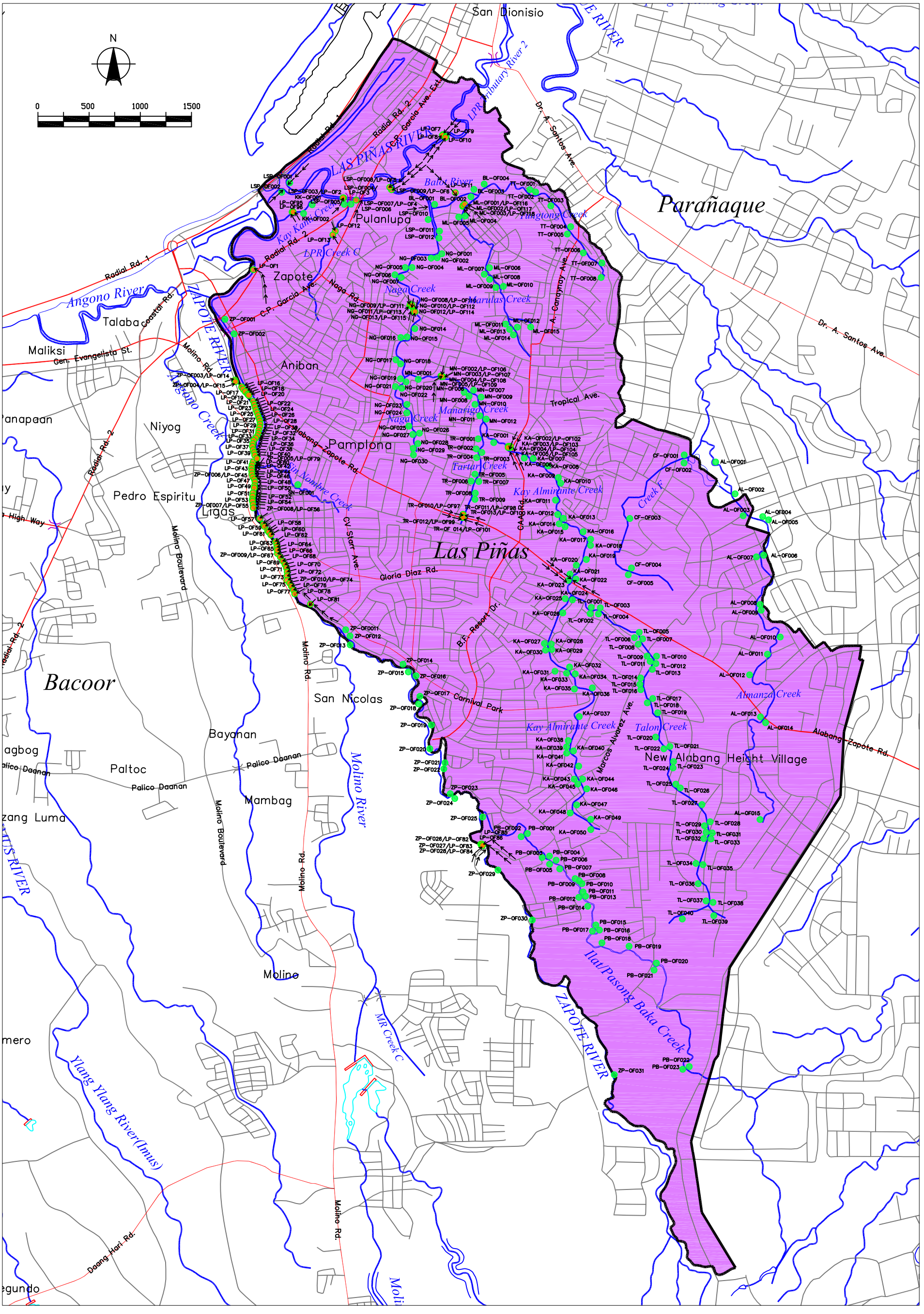
IMG_4081

IMG_4082

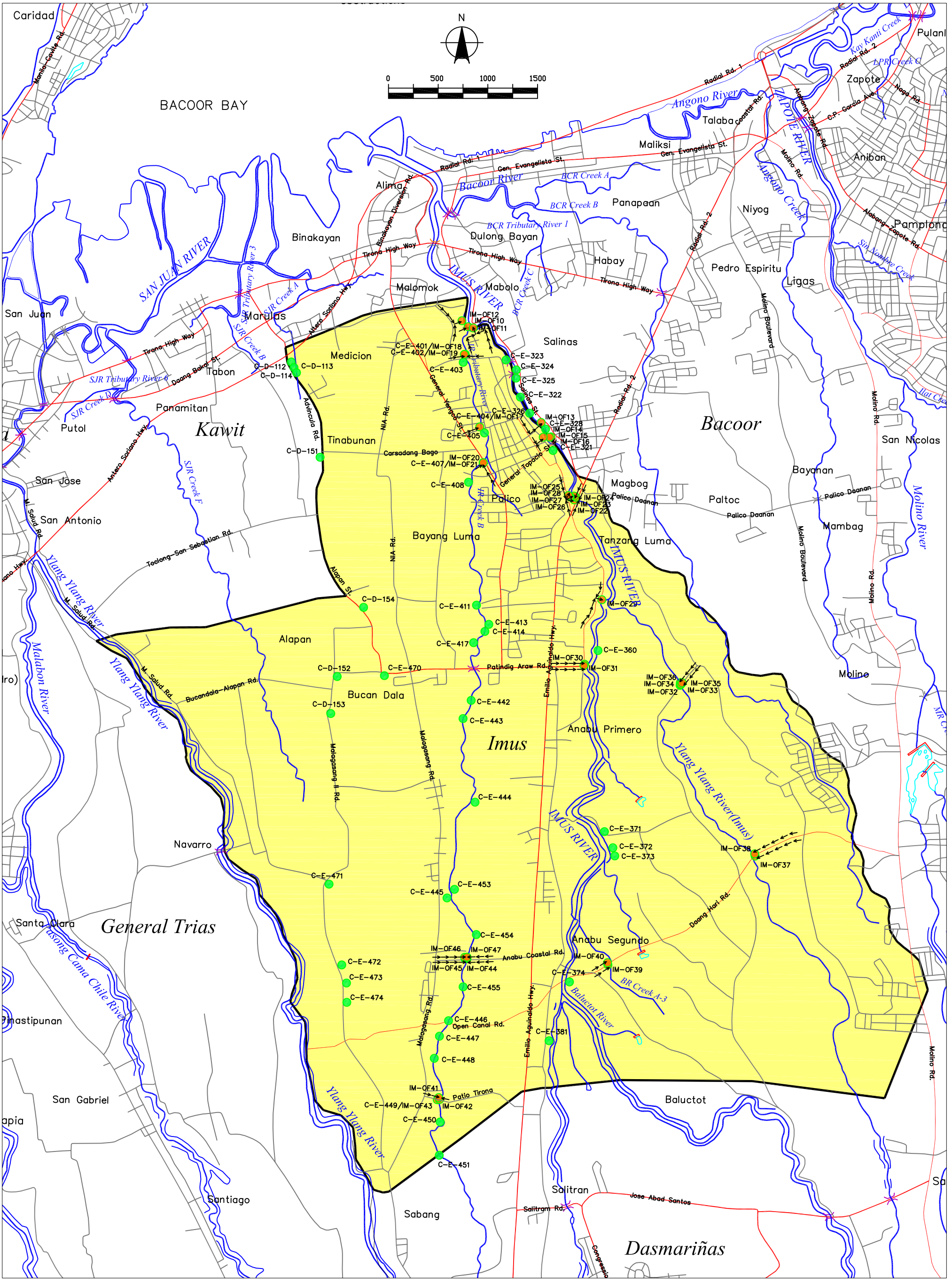
Appendix 8

Information and Data of Existing Drainage

DRAINAGE MAP (LAS PIÑAS)



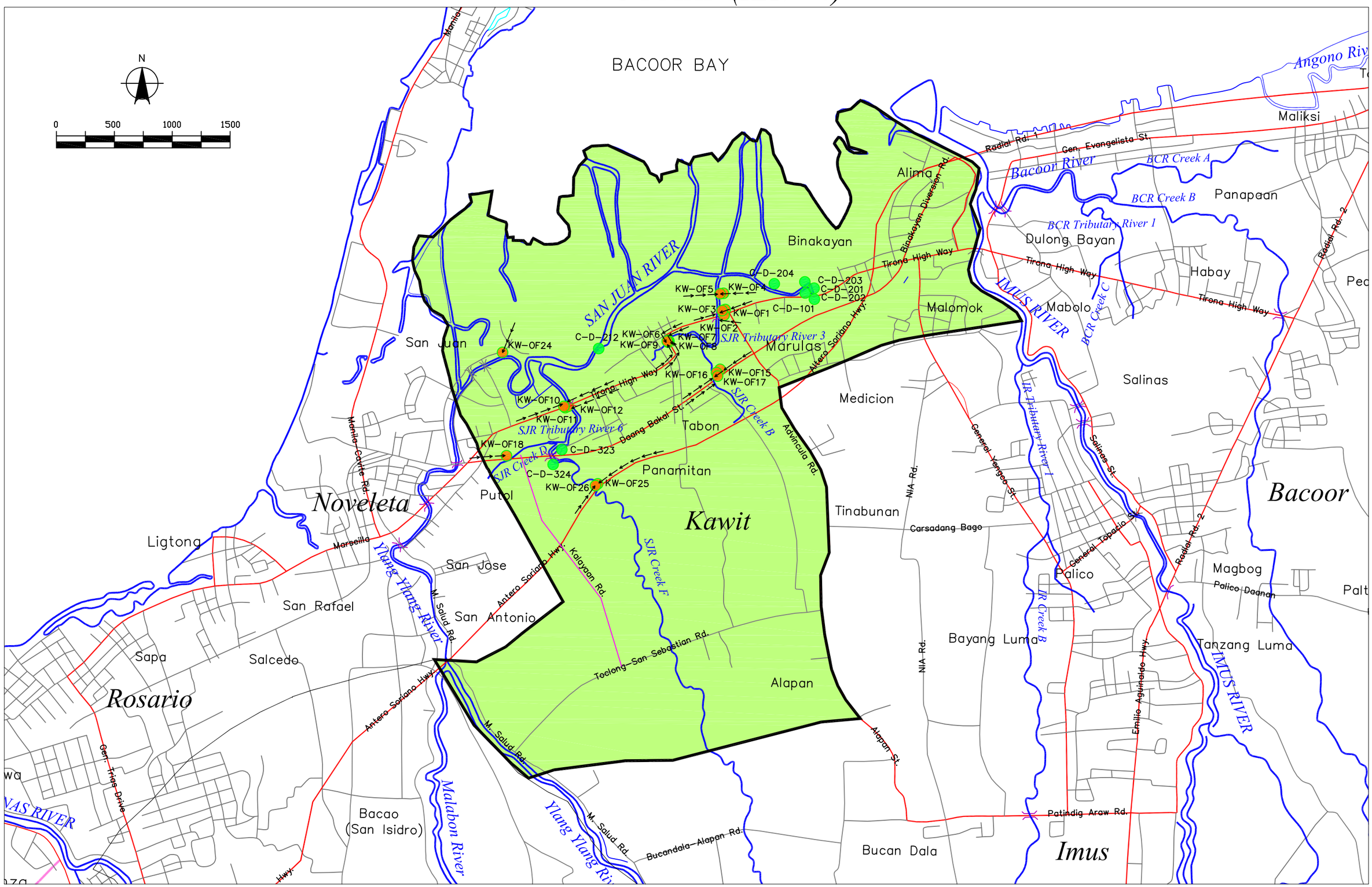
DRAINAGE MAP (IMUS)



LEGEND:

- *Outfall Location*
- *Outfall Location (FS)*
- *Drainage Line*
- *City/Municipal Boundary*
- *Rivers/Creeks*
- *Major Roads*
- *Secondary Roads*

DRAINAGE MAP (KAWIT)



LEGEND:

- *Outfall Location*
- *Outfall Location (FS)*
- *Drainage Line*
- *City/Municipal Boundary*
- *Rivers/Creeks*
- *Major Roads*
- *Secondary Roads*

Appendix 9

Calculation of Life Cycle Cost

for Each Alternative Scheme

Appendix 9: Calculation of Life Cycle Cost for Each Alternative Scheme

Alternative Scheme	Cost Item	Design Capacity	Construction Period	Unit Cost		7.89% Life Cycle Cost (PHP million)	1 2019	2 2020	3 2021	4 2022	5 2023	6 2024	7 2025	8 2026	9 2027	10 2028	11 2029	12 2030	13 2031	14 2032	15 2033	16 2034	17 2035	18 2036	19 2037
	Treatment Rate										50.0%	53.3%	56.7%	60.0%	63.3%	66.7%	70.0%	73.3%	76.7%	80.0%	83.3%	86.7%	90.0%	93.3%	100.0%
CAS-LP-1		113,200	3.5			**6,402.3**	866.7	1,733.4	1,733.4	1,733.4	201.7	206.4	211.1	215.7	220.4	225.0	229.7	234.3	239.0	243.6	248.3	252.9	257.6	262.3	271.6
	Construction Cost			6,066.9	milion PHP	4,952.0	866.7	1,733.4	1,733.4	1,733.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			131.9	million PHP/yea	839.1	0.0	0.0	0.0	0.0	131.9	131.9	131.9	131.9	131.9	131.9	131.9	131.9	131.9	131.9	131.9	131.9	131.9	131.9	131.9
	Variable Cost of O&M Work			139.62	million PHP/yea	611.2	0.0	0.0	0.0	0.0	69.8	74.5	79.1	83.8	88.4	93.1	97.7	102.4	107.0	111.7	116.4	121.0	125.7	130.3	139.6
CAS-LP-2		113,200	3.0			**6,148.9**	0.0	2,013.8	2,013.8	2,013.8	182.9	187.5	192.1	196.7	201.4	206.0	210.6	215.2	219.9	224.5	229.1	233.7	238.4	243.0	252.2
	Construction Cost			6,041.3	milion PHP	4,819.7	0.0	2,013.8	2,013.8	2,013.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			113.5	million PHP/yea	721.8	0.0	0.0	0.0	0.0	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5
	Variable Cost of O&M Work			138.74	million PHP/yea	607.3	0.0	0.0	0.0	0.0	69.4	74.0	78.6	83.2	87.9	92.5	97.1	101.7	106.4	111.0	115.6	120.2	124.9	129.5	138.7
CAS-IMS-1		93,600	3.0			**4,042.6**	0.0	1,216.7	1,216.7	1,216.7	157.4	161.0	164.6	168.2	171.8	175.4	179.0	182.6	186.2	189.8	193.4	197.0	200.6	204.2	211.4
	Construction Cost			3,650.2	milion PHP	2,912.1	0.0	1,216.7	1,216.7	1,216.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			103.5	million PHP/yea	658.5	0.0	0.0	0.0	0.0	103.5	103.5	103.5	103.5	103.5	103.5	103.5	103.5	103.5	103.5	103.5	103.5	103.5	103.5	103.5
	Variable Cost of O&M Work			107.83	million PHP/yea	472.0	0.0	0.0	0.0	0.0	53.9	57.5	61.1	64.7	68.3	71.9	75.5	79.1	82.7	86.3	89.9	93.5	97.0	100.6	107.8
CAS-IMS-2		93,600	2.5			**3,873.5**	0.0	724.4	1,448.9	1,448.9	141.5	145.1	148.6	152.2	155.8	159.3	162.9	166.5	170.1	173.6	177.2	180.8	184.3	187.9	195.0
	Construction Cost			3,622.2	milion PHP	2,845.4	0.0	724.4	1,448.9	1,448.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			87.9	million PHP/yea	559.3	0.0	0.0	0.0	0.0	87.9	87.9	87.9	87.9	87.9	87.9	87.9	87.9	87.9	87.9	87.9	87.9	87.9	87.9	87.9
	Variable Cost of O&M Work			107.10	million PHP/yea	468.8	0.0	0.0	0.0	0.0	53.5	57.1	60.7	64.3	67.8	71.4	75.0	78.5	82.1	85.7	89.2	92.8	96.4	100.0	107.1
CAS-IMS-3		93,600	3.0			**4,015.2**	0.0	1,206.3	1,206.3	1,206.3	157.1	160.7	164.3	167.8	171.4	175.0	178.6	182.2	185.8	189.4	193.0	196.6	200.2	203.8	210.9
	Construction Cost			3,618.9	milion PHP	2,887.2	0.0	1,206.3	1,206.3	1,206.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			103.2	million PHP/yea	656.4	0.0	0.0	0.0	0.0	103.2	103.2	103.2	103.2	103.2	103.2	103.2	103.2	103.2	103.2	103.2	103.2	103.2	103.2	103.2
	Variable Cost of O&M Work			107.73	million PHP/yea	471.6	0.0	0.0	0.0	0.0	53.9	57.5	61.0	64.6	68.2	71.8	75.4	79.0	82.6	86.2	89.8	93.4	97.0	100.5	107.7
CAS-IMS-4		93,600	2.5			**3,830.6**	0.0	714.1	1,428.3	1,428.3	141.1	144.7	148.3	151.8	155.4	159.0	162.5	166.1	169.7	173.2	176.8	180.4	183.9	187.5	194.6
	Construction Cost			3,570.7	milion PHP	2,804.9	0.0	714.1	1,428.3	1,428.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			87.6	million PHP/yea	557.3	0.0	0.0	0.0	0.0	87.6	87.6	87.6	87.6	87.6	87.6	87.6	87.6	87.6	87.6	87.6	87.6	87.6	87.6	87.6
	Variable Cost of O&M Work			106.99	million PHP/yea	468.4	0.0	0.0	0.0	0.0	53.5	57.1	60.6	64.2	67.8	71.3	74.9	78.5	82.0	85.6	89.2	92.7	96.3	99.9	107.0
CAS-KWT-1		22,000	1.0			**1,050.4**	0.0	0.0	0.0	1,030.8	40.5	41.4	42.3	43.2	44.1	45.0	45.9	46.7	47.6	48.5	49.4	50.3	51.2	52.1	53.8
	Construction Cost			1,030.8	milion PHP	760.7	0.0	0.0	0.0	1,030.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			27.2	million PHP/yea	173.2	0.0	0.0	0.0	0.0	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2
	Variable Cost of O&M Work			26.60	million PHP/yea	116.4	0.0	0.0	0.0	0.0	13.3	14.2	15.1	16.0	16.8	17.7	18.6	19.5	20.4	21.3	22.2	23.1	23.9	24.8	26.6
CAS-KWT-2		22,000	1.0			**978.0**	0.0	0.0	0.0	968.8	36.4	37.3	38.1	39.0	39.9	40.8	41.7	42.5	43.4	44.3	45.2	46.1	47.0	47.8	49.6
	Construction Cost			968.8	milion PHP	715.0	0.0	0.0	0.0	968.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			23.2	million PHP/yea	147.4	0.0	0.0	0.0	0.0	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2
	Variable Cost of O&M Work			26.43	million PHP/yea	115.7	0.0	0.0	0.0	0.0	13.2	14.1	15.0	15.9	16.7	17.6	18.5	19.4	20.3	21.1	22.0	22.9	23.8	24.7	26.4
MBR-LP-1		113,200	3.5			**7,543.9**	956.6	1,913.1	1,913.1	1,913.1	291.0	297.3	303.7	310.0	316.3	322.7	329.0	335.4	341.7	348.1	354.4	360.8	367.1	373.4	386.1
	Construction Cost			6,695.9	milion PHP	5,465.4	956.6	1,913.1	1,913.1	1,913.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			195.8	million PHP/yea	1,245.3	0.0	0.0	0.0	0.0	195.8	195.8	195.8	195.8	195.8	195.8	195.8	195.8	195.8	195.8	195.8	195.8	195.8	195.8	195.8
	Variable Cost of O&M Work			190.33	million PHP/yea	833.2	0.0	0.0	0.0	0.0	95.2	101.5	107.9	114.2	120.5	126.9	133.2	139.6	145.9	152.3	158.6	164.9	171.3	177.6	190.3
MBR-LP-2		113,200	3.0			**7,351.4**	0.0	2,219.6	2,219.6	2,219.6	284.9	291.2	297.5	303.9	310.2	316.5	322.8	329.2	335.5	341.8	348.1	354.5	360.8	367.1	379.8
	Construction Cost			6,658.9	milion PHP	5,312.4	0.0	2,219.6	2,219.6	2,219.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			190.0	million PHP/yea	1,208.4	0.0	0.0	0.0	0.0	190.0	190.0	190.0	190.0	190.0	190.0	190.0	190.0	190.0	190.0	190.0	190.0	190.0	190.0	190.0
	Variable Cost of O&M Work			189.75	million PHP/yea	830.6	0.0	0.0	0.0	0.0	94.9	101.2	107.5	113.8	120.2	126.5	132.8	139.1	145.5	151.8	158.1	164.4	170.8	177.1	189.7
MBR-IMS-1		93,600	3.0			**5,329.6**	0.0	1,497.6	1,497.6	1,497.6	246.3	251.3	256.3	261.2	266.2	271.2	276.2	281.2	286.1	291.1	296.1	301.1	306.0	311.0	321.0
	Construction Cost			4,492.7	milion PHP	3,584.3	0.0	1,497.6	1,497.6	1,497.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			171.6	million PHP/yea	1,091.6	0.0	0.0	0.0	0.0	171.6	171.6	171.6	171.6	171.6	171.6	171.6	171.6	171.6	171.6	171.6	171.6	171.6	171.6	171.6
	Variable Cost of O&M Work			149.34	million PHP/yea	653.7	0.0	0.0	0.0	0.0	74.7	79.6	84.6	89.6	94.6	99.6	104.5	109.5	114.5	119.5	124.4	129.4	134.4	139.4	149.3
MBR-IMS-2		93,600	2.5			**5,215.8**	0.0	892.2	1,784.3	1,784.3	241.1	246.1	251.0	256.0	260.9	265.9	270.9	275.8	280.8	285.8	290.7	295.7	300.6	305.6	315.5
	Construction Cost			4,460.8	milion PHP	3,504.1	0.0	892.2	1,784.3	1,784.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			166.7	million PHP/yea	1,060.0	0.0	0.0	0.0	0.0	166.7	166.7	166.7	166.7	166.7	166.7	166.7	166.7	166.7	166.7	166.7	166.7	166.7	166.7	166.7
	Variable Cost of O&M Work			148.86	million PHP/yea	651.6	0.0	0.0	0.0	0.0	74.4	79.4	84.4	89.3	94.3	99.2	104.2	109.2	114.1	119.1	124.0	129.0	134.0	138.9	148.9
MBR-IMS-3		93,600	3.0			**5,289.3**	0.0	1,481.8	1,481.8	1,481.8	245.9	250.9	255.9	260.9	265.8	270.8	275.8	280.8	285.7	290.7	295.7	300.7	305.6	310.6	320.6
	Construction Cost			4,445.3	milion PHP	3,546.4	0.0	1,481.8	1,481.8	1,481.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			171.3	million PHP/yea	1,089.6	0.0	0.0	0.0	0.0	171.3	171.3	171.3	171.3	171.3	171.3	171.3	171.3	171.3	171.3	171.3	171.3	171.3	171.3	171.3
	Variable Cost of O&M Work			149.23	million PHP/yea	653.3	0.0	0.0	0.0	0.0	74.6	79.6	84.6	89.5	94.5	99.5	104.5	109.4	114.4	119.4	124.4	129.3	134.3	139.3	149.2
MBR-IMS-4		93,600	2.5			**5,166.0**	0.0	880.1	1,760.2	1,760.2	240.7	245.7	250.6	255.6	260.6	265.5	270.5	275.4	280.4	285.3	290.3	295.3	300.2	305.2	315.1
	Construction Cost			4,400.6	milion PHP	3,456.8	0.0	880.1	1,760.2	1,760.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			166.3	million PHP/yea	1,057.9	0.0	0.0	0.0	0.0	166.3	166.3	166.3	166.3	166.3	166.3	166.3	166.3	166.3	166.3	166.3	166.3	166.3	166.3	166.3
	Variable Cost of O&M Work			148.75	million PHP/yea	651.2	0.0	0.0	0.0	0.0	74.4	79.3	84.3	89.3	94.2	99.2	104.1	109.1	114.0	119.0	124.0	128.9	133.9	138.8	148.8
MBR-KWT-1		22,000	1.0			**1,368.5**	0.0	0.0	0.0	1,196.3	69.1	70.4	71.7	73.0	74.2	75.5	76.8	78.1	79.4	80.7	81.9	83.2	84.5	85.8	88.3
	Construction Cost			1,196.3	milion PHP	882.9	0.0	0.0	0.0	1,196.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			49.9	million PHP/yea	317.3	0.0	0.0	0.0	0.0	49.9	49.9	49.9	49.9	49.9	49.9	49.9	49.9	49.9	49.9	49.9	49.9	49.9	49.9	49.9
	Variable Cost of O&M Work			38.45	million PHP/yea	168.3	0.0	0.0	0.0	0.0	19.2	20.5	21.8	23.1	24.4	25.6	26.9	28.2	29.5	30.8	32.0	33.3	34.6	35.9	38.5
MBR-KWT-2		22,000	1.0			**1,349.5**	0.0	0.0	0.0	1,183.4	67.6	68.9	70.2	71.5	72.8	74.0	75.3	76.6	77.9	79.1	80.4	81.7	83.0	84.3	86.8
	Construction Cost			1,183.4	milion PHP	873.4	0.0	0.0	0.0	1,183.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			48.5	million PHP/yea	308.3	0.0	0.0	0.0	0.0	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5
	Variable Cost of O&M Work			38.34	million PHP/yea	167.8	0.0	0.0	0.0	0.0	19.2	20.4	21.7	23.0	24.3	25.6	26.8	28.1	29.4	30.7	31.9	33.2	34.5	35.8	38.3

Alternative Scheme	Cost Item	Design Capacity	Construction Period	Unit Cost		7.89% Life Cycle Cost (PHP million)	1 2019	2 2020	3 2021	4 2022	5 2023	6 2024	7 2025	8 2026	9 2027	10 2028	11 2029	12 2030	13 2031	14 2032	15 2033	16 2034	17 2035	18 2036	19 2037
	Treatment Rate										50.0%	53.3%	56.7%	60.0%	63.3%	66.7%	70.0%	73.3%	76.7%	80.0%	83.3%	86.7%	90.0%	93.3%	100.0%
MBR-KWT-3		22,000	1.0			**1,439.4**	0.0	0.0	0.0	1,288.9	69.5	70.8	72.1	73.4	74.6	75.9	77.2	78.5	79.8	81.1	82.3	83.6	84.9	86.2	88.8
	Construction Cost			1,288.9	milion PHP	951.2	0.0	0.0	0.0	1,288.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			50.3	million PHP/yea	319.8	0.0	0.0	0.0	0.0	50.3	50.3	50.3	50.3	50.3	50.3	50.3	50.3	50.3	50.3	50.3	50.3	50.3	50.3	50.3
	Variable Cost of O&M Work			38.47	million PHP/yea	168.4	0.0	0.0	0.0	0.0	19.2	20.5	21.8	23.1	24.4	25.6	26.9	28.2	29.5	30.8	32.1	33.3	34.6	35.9	38.5
MBR-KWT-4		22,000	1.0			**1,407.4**	0.0	0.0	0.0	1,258.5	68.0	69.3	70.6	71.9	73.2	74.4	75.7	77.0	78.3	79.5	80.8	82.1	83.4	84.7	87.2
	Construction Cost			1,258.5	milion PHP	928.8	0.0	0.0	0.0	1,258.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			48.9	million PHP/yea	310.8	0.0	0.0	0.0	0.0	48.9	48.9	48.9	48.9	48.9	48.9	48.9	48.9	48.9	48.9	48.9	48.9	48.9	48.9	48.9
	Variable Cost of O&M Work			38.35	million PHP/yea	167.9	0.0	0.0	0.0	0.0	19.2	20.5	21.7	23.0	24.3	25.6	26.8	28.1	29.4	30.7	32.0	33.2	34.5	35.8	38.4
SBR-LP-1		113,200	2.0			**6,058.4**	0.0	0.0	2,941.8	2,941.8	214.3	219.4	224.4	229.5	234.6	239.6	244.7	249.7	254.8	259.8	264.9	270.0	275.0	280.1	290.2
	Construction Cost			5,883.6	milion PHP	4,513.6	0.0	0.0	2,941.8	2,941.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			138.5	million PHP/yea	880.8	0.0	0.0	0.0	0.0	138.5	138.5	138.5	138.5	138.5	138.5	138.5	138.5	138.5	138.5	138.5	138.5	138.5	138.5	138.5
	Variable Cost of O&M Work			151.68	million PHP/yea	664.0	0.0	0.0	0.0	0.0	75.8	80.9	86.0	91.0	96.1	101.1	106.2	111.2	116.3	121.3	126.4	131.5	136.5	141.6	151.7
SBR-LP-2		113,200	2.0			**5,977.9**	0.0	0.0	2,975.6	2,975.6	193.7	198.8	203.8	208.8	213.8	218.8	223.9	228.9	233.9	238.9	243.9	248.9	254.0	259.0	269.0
	Construction Cost			5,951.1	milion PHP	4,565.4	0.0	0.0	2,975.6	2,975.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			118.5	million PHP/yea	753.5	0.0	0.0	0.0	0.0	118.5	118.5	118.5	118.5	118.5	118.5	118.5	118.5	118.5	118.5	118.5	118.5	118.5	118.5	118.5
	Variable Cost of O&M Work			150.54	million PHP/yea	659.0	0.0	0.0	0.0	0.0	75.3	80.3	85.3	90.3	95.3	100.4	105.4	110.4	115.4	120.4	125.4	130.5	135.5	140.5	150.5
SBR-IMS-1		93,600	2.0			**4,145.2**	0.0	0.0	1,904.8	1,904.8	169.8	173.7	177.7	181.7	185.7	189.7	193.6	197.6	201.6	205.6	209.6	213.5	217.5	221.5	229.5
	Construction Cost			3,809.6	milion PHP	2,922.6	0.0	0.0	1,904.8	1,904.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			110.0	million PHP/yea	699.9	0.0	0.0	0.0	0.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0
	Variable Cost of O&M Work			119.43	million PHP/yea	522.8	0.0	0.0	0.0	0.0	59.7	63.7	67.7	71.7	75.6	79.6	83.6	87.6	91.6	95.5	99.5	103.5	107.5	111.5	119.4
SBR-IMS-2		93,600	2.0			**4,000.9**	0.0	0.0	1,883.8	1,883.8	152.3	156.2	160.2	164.1	168.1	172.1	176.0	180.0	183.9	187.9	191.8	195.8	199.8	203.7	211.6
	Construction Cost			3,767.6	milion PHP	2,890.3	0.0	0.0	1,883.8	1,883.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			92.9	million PHP/yea	590.7	0.0	0.0	0.0	0.0	92.9	92.9	92.9	92.9	92.9	92.9	92.9	92.9	92.9	92.9	92.9	92.9	92.9	92.9	92.9
	Variable Cost of O&M Work			118.77	million PHP/yea	519.9	0.0	0.0	0.0	0.0	59.4	63.3	67.3	71.3	75.2	79.2	83.1	87.1	91.1	95.0	99.0	102.9	106.9	110.9	118.8
SBR-IMS-3		93,600	2.0			**4,212.0**	0.0	0.0	1,933.0	1,933.0	173.4	177.4	181.4	185.4	189.4	193.4	197.4	201.3	205.3	209.3	213.3	217.3	221.3	225.3	233.3
	Construction Cost			3,866.0	milion PHP	2,965.8	0.0	0.0	1,933.0	1,933.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			113.4	million PHP/yea	721.1	0.0	0.0	0.0	0.0	113.4	113.4	113.4	113.4	113.4	113.4	113.4	113.4	113.4	113.4	113.4	113.4	113.4	113.4	113.4
	Variable Cost of O&M Work			119.95	million PHP/yea	525.1	0.0	0.0	0.0	0.0	60.0	64.0	68.0	72.0	76.0	80.0	84.0	88.0	92.0	96.0	100.0	104.0	108.0	111.9	119.9
SBR-IMS-4		93,600	2.0			**4,089.1**	0.0	0.0	1,926.5	1,926.5	155.7	159.6	163.6	167.6	171.6	175.6	179.6	183.6	187.6	191.6	195.5	199.5	203.5	207.5	215.5
	Construction Cost			3,853.0	milion PHP	2,955.8	0.0	0.0	1,926.5	1,926.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			95.8	million PHP/yea	609.5	0.0	0.0	0.0	0.0	95.8	95.8	95.8	95.8	95.8	95.8	95.8	95.8	95.8	95.8	95.8	95.8	95.8	95.8	95.8
	Variable Cost of O&M Work			119.65	million PHP/yea	523.8	0.0	0.0	0.0	0.0	59.8	63.8	67.8	71.8	75.8	79.8	83.8	87.7	91.7	95.7	99.7	103.7	107.7	111.7	119.7
SBR-IMS-5		93,600	3.0			**4,104.2**	0.0	1,216.4	1,216.4	1,216.4	165.1	169.0	173.0	177.0	181.0	185.0	189.0	192.9	196.9	200.9	204.9	208.9	212.9	216.8	224.8
	Construction Cost			3,649.3	milion PHP	2,911.4	0.0	1,216.4	1,216.4	1,216.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			105.3	million PHP/yea	669.8	0.0	0.0	0.0	0.0	105.3	105.3	105.3	105.3	105.3	105.3	105.3	105.3	105.3	105.3	105.3	105.3	105.3	105.3	105.3
	Variable Cost of O&M Work			119.48	million PHP/yea	523.0	0.0	0.0	0.0	0.0	59.7	63.7	67.7	71.7	75.7	79.7	83.6	87.6	91.6	95.6	99.6	103.5	107.5	111.5	119.5
SBR-IMS-6		93,600	2.5			**3,935.8**	0.0	725.0	1,450.0	1,450.0	148.7	152.7	156.6	160.6	164.6	168.5	172.5	176.5	180.4	184.4	188.3	192.3	196.3	200.2	208.1
	Construction Cost			3,625.0	milion PHP	2,847.6	0.0	725.0	1,450.0	1,450.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			89.3	million PHP/yea	568.0	0.0	0.0	0.0	0.0	89.3	89.3	89.3	89.3	89.3	89.3	89.3	89.3	89.3	89.3	89.3	89.3	89.3	89.3	89.3
	Variable Cost of O&M Work			118.82	million PHP/yea	520.1	0.0	0.0	0.0	0.0	59.4	63.4	67.3	71.3	75.3	79.2	83.2	87.1	91.1	95.1	99.0	103.0	106.9	110.9	118.8
SBR-KWT-1		22,000	1.0			**1,015.4**	0.0	0.0	0.0	967.0	41.9	42.9	43.9	44.9	45.8	46.8	47.8	48.8	49.7	50.7	51.7	52.7	53.7	54.6	56.6
	Construction Cost			967.0	milion PHP	713.7	0.0	0.0	0.0	967.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			27.2	million PHP/yea	173.2	0.0	0.0	0.0	0.0	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2
	Variable Cost of O&M Work			29.36	million PHP/yea	128.5	0.0	0.0	0.0	0.0	14.7	15.7	16.6	17.6	18.6	19.6	20.6	21.5	22.5	23.5	24.5	25.4	26.4	27.4	29.4
SBR-KWT-2		22,000	1.0			**983.5**	0.0	0.0	0.0	959.8	37.8	38.7	39.7	40.7	41.7	42.6	43.6	44.6	45.6	46.5	47.5	48.5	49.5	50.4	52.4
	Construction Cost			959.8	milion PHP	708.3	0.0	0.0	0.0	959.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			23.2	million PHP/yea	147.4	0.0	0.0	0.0	0.0	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2	23.2
	Variable Cost of O&M Work			29.21	million PHP/yea	127.8	0.0	0.0	0.0	0.0	14.6	15.6	16.5	17.5	18.5	19.5	20.4	21.4	22.4	23.4	24.3	25.3	26.3	27.3	29.2
MBBR-LP-1		113,200	3.0			**6,716.7**	0.0	2,101.6	2,101.6	2,101.6	244.7	248.4	252.0	255.6	259.2	262.9	266.5	270.1	273.7	277.3	281.0	284.6	288.2	291.8	299.1
	Construction Cost			6,304.9	milion PHP	5,030.0	0.0	2,101.6	2,101.6	2,101.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			190.4	million PHP/yea	1,211.1	0.0	0.0	0.0	0.0	190.4	190.4	190.4	190.4	190.4	190.4	190.4	190.4	190.4	190.4	190.4	190.4	190.4	190.4	190.4
	Variable Cost of O&M Work			108.65	million PHP/yea	475.6	0.0	0.0	0.0	0.0	54.3	57.9	61.6	65.2	68.8	72.4	76.1	79.7	83.3	86.9	90.5	94.2	97.8	101.4	108.6
MBBR-LP-2		113,200	3.5			**6,874.8**	917.4	1,834.7	1,834.7	1,834.7	236.1	239.8	243.5	247.1	250.8	254.5	258.1	261.8	265.4	269.1	272.8	276.4	280.1	283.8	291.1
	Construction Cost			6,421.5	milion PHP	5,241.4	917.4	1,834.7	1,834.7	1,834.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			181.2	million PHP/yea	1,152.2	0.0	0.0	0.0	0.0	181.2	181.2	181.2	181.2	181.2	181.2	181.2	181.2	181.2	181.2	181.2	181.2	181.2	181.2	181.2
	Variable Cost of O&M Work			109.93	million PHP/yea	481.2	0.0	0.0	0.0	0.0	55.0	58.6	62.3	66.0	69.6	73.3	77.0	80.6	84.3	87.9	91.6	95.3	98.9	102.6	109.9
MBBR-IMS-1		93,600	2.5			**4,520.0**	0.0	810.5	1,621.0	1,621.0	194.1	196.9	199.8	202.6	205.5	208.3	211.2	214.0	216.9	219.7	222.6	225.4	228.2	231.1	236.8
	Construction Cost			4,052.5	milion PHP	3,183.4	0.0	810.5	1,621.0	1,621.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			151.4	million PHP/yea	962.8	0.0	0.0	0.0	0.0	151.4	151.4	151.4	151.4	151.4	151.4	151.4	151.4	151.4	151.4	151.4	151.4	151.4	151.4	151.4
	Variable Cost of O&M Work			85.40	million PHP/yea	373.9	0.0	0.0	0.0	0.0	42.7	45.5	48.4	51.2	54.1	56.9	59.8	62.6	65.5	68.3	71.2	74.0	76.9	79.7	85.4
MBBR-IMS-2		93,600	2.5			**4,307.7**	0.0	797.6	1,595.2	1,595.2	168.8	171.7	174.5	177.3	180.1	182.9	185.7	188.6	191.4	194.2	197.0	199.8	202.7	205.5	211.1
	Construction Cost			3,987.9	milion PHP	3,132.6	0.0	797.6	1,595.2	1,595.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			126.6	million PHP/yea	804.8	0.0	0.0	0.0	0.0	126.6	126.6	126.6	126.6	126.6	126.6	126.6	126.6	126.6	126.6	126.6	126.6	126.6	126.6	126.6
	Variable Cost of O&M Work			84.56	million PHP/yea	370.2	0.0	0.0	0.0	0.0	42.3	45.1	47.9	50.7	53.6	56.4	59.2	62.0	64.8	67.7	70.5	73.3	76.1	78.9	84.6
MBBR-IMS-3		93,600	2.5			**4,548.1**	0.0	818.2	1,636.5	1,636.5	194.0	196.8	199.6	202.4	205.2	208.0	210.8	213.6	216.4	219.2	222.0	224.8	227.6	230.4	236.0
	Construction Cost			4,091.2	milion PHP	3,213.8	0.0	818.2	1,636.5	1,636.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			151.9	million PHP/yea	965.9	0.0	0.0	0.0	0.0	151.9	151.9	151.9	151.9	151.9	151.9	151.9	151.9	151.9	151.9	151.9	151.9	151.9	151.9	151.9
	Variable Cost of O&M Work			84.15	million PHP/yea	368.4	0.0	0.0	0.0	0.0	42.1	44.9	47.7	50.5	53.3	56.1	58.9	61.7	64.5	67.3	70.1	72.9	75.7	78.5	84.2

Alternative Scheme	Cost Item	Design Capacity	Construction Period	Unit Cost		7.89%	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
						Life Cycle Cost (PHP million)	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
	Treatment Rate										50.0%	53.3%	56.7%	60.0%	63.3%	66.7%	70.0%	73.3%	76.7%	80.0%	83.3%	86.7%	90.0%	93.3%	100.0%
MBBR-IMS-4		93,600	3.0			**4,372.9**	0.0	1,301.2	1,301.2	1,301.2	182.4	185.2	187.9	190.6	193.4	196.1	198.9	201.6	204.3	207.1	209.8	212.6	215.3	218.1	223.5
	Construction Cost			3,903.6	milion PHP	3,114.3	0.0	1,301.2	1,301.2	1,301.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			141.3	million PHP/yea	898.5	0.0	0.0	0.0	0.0	141.3	141.3	141.3	141.3	141.3	141.3	141.3	141.3	141.3	141.3	141.3	141.3	141.3	141.3	141.3
	Variable Cost of O&M Work			82.25	million PHP/yea	360.1	0.0	0.0	0.0	0.0	41.1	43.9	46.6	49.4	52.1	54.8	57.6	60.3	63.1	65.8	68.5	71.3	74.0	76.8	82.3
MBBR-IMS-5		93,600	3.0			**4,422.1**	0.0	1,304.7	1,304.7	1,304.7	188.5	191.3	194.1	196.9	199.7	202.5	205.3	208.1	210.9	213.7	216.5	219.3	222.1	224.9	230.5
	Construction Cost			3,914.0	milion PHP	3,122.6	0.0	1,304.7	1,304.7	1,304.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			146.5	million PHP/yea	931.7	0.0	0.0	0.0	0.0	146.5	146.5	146.5	146.5	146.5	146.5	146.5	146.5	146.5	146.5	146.5	146.5	146.5	146.5	146.5
	Variable Cost of O&M Work			84.02	million PHP/yea	367.8	0.0	0.0	0.0	0.0	42.0	44.8	47.6	50.4	53.2	56.0	58.8	61.6	64.4	67.2	70.0	72.8	75.6	78.4	84.0
MBBR-IMS-6		93,600	2.5			**4,311.3**	0.0	776.7	1,553.5	1,553.5	182.6	185.3	188.1	190.9	193.6	196.4	199.2	202.0	204.7	207.5	210.3	213.0	215.8	218.6	224.1
	Construction Cost			3,883.6	milion PHP	3,050.7	0.0	776.7	1,553.5	1,553.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			141.0	million PHP/yea	896.5	0.0	0.0	0.0	0.0	141.0	141.0	141.0	141.0	141.0	141.0	141.0	141.0	141.0	141.0	141.0	141.0	141.0	141.0	141.0
	Variable Cost of O&M Work			83.18	million PHP/yea	364.1	0.0	0.0	0.0	0.0	41.6	44.4	47.1	49.9	52.7	55.5	58.2	61.0	63.8	66.5	69.3	72.1	74.9	77.6	83.2
MBBR-KWT-1		22,000	1.0			**1,070.1**	0.0	0.0	0.0	1,026.6	45.2	45.9	46.6	47.3	48.0	48.7	49.4	50.1	50.8	51.5	52.2	52.9	53.6	54.3	55.7
	Construction Cost			1,026.6	milion PHP	757.7	0.0	0.0	0.0	1,026.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			34.7	million PHP/yea	220.4	0.0	0.0	0.0	0.0	34.7	34.7	34.7	34.7	34.7	34.7	34.7	34.7	34.7	34.7	34.7	34.7	34.7	34.7	34.7
	Variable Cost of O&M Work			21.02	million PHP/yea	92.0	0.0	0.0	0.0	0.0	10.5	11.2	11.9	12.6	13.3	14.0	14.7	15.4	16.1	16.8	17.5	18.2	18.9	19.6	21.0
MBBR-KWT-2		22,000	1.0			**1,023.6**	0.0	0.0	0.0	972.8	44.1	44.8	45.5	46.2	46.9	47.6	48.3	49.0	49.7	50.4	51.1	51.8	52.5	53.2	54.6
	Construction Cost			972.8	milion PHP	718.0	0.0	0.0	0.0	972.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			33.7	million PHP/yea	214.5	0.0	0.0	0.0	0.0	33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7	33.7
	Variable Cost of O&M Work			20.83	million PHP/yea	91.2	0.0	0.0	0.0	0.0	10.4	11.1	11.8	12.5	13.2	13.9	14.6	15.3	16.0	16.7	17.4	18.1	18.7	19.4	20.8

Appendix 10

Water Demand Projection

Appendix 10 Projection of Water Demand and Revenue related to Sewerage Service

Water Demand Projection (Data source: Maynilad) (Unit: Million Cubic Meters)

Las Pinas City

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Domestic Demand	22.8	21.5	21.8	22.7	23.5	24.4	25.2	26.1	27.0	27.9	28.8	29.8	30.8	31.9	33.0	34.1	35.3	36.5	37.8	39.2	40.6	41.3	41.6	41.8	42.1	42.3	42.5	42.6
Commercial Demand	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.9	0.9	1.0	1.0	1.1	1.1	1.2	1.3	1.3	1.4	1.5	1.6	1.6	1.7	1.8	1.9	2.0	2.1	2.3
Total Demand	**23.4**	**22.1**	**22.4**	**23.3**	**24.2**	**25.1**	**25.9**	**26.9**	**27.8**	**28.8**	**29.7**	**30.8**	**31.8**	**33.0**	**34.1**	**35.3**	**36.6**	**37.8**	**39.2**	**40.7**	**42.2**	**42.9**	**43.3**	**43.6**	**44.0**	**44.3**	**44.6**	**44.9**

Imus City

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Domestic Demand	14.3	11.2	11.5	12.5	13.6	14.8	16.0	17.2	18.6	20.0	21.0	22.1	23.2	24.4	25.7	27.1	28.5	29.5	30.2	31.0	31.8	32.5	33.2	34.0	34.7	35.5	36.2	37.0
Commercial Demand	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total Demand	**14.3**	**11.2**	**11.5**	**12.5**	**13.6**	**14.8**	**16.0**	**17.2**	**18.6**	**20.0**	**21.0**	**22.1**	**23.2**	**24.5**	**25.8**	**27.2**	**28.6**	**29.6**	**30.3**	**31.1**	**31.9**	**32.6**	**33.3**	**34.1**	**34.8**	**35.6**	**36.3**	**37.1**

Kawit Town

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Domestic Demand	3.5	3.5	3.6	3.8	3.9	4.1	4.3	4.4	4.6	4.8	5.0	5.2	5.4	5.7	5.9	6.2	6.5	6.8	7.0	7.1	7.3	7.4	7.5	7.6	7.7	7.9	8.0	8.1
Commercial Demand	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.6
Total Demand	**3.7**	**3.7**	**3.8**	**4.0**	**4.1**	**4.3**	**4.5**	**4.6**	**4.8**	**5.0**	**5.2**	**5.5**	**5.7**	**6.0**	**6.2**	**6.5**	**6.8**	**7.2**	**7.4**	**7.5**	**7.7**	**7.8**	**8.0**	**8.1**	**8.2**	**8.4**	**8.6**	**8.7**

Revenue Projection related to Sewerage Service (Unit: PHP Million)

4.6 PHP/m3 : Domestic **17.0** PHP/m3 : Commercial

Las Pinas City

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Domestic Demand	104.9	98.9	100.3	104.4	108.1	112.2	115.9	120.1	124.2	128.3	132.5	137.1	141.7	146.7	151.8	156.9	162.4	167.9	173.9	180.3	186.8	190.0	191.4	192.3	193.7	194.6	195.5	196.0
Commercial Demand	10.2	10.2	10.2	10.2	11.9	11.9	11.9	13.6	13.6	15.3	15.3	17.0	17.0	18.7	18.7	20.4	22.1	22.1	23.8	25.5	27.2	27.2	28.9	30.6	32.3	34.0	35.7	39.1
Total Demand	**115.1**	**109.1**	**110.5**	**114.6**	**120.0**	**124.1**	**127.8**	**133.7**	**137.8**	**143.6**	**147.8**	**154.1**	**158.7**	**165.4**	**170.5**	**177.3**	**184.5**	**190.0**	**197.7**	**205.8**	**214.0**	**217.2**	**220.3**	**222.9**	**226.0**	**228.6**	**231.2**	**235.1**

Imus City

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Domestic Demand	65.8	51.5	52.9	57.5	62.6	68.1	73.6	79.1	85.6	92.0	96.6	101.7	106.7	112.2	118.2	124.7	131.1	135.7	138.9	142.6	146.3	149.5	152.7	156.4	159.6	163.3	166.5	170.2
Commercial Demand	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Demand	**65.8**	**51.5**	**52.9**	**57.5**	**62.6**	**68.1**	**73.6**	**79.1**	**85.6**	**92.0**	**96.6**	**101.7**	**106.7**	**113.9**	**119.9**	**126.4**	**132.8**	**137.4**	**140.6**	**144.3**	**148.0**	**151.2**	**154.4**	**158.1**	**161.3**	**165.0**	**168.2**	**171.9**

Kawit Town

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Domestic Demand	16.1	16.1	16.6	17.5	17.9	18.9	19.8	20.2	21.2	22.1	23.0	23.9	24.8	26.2	27.1	28.5	29.9	31.3	32.2	32.7	33.6	34.0	34.5	35.0	35.4	36.3	36.8	37.3
Commercial Demand	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	5.1	5.1	5.1	5.1	5.1	5.1	6.8	6.8	6.8	6.8	6.8	8.5	8.5	8.5	8.5	10.2	10.2
Total Demand	**19.5**	**19.5**	**20.0**	**20.9**	**21.3**	**22.3**	**23.2**	**23.6**	**24.6**	**25.5**	**26.4**	**29.0**	**29.9**	**31.3**	**32.2**	**33.6**	**35.0**	**38.1**	**39.0**	**39.5**	**40.4**	**40.8**	**43.0**	**43.5**	**43.9**	**44.8**	**47.0**	**47.5**

Appendix 11

Financial Analysis

Appendix 11 Revenue and Cost Comparison related to Sewerage Services of the Project

Alternative Scheme	Cost Item	Design Capacity	Construction Period	Unit Cost		7.89% Present Value (PHP million)	1 2019	2 2020	3 2021	4 2022	5 2023	6 2024	7 2025	8 2026	9 2027	10 2028	11 2029	12 2030	13 2031	14 2032	15 2033	16 2034	17 2035	18 2036	19 2037
	Treatment Rate										50.0%	53.3%	56.7%	60.0%	63.3%	66.7%	70.0%	73.3%	76.7%	80.0%	83.3%	86.7%	90.0%	93.3%	100.0%
Las Pinas	**Financial Cost**	113,200	3.5			**-6,402**	**-866.7**	**-1,733.4**	**-1,733.4**	**-1,733.4**	**-201.7**	**-206.4**	**-211.1**	**-215.7**	**-220.4**	**-225.0**	**-229.7**	**-234.3**	**-239.0**	**-243.6**	**-248.3**	**-252.9**	**-257.6**	**-262.3**	**-271.6**
	Construction Cost			6,066.9	milion PHP	-4,952	-866.7	-1,733.4	-1,733.4	-1,733.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			131.9	million PHP/yea	-839	0.0	0.0	0.0	0.0	-131.9	-131.9	-131.9	-131.9	-131.9	-131.9	-131.9	-131.9	-131.9	-131.9	-131.9	-131.9	-131.9	-131.9	-131.9
	Variable Cost of O&M Work			139.62	million PHP/yea	-611	0.0	0.0	0.0	0.0	-69.8	-74.5	-79.1	-83.8	-88.4	-93.1	-97.7	-102.4	-107.0	-111.7	-116.4	-121.0	-125.7	-130.3	-139.6
	Revenue					**1,262**	**0**	**0**	**0**	**0**	**165.4**	**170.5**	**177.3**	**184.5**	**190.0**	**197.7**	**205.8**	**214.0**	**217.2**	**220.3**	**222.9**	**226.0**	**228.6**	**231.2**	**235.1**
	Environmenat and Sewer Charges					1,262	0	0	0	0	165.4	170.5	177.3	184.5	190.0	197.7	205.8	214.0	217.2	220.3	222.9	226.0	228.6	231.2	235.1
	Cash Balance			**FIRR**	N.A.	-5,140	-866.7	-1,733.4	-1,733.4	-1,733.4	-36.3	-35.9	-33.8	-31.2	-30.4	-27.3	-23.9	-20.4	-21.8	-23.4	-25.4	-27.0	-29.0	-31.1	-36.5
Imus	**Financial Cost**	93,600	2.0			**-4,212**	**0.0**	**0.0**	**-1,933.0**	**-1,933.0**	**-173.4**	**-177.4**	**-181.4**	**-185.4**	**-189.4**	**-193.4**	**-197.4**	**-201.3**	**-205.3**	**-209.3**	**-213.3**	**-217.3**	**-221.3**	**-225.3**	**-233.3**
	Construction Cost			3,866.0	milion PHP	-2,966	0.0	0.0	-1,933.0	-1,933.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			113.4	million PHP/yea	-721	0.0	0.0	0.0	0.0	-113.4	-113.4	-113.4	-113.4	-113.4	-113.4	-113.4	-113.4	-113.4	-113.4	-113.4	-113.4	-113.4	-113.4	-113.4
	Variable Cost of O&M Work			119.95	million PHP/yea	-525	0.0	0.0	0.0	0.0	-60.0	-64.0	-68.0	-72.0	-76.0	-80.0	-84.0	-88.0	-92.0	-96.0	-100.0	-104.0	-108.0	-111.9	-119.9
	Revenue					**895**	**0**	**0**	**0**	**0**	**113.9**	**119.9**	**126.4**	**132.8**	**137.4**	**140.6**	**144.3**	**148.0**	**151.2**	**154.4**	**158.1**	**161.3**	**165.0**	**168.2**	**171.9**
	Environmenat and Sewer Charges					895	0	0	0	0	113.9	119.9	126.4	132.8	137.4	140.6	144.3	148.0	151.2	154.4	158.1	161.3	165.0	168.2	171.9
	Cash Balance			**FIRR**	N.A.	-3,317	0.0	0.0	-1,933.0	-1,933.0	-59.4	-57.4	-55.0	-52.6	-52.0	-52.7	-53.1	-53.4	-54.1	-54.9	-55.2	-56.0	-56.3	-57.1	-61.4
Kawit	**Financial Cost**	22,000	1.0			**-1,050**	**0.0**	**0.0**	**0.0**	**-1,030.8**	**-40.5**	**-41.4**	**-42.3**	**-43.2**	**-44.1**	**-45.0**	**-45.9**	**-46.7**	**-47.6**	**-48.5**	**-49.4**	**-50.3**	**-51.2**	**-52.1**	**-53.8**
	Construction Cost			1,030.8	milion PHP	-761	0.0	0.0	0.0	-1,030.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			27.2	million PHP/yea	-173	0.0	0.0	0.0	0.0	-27.2	-27.2	-27.2	-27.2	-27.2	-27.2	-27.2	-27.2	-27.2	-27.2	-27.2	-27.2	-27.2	-27.2	-27.2
	Variable Cost of O&M Work			26.60	million PHP/yea	-116	0.0	0.0	0.0	0.0	-13.3	-14.2	-15.1	-16.0	-16.8	-17.7	-18.6	-19.5	-20.4	-21.3	-22.2	-23.1	-23.9	-24.8	-26.6
	Revenue					**244**	**0**	**0**	**0**	**0**	**31.3**	**32.2**	**33.6**	**35.0**	**38.1**	**39.0**	**39.5**	**40.4**	**40.8**	**43.0**	**43.5**	**43.9**	**44.8**	**47.0**	**47.5**
	Environmenat and Sewer Charges					244	0	0	0	0	31.3	32.2	33.6	35.0	38.1	39.0	39.5	40.4	40.8	43.0	43.5	43.9	44.8	47.0	47.5
	Cash Balance			**FIRR**	N.A.	-806	0.0	0.0	0.0	-1,030.8	-9.2	-9.2	-8.7	-8.2	-6.0	-6.0	-6.4	-6.4	-6.8	-5.5	-5.9	-6.4	-6.3	-5.1	-6.4
Total	**Total Cost**					**(11,665)**	**-866.7**	**-1,733.4**	**-3,666.4**	**-4,697.2**	**-415.6**	**-425.2**	**-434.7**	**-444.3**	**-453.8**	**-463.3**	**-472.9**	**-482.4**	**-492.0**	**-501.5**	**-511.0**	**-520.6**	**-530.1**	**-539.6**	**-558.7**
	Total Revenue					**2,401**	**0.0**	**0.0**	**0.0**	**0.0**	**310.7**	**322.7**	**337.2**	**352.3**	**365.5**	**377.3**	**389.6**	**402.3**	**409.2**	**417.7**	**424.4**	**431.2**	**438.4**	**446.4**	**454.4**
	Cash Balance			**FIRR**	N.A.	**(9,264)**	**-866.7**	**-1,733.4**	**-3,666.4**	**-4,697.2**	**-104.9**	**-102.5**	**-97.5**	**-92.0**	**-88.3**	**-86.0**	**-83.3**	**-80.1**	**-82.7**	**-83.8**	**-86.6**	**-89.4**	**-91.7**	**-93.2**	**-104.3**

Appendix 12

Economic Analysis

Appendix 12 Economic Analisys of the Project

Alternative Scheme	Cost Item	Design Capacity	Construction Period	Unit Cost		10.00% NPV (PHP million)	1 2019	2 2020	3 2021	4 2022	5 2023	6 2024	7 2025	8 2026	9 2027	10 2028	11 2029	12 2030	13 2031	14 2032	15 2033	16 2034	17 2035	18 2036	19 2037	20 2038	21 2039	22 2040	23 2041	24 2042	25 2043	26 2044	27 2045	28 2046	29 2047	30 2048
	Treatment Rate										50.0%	53.3%	56.7%	60.0%	63.3%	66.7%	70.0%	73.3%	76.7%	80.0%	83.3%	86.7%	90.0%	93.3%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Population	Las Pinas						632,529	640,834	647,831	654,904	662,054	669,282	676,589	681,970	687,394	692,861	698,371	703,925	708,025	712,148	716,295	720,466	724,662	727,280	729,908												
	Imus						406,465	418,795	430,513	442,558	454,941	467,670	480,755	492,839	505,226	517,926	530,944	544,290	556,529	569,044	581,841	594,925	608,303	620,405	632,748					no available data						
	Kawit						99,319	101,671	103,863	106,102	108,390	110,726	113,114	115,256	117,438	119,662	121,928	124,237	126,287	128,370	130,488	132,641	134,830	136,699	138,595												
Las Pinas	**Economic Costs**	113,200	3.5			**-6,109.9**	**-780.0**	**-1,560.1**	**-1,560.1**	**-1,560.1**	**-181.6**	**-185.8**	**-190.0**	**-194.1**	**-198.3**	**-202.5**	**-206.7**	**-210.9**	**-215.1**	**-219.3**	**-223.5**	**-227.6**	**-231.8**	**-236.0**	**-244.4**	**-244.4**	**-244.4**	**-244.4**	**-244.4**	**-244.4**	**-244.4**	**-244.4**	**-244.4**	**-244.4**	**-244.4**	**-244.4**
	Construction Cost			5,460.2	milion PHP	-4,659.7	-780.0	-1,560.1	-1,560.1	-1,560.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			118.7	million PHP/year	-817.3	0.0	0.0	0.0	0.0	-118.7	-118.7	-118.7	-118.7	-118.7	-118.7	-118.7	-118.7	-118.7	-118.7	-118.7	-118.7	-118.7	-118.7	-118.7	-118.7	-118.7	-118.7	-118.7	-118.7	-118.7	-118.7	-118.7	-118.7	-118.7
	Variable Cost of O&M Work			125.66	million PHP/year	-633.0	0.0	0.0	0.0	0.0	-62.8	-67.0	-71.2	-75.4	-79.6	-83.8	-88.0	-92.2	-96.3	-100.5	-104.7	-108.9	-113.1	-117.3	-125.7	-125.7	-125.7	-125.7	-125.7	-125.7	-125.7	-125.7	-125.7	-125.7	-125.7	-125.7
	Economic Benefits					**7,071**	**0.0**	**0.0**	**0.0**	**0.0**	**1,382.2**	**1,387.5**	**1,394.5**	**1,401.9**	**1,407.6**	**1,415.4**	**1,423.8**	**1,432.1**	**1,435.4**	**1,438.6**	**245.4**	**248.6**	**251.3**	**254.0**	**258.0**	**258.0**	**258.0**	**258.0**	**258.0**	**258.0**	**258.0**	**258.0**	**258.0**	**258.0**	**258.0**	**258.0**	**258.0**
	Willingness to Pay					1,398.6	0.0	0.0	0.0	0.0	165.4	170.5	177.3	184.5	190.0	197.7	205.8	214.0	217.2	220.3	222.9	226.0	228.6	231.2	235.1	235.1	235.1	235.1	235.1	235.1	235.1	235.1	235.1	235.1	235.1	235.1	235.1
	Reduciton of Medical Cost			32.99		151.1	0.0	0.0	0.0	0.0	20.8	21.0	21.3	21.4	21.6	21.8	21.9	22.1	22.2	22.4	22.5	22.6	22.8	22.8	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9
	Increase of Land Value		6,500	18.40	km2	5,521.3	0.0	0.0	0.0	0.0	1,196.0	1,196.0	1,196.0	1,196.0	1,196.0	1,196.0	1,196.0	1,196.0	1,196.0	1,196.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
				B/C	**1.16**																															
	Cash Balance			**EIRR**	**13.4%**	**961**	**-780.0**	**-1,560.1**	**-1,560.1**	**-1,560.1**	**1,200.7**	**1,201.8**	**1,204.6**	**1,207.8**	**1,209.3**	**1,212.9**	**1,217.1**	**1,221.2**	**1,220.3**	**1,219.4**	**21.9**	**20.9**	**19.5**	**18.0**	**13.6**	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6
Imus	**Economic Costs**	93,600	2.0			**-3,745.7**	**0.0**	**0.0**	**-1,739.7**	**-1,739.7**	**-156.0**	**-159.6**	**-163.2**	**-166.8**	**-170.4**	**-174.0**	**-177.6**	**-181.2**	**-184.8**	**-188.4**	**-192.0**	**-195.6**	**-199.2**	**-202.8**	**-210.0**	**-210.0**	**-210.0**	**-210.0**	**-210.0**	**-210.0**	**-210.0**	**-210.0**	**-210.0**	**-210.0**	**-210.0**	**-210.0**	**-210.0**
	Construction Cost			3,479.4	milion PHP	-2,744.8	0.0	0.0	-1,739.7	-1,739.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			102.1	million PHP/year	-702.4	0.0	0.0	0.0	0.0	-102.1	-102.1	-102.1	-102.1	-102.1	-102.1	-102.1	-102.1	-102.1	-102.1	-102.1	-102.1	-102.1	-102.1	-102.1	-102.1	-102.1	-102.1	-102.1	-102.1	-102.1	-102.1	-102.1	-102.1	-102.1	-102.1
	Variable Cost of O&M Work			107.95	million PHP/year	-543.8	0.0	0.0	0.0	0.0	-54.0	-57.6	-61.2	-64.8	-68.4	-72.0	-75.6	-79.2	-82.8	-86.4	-90.0	-93.6	-97.2	-100.8	-108.0	-108.0	-108.0	-108.0	-108.0	-108.0	-108.0	-108.0	-108.0	-108.0	-108.0	-108.0	-108.0
	Economic Benefits					**3,718**	**0.0**	**0.0**	**0.0**	**0.0**	**740.7**	**747.1**	**754.0**	**760.8**	**765.8**	**769.4**	**773.5**	**777.6**	**781.2**	**784.8**	**176.4**	**180.0**	**184.1**	**187.7**	**191.8**	**191.8**	**191.8**	**191.8**	**191.8**	**191.8**	**191.8**	**191.8**	**191.8**	**191.8**	**191.8**	**191.8**	**191.8**
	Willingness to Pay					997.1	0.0	0.0	0.0	0.0	113.9	119.9	126.4	132.8	137.4	140.6	144.3	148.0	151.2	154.4	158.1	161.3	165.0	168.2	171.9	171.9	171.9	171.9	171.9	171.9	171.9	171.9	171.9	171.9	171.9	171.9	171.9
	Reduciton of Medical Cost			64.70		116.9	0.0	0.0	0.0	0.0	14.3	14.7	15.1	15.5	15.9	16.3	16.7	17.1	17.5	17.9	18.3	18.7	19.1	19.5	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9
	Increase of Land Value		3,500	17.50	km2	3,763.5					612.5	612.5	612.5	612.5	612.5	612.5	612.5	612.5	612.5	612.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
				B/C	**0.99**																															
	Cash Balance			**EIRR**	**9.6%**	**-28**	**0.0**	**0.0**	**-1,739.7**	**-1,739.7**	**584.7**	**587.5**	**590.7**	**594.0**	**595.4**	**595.4**	**595.9**	**596.4**	**596.4**	**596.4**	**-15.6**	**-15.6**	**-15.1**	**-15.1**	**-18.2**	**-18.2**	**-18.2**	**-18.2**	**-18.2**	**-18.2**	**-18.2**	**-18.2**	**-18.2**	**-18.2**	**-18.2**	**-18.2**
Kawit	**Economic Costs**	22,000	1.0			**-929.7**	**0.0**	**0.0**	**0.0**	**-927.7**	**-36.5**	**-37.3**	**-38.1**	**-38.9**	**-39.7**	**-40.5**	**-41.3**	**-42.1**	**-42.9**	**-43.7**	**-44.5**	**-45.3**	**-46.1**	**-46.9**	**-48.4**	**-48.4**	**-48.4**	**-48.4**	**-48.4**	**-48.4**	**-48.4**	**-48.4**	**-48.4**	**-48.4**	**-48.4**	**-48.4**
	Construction Cost			927.7	milion PHP	-697.0	0.0	0.0	0.0	-927.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fixed Cost of O&M Work			24.5	million PHP/year	-168.7	0.0	0.0	0.0	0.0	-24.5	-24.5	-24.5	-24.5	-24.5	-24.5	-24.5	-24.5	-24.5	-24.5	-24.5	-24.5	-24.5	-24.5	-24.5	-24.5	-24.5	-24.5	-24.5	-24.5	-24.5	-24.5	-24.5	-24.5	-24.5	-24.5
	Variable Cost of O&M Work			23.94	million PHP/year	-120.6	0.0	0.0	0.0	0.0	-12.0	-12.8	-13.6	-14.4	-15.2	-16.0	-16.8	-17.6	-18.4	-19.2	-19.9	-20.7	-21.5	-22.3	-23.9	-23.9	-23.9	-23.9	-23.9	-23.9	-23.9	-23.9	-23.9	-23.9	-23.9	-23.9
	Economic Benefits					**1,381**	**0.0**	**0.0**	**0.0**	**0.0**	**282.2**	**283.2**	**284.7**	**286.1**	**289.3**	**290.3**	**290.8**	**291.8**	**292.3**	**294.5**	**47.6**	**48.1**	**49.1**	**51.3**	**51.8**	**51.8**	**51.8**	**51.8**	**51.8**	**51.8**	**51.8**	**51.8**	**51.8**	**51.8**	**51.8**	**51.8**	**51.8**
	Willingness to Pay					272.5	0.0	0.0	0.0	0.0	31.3	32.2	33.6	35.0	38.1	39.0	39.5	40.4	40.8	43.0	43.5	43.9	44.8	47.0	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5
	Reduciton of Medical Cost			13.4		26.7	0.0	0.0	0.0	0.0	3.4	3.5	3.6	3.6	3.7	3.8	3.8	3.9	4.0	4.0	4.1	4.2	4.2	4.3	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
	Increase of Land Value		5,500	4.5	km2	1,142.6	0.0	0.0	0.0	0.0	247.5	247.5	247.5	247.5	247.5	247.5	247.5	247.5	247.5	247.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
				B/C	**1.49**																															
	Cash Balance			**EIRR**	**23.5%**	**452**	**0.0**	**0.0**	**0.0**	**-927.7**	**245.7**	**245.9**	**246.6**	**247.2**	**249.6**	**249.8**	**249.5**	**249.7**	**249.4**	**250.9**	**3.1**	**2.8**	**3.0**	**4.4**	**3.4**	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
Total	**Economic Costs**					**-11,087**	**-780.0**	**-1,560.1**	**-3,299.8**	**-4,227.5**	**-374.1**	**-382.7**	**-391.3**	**-399.8**	**-408.4**	**-417.0**	**-425.6**	**-434.2**	**-442.8**	**-451.3**	**-459.9**	**-468.5**	**-477.1**	**-485.7**	**-502.9**	**-502.9**	**-502.9**	**-502.9**	**-502.9**	**-502.9**	**-502.9**	**-502.9**	**-502.9**	**-502.9**	**-502.9**	**-502.9**	**-502.9**
	Economic Benefits			**B/C**	**1.12**	**12,454**	**0.0**	**0.0**	**0.0**	**0.0**	**2,405.2**	**2,417.9**	**2,433.2**	**2,448.8**	**2,462.6**	**2,475.1**	**2,488.0**	**2,501.4**	**2,508.9**	**2,518.0**	**469.3**	**476.7**	**484.5**	**493.1**	**501.6**	**501.6**	**501.6**	**501.6**	**501.6**	**501.6**	**501.6**	**501.6**	**501.6**	**501.6**	**501.6**	**501.6**	**501.6**
	Cost Benefit Balance			**EIRR**	**13.1%**	**1,367**	**-780.0**	**-1,560.1**	**-3,299.8**	**-4,227.5**	**2,031.1**	**2,035.2**	**2,041.9**	**2,049.0**	**2,054.2**	**2,058.1**	**2,062.4**	**2,067.3**	**2,066.2**	**2,066.6**	**9.4**	**8.2**	**7.4**	**7.4**	**-1.3**	**-1.3**	**-1.3**	**-1.3**	**-1.3**	**-1.3**	**-1.3**	**-1.3**	**-1.3**	**-1.3**	**-1.3**	**-1.3**	**-1.3**
Sensitibity Analysis	**Cost Increase +10%**					**-12,196**	-858.0	-1716.1	-3629.7	-4650.2	-411.5	-420.9	-430.4	-439.8	-449.3	-458.7	-468.1	-477.6	-487.0	-496.5	-505.9	-515.4	-524.8	-534.3	-553.1	-553.1	-553.1	-553.1	-553.1	-553.1	-553.1	-553.1	-553.1	-553.1	-553.1	-553.1
	Benefit Reduction -10%					**11,209**	0.0	0.0	0.0	0.0	2164.7	2176.1	2189.8	2203.9	2216.4	2227.6	2239.2	2251.3	2258.0	2266.2	422.4	429.0	436.1	443.7	451.4	451.4	451.4	451.4	451.4	451.4	451.4	451.4	451.4	451.4	451.4	451.4	451.4
	Cost Benefit Balance		**B/C**		**EIRR**																															
	Case 1 (cost +10%)		1.02		**10.6%**	**258**	-858.0	-1716.1	-3629.7	-4650.2	1993.7	1996.9	2002.8	2009.0	2013.4	2016.4	2019.9	2023.8	2021.9	2021.5	-36.6	-38.7	-40.3	-41.2	-51.6	-51.6	-51.6	-51.6	-51.6	-51.6	-51.6	-51.6	-51.6	-51.6	-51.6	-51.6
	Case 2 (benefit -10%)		1.01		**10.3%**	**122**	-780.0	-1560.1	-3299.8	-4227.5	1790.6	1793.4	1798.6	1804.1	1808.0	1810.6	1813.6	1817.1	1815.3	1814.8	-37.5	-39.5	-41.0	-41.9	-51.4	-51.4	-51.4	-51.4	-51.4	-51.4	-51.4	-51.4	-51.4	-51.4	-51.4	-51.4	-51.4
	Case 3 (worst)		0.92		**7.6%**	**-987**	-858.0	-1716.1	-3629.7	-4650.2	1753.2	1755.1	1759.5	1764.1	1767.1	1768.9	1771.1	1773.7	1771.0	1769.7	-83.5	-86.3	-88.7	-90.5	-101.7	-101.7	-101.7	-101.7	-101.7	-101.7	-101.7	-101.7	-101.7	-101.7	-101.7	-101.7	-101.7

Appendix 13

List of Philippines International Agreements on Environment and Natural Resources

PHILIPPINES INTERNATIONAL AGREEMENTS ON ENVIRONMENT AND NATURAL RESOURCES

TREATIES/AGREEMENTS	FOCUS/OBJECTIVE	DATE	FOCAL OFFICE
	MULTILATERAL		
1. Food and Agriculture Organization (FAO) Committee on Forestry (COFO)	The FAO of the United Nations (UN) created the COFO as one of its governing bodies to fulfill its goal in providing food security for everyone. The COFO, as the highest FAO forestry statutory body, gathers 138 countries in biennial session at the FAO Headquarters in Rome, Italy. It brings together senior government officials and heads of different forest services to review international forestry problems, identify emerging policy and technical issues, provide possible solutions, and advise FAO on appropriate action.	First Session: May 1972	Forestry Management Bureau (FMB)
2. International Hydrographic Organization (IHO)	The IHO is an intergovernmental consultative and technical organization established to support safety of navigation and the protection of the marine environment. It aims to coordinate activities of national hydrographic offices, have uniform nautical charts and documents, promote adoption of reliable and efficient methods of carrying out and exploiting hydrographic surveys and develop the sciences in the field of hydrography and the techniques employed in descriptive oceanography.	Date Established: 1921 / Date Convention was Enforced: 1970	National Mapping and Resource Information Authority (NAMRIA)
3. International Tropical Timber Organization (ITTO)	With the support of the United Nations Conference on Trade and Development (UNCTAD), the International Tropical Timber Agreement (ITTA) was negotiated to provide an effective framework for cooperation and consultation between countries producing and consuming tropical timber, and promote and support research and development to improve forest management and wood utilization. The International Tropical Timber Organization (ITTO), based in Yokohama Japan, was established by the ITTA in 1983. The ITTO has 72 members, which are divided into two groups: producer countries (34 members) where the Philippines belongs and consumer countries (38 members) which include the European Union.	Established 1983	Forestry Management Bureau (FMB)
4. United Nations Environment Assembly (UNEA)	UNEA is a result of the call made by world leaders at the United Nations Conference on Sustainable Development (Rio+20), held in Brazil in June 2012, to strengthen and upgrade the United Nations Environment Programme (UNEP) as the leading global environmental authority that sets the global environmental agenda and by establishing universal membership in its Governing Council. It serves as the Assembly for the UNEP. The first UNEA was held in 23-27 June 2014 in Nairobi Kenya, and was attended by over 1,065 participants, including 163 Member States and 113 Ministers.	First Assembly: June 23-27, 2014	Department of Environment and Natural Resources (DENR) Central Office
5. United Nations Forum on Forests (UNFF)	The United Nations Forum on Forests (UNFF) was established by the Economic and Social Council's (ECOSOC) Resolution 2000/35 as part of a new international arrangement on forests, to carry on the work built on the Intergovernmental Panel on Forests (IPF) and International Forum on Forests (IFF) processes. The Forum is composed of all Member States of the United Nations and specialized agencies. The main objective of UNFF is to promote the management, conservation and sustainable development of all types of forests and strengthen long-term political commitment.	Established 2000	Forestry Management Bureau (FMB)
6. Basel Convention	The Basel Convention is an international treaty designed to reduce the movements of hazardous waste between nations, specifically to prevent transfer of hazardous waste from developed to less developed countries (LDCs). The Basel Convention on the Control of Transboundary Movements of Hazardous Waste was adopted on 22 March 1989 by the Conference of Plenipotentiaries in Basel, Switzerland, in response to a public outcry following the discovery of deposits of toxic wastes imported to Africa and other parts of the developing world.	Date Ratified: January 19, 1994	Environmental Management Bureau (EMB)

PHILIPPINES INTERNATIONAL AGREEMENTS ON ENVIRONMENT AND NATURAL RESOURCES

TREATIES/AGREEMENTS	FOCUS/OBJECTIVE	DATE	FOCAL OFFICE
	MULTILATERAL		
7. Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention / CMS)	Bonn Convention provides a global platform for the conservation and sustainable use of migratory animals and their habitats. CMS brings together the States through which migratory animals pass and lays the legal foundation for internationally coordinated conservation measures throughout a migratory range. Through CMS, Parties also agree that Range States (countries where a particular migratory species reside in or traverse through) should take joint conservation action.	Date Ratified: February 1, 1994	Biodiversity Management Bureau (BMB)
8. Memorandum of Understanding (MOU) on the Conservation and Management of Dugongs and their Habitats throughout their Range	The Memorandum of Understanding on the Conservation and Management of Dugongs (Dugong dugon) and their Habitats throughout their Range (Dugong MOU) is a CMS instrument which aims to promote and ensure the long-term survival of Dugongs and their seagrass habitats	Date Ratified: August 19, 2008	BMB
9. MOU on the Conservation and Management of Marine Turtles and their habitats of the Indian Ocean and South-East Asia	he Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (IOSEA Marine Turtle MOU) is a CMS instrument which aims to protect, conserve, replenish and recover marine turtles and their habitats, based on the best scientific evidence, taking into account the environmental, socio-economic and cultural characteristics of the signatory States.	Date Ratified: June 23, 2001	BMB
10. MOU on the Conservation of Migratory Sharks	The Memorandum of Understanding on the Conservation of Migratory Sharks is the first global instrument for the conservation of migratory species of sharks listed on Appendix I or II of the Bonn Convention. The legally non-binding international instrument aims to achieve and maintain a favorable conservation status for migratory sharks based on the best available scientific information, taking into account the socio-economic value of these species for concerned areas.	Date Ratified: February 12, 2010	BMB
11. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	The CITES ensures that international trade in specimens of wild animals and plants does not threaten their survival. CITES provides control for the international trade (importation, exportation) of specimens of selected species through a licensing system for importation/exportation. These species are categorized according to the degree of protection needed:	Date Ratified: August 18, 1981	BMB
12. Convention on Biological Diversity (CBD)	The CBD aims to conserve biological diversity, promote sustainable use of components of biological diversity and the fair and equitable sharing of benefits arising out of the utilization of genetic resources. The Convention was opened for signature on 5 June 1992 at the United Nations Conference on Environment and Development (the Rio Earth Summit). It entered into force on 29 December 1993. The Philippine government signed the Convention on 12 June 1992.	Date Ratified: Party since October 8, 1993	BMB
13. Cartagena Protocol	The Cartagena Protocol on Biosafety to the Convention on Biological Diversity is an international agreement which aims to ensure the safe handling, transport and use of living modified organisms (LMOs) resulting from modern biotechnology that may have adverse effects on biological diversity, taking also into account risks to human health.	Date Ratified: Party since October 5, 2006	BMB

PHILIPPINES INTERNATIONAL AGREEMENTS ON ENVIRONMENT AND NATURAL RESOURCES

TREATIES/AGREEMENTS	FOCUS/OBJECTIVE	DATE	FOCAL OFFICE
	MULTILATERAL		
14. Nagoya Protocol	The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (ABS) to the Convention on Biological Diversity is a supplementary agreement to the Convention on Biological Diversity. It provides a transparent legal framework for the effective implementation of one of the three objectives of the CBD: the fair and equitable sharing of benefits arising out of the utilization of genetic resources. It was adopted by the Conference of the Parties to the Convention on Biological Diversity at its' tenth meeting on 29 October 2010 in Nagoya, Japan.	Date Ratified: Party since September 29, 2015	BMB
15. Minamata Convention	The Minamata Convention on Mercury is a global treaty to protect human health and the environment from the adverse effects of mercury pollution, including a ban on new mercury mines, the phase-out of existing ones, control measures on air emissions, and the international regulation of the informal sector for artisanal and small-scale gold mining. The convention is named after Minamata Bay, which was contaminated by methyl mercury discharged from a local chemical factory. The text of the Minamata Convention on Mercury was adopted by the Conference of Plenipotentiaries on 10 October 2013 in Kumamoto, Japan.	Date Ratified: Signed on October 10, 2013	EMB
16. Convention on Wetlands (Ramsar Convention)	The Convention on Wetlands of International Importance (Ramsar Convention) is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. It was developed and adopted by participating nations in Ramsar, Iran on 2 February 1971 and came into force on 21 December 1975. The Philippines become a Contracting Party to the Convention on 8 November 1994.	Date Ratified: November 9, 1994	BMB
17. Rotterdam Convention	The Convention creates legally binding obligations for the implementation of the Prior Informed Consent (PIC) procedure, covering pesticides and industrial chemicals that have been banned or severely restricted for health or environmental reasons by the Parties to the Convention. The Convention entered into force in 23 February 2004.	Date Ratified: July 31, 2006	EMB
18. Stockholm Convention	The Stockholm Convention is a global treaty to protect human health and the environment from the adverse effects of persistent organic pollutants (POPs). Adopted in 2001 and entered into force in 2004, the convention requires its parties to take measures to eliminate or reduce the release of POPs into the environment. The Convention was adopted and opened for signature at a Conference of Plenipotentiaries in Stockholm, Sweden in May 2001.	Date Ratified: May 27, 2004	EMB
19. United Nations Convention on the Law of the Sea (UNCLOS)	The United Nations Convention on the Law of the Sea (UNCLOS) establishes a comprehensive legal framework to govern all activities and uses of the world's seas and oceans. The Convention defines the limits of territorial seas of countries from which they can explore and exploit marine resources. As of January 2015, 166 countries and the European Union have joined the Convention. The Philippines is the 11th country that ratified the Convention.	Date Ratified: Signed the convention on December 10, 1984	NAMRIA

PHILIPPINES INTERNATIONAL AGREEMENTS ON ENVIRONMENT AND NATURAL RESOURCES

TREATIES/AGREEMENTS	FOCUS/OBJECTIVE	DATE	FOCAL OFFICE
	MULTILATERAL		
20. United Nations Framework Convention on Climate Change	The United Nations Framework Convention on Climate Change is an international treaty focusing on what countries could do to limit average global temperature increases and the resulting climate change. The ultimate objective of the convention is the stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.	Date Ratified: November 20, 2003	EMB
21. Kyoto Protocol	The Kyoto Protocol is an international treaty under the UNFCCC. Adopted last 1997, the protocol commits 43 Annex I countries to limit their greenhouse gas emissions for the period 2008-2012 below or equal to the level of their emissions in 1990. By 2012, the Doha Amendment to the protocol was proposed to extend the protocol to a second commitment period for 2013-2020. However, only 37 countries have committed to binding targets.	Date Ratified: November 20, 2003	EMB
22. Vienna Convention for the Protection of the Ozone Layer	The Vienna Convention serves as a framework for efforts to protect the globe's ozone layer.	Date Ratified: July 17, 1991	EMB
23. Montreal Protocol	The Montreal Protocol on Substances That Deplete the Ozone Layer is a landmark international agreement designed to protect the stratospheric ozone layer from depletion due to ozone (O3) reaction with halogenated hydrocarbons.	Date Ratified: July 17, 1991	EMB
	ASIA PACIFIC		
24. Eda Statement (2015 APEC Meeting of Ministers Responsible for Forestry)	APEC Ministers and Senior Officials acknowledged the 2015 APEC theme "Building Inclusive Economies, Building a Better World" and highlighted the importance of sustainable forest management in achieving long term sustainable socio-economic development in the region.	Date Ratified: October 28, 2015	
25. Cusco Statement (2013 APEC Meeting of Ministers Responsible for Forestry)	APEC ministers and senior officials reaffirm the forestry goals outlined in the 2007 Sydney APEC Leaders' Declaration on Climate Change, Energy Security and Clean Development, such as increasing forest cover in the region by at least 20 million hectares of all types of forests by 2020 and recall subsequent commitments and declarations in relation to forests.	Date Signed: August 15, 2013	
26. Beijing Statement on Forests and Forestry (2011 First APEC Meeting of Ministers Responsible for Forestry)	The statement by APEC ministers and senior officials began by noting that improved management, conservation and rehabilitation of forests can make a significant contribution to the economic, environmental and social priorities and goals of the APEC economies and that enhanced international cooperation is needed to address these challenges.	Date Signed: September 7, 2011	
27. Beijing Statement (2014 APEC Meeting of Ministers Responsible for Mining)	At their 5th meeting, APEC ministers responsible for mining discussed three topics on closer cooperation of the mining sector in the Asia-Pacific region, innovation-driven growth, and social responsibility and common development centered on the theme “Closer Mining Cooperation for Transformation and Growth.”	Date Signed: June 28, 2014	
28. Khabarovsk Statement (2012 APEC Meeting of Ministers Responsible for the Environment)	APEC Ministers and senior officials responsible for the environment, convinced that "environmental protection and the conservation and sustainable use of natural resources, ecosystems and biodiversity are essential foundations for achieving sustainable economic and social results for the APEC region," made statements in five areas: biological diversity, use of natural resources, water management and trans-boundary watercourses, trans-boundary air pollution and climate change, green growth.	Date Signed: July 18, 2012	

PHILIPPINES INTERNATIONAL AGREEMENTS ON ENVIRONMENT AND NATURAL RESOURCES

TREATIES/AGREEMENTS	FOCUS/OBJECTIVE	DATE	FOCAL OFFICE
	MULTILATERAL		
29. APEC Experts Group on Illegal Logging and Associated Trade (EGILAT)	The Experts Group on Illegal Logging and Associated Trade (EGILAT) is a new body within APEC under the SOM Steering Committee on Economic and Technical Cooperation. EGILAT's mission is to foster sustainable economic growth in the Asia-Pacific region by enhancing the efforts of member economies to take concrete steps to combat illegal logging and associated trade and promote trade in legally harvested forest products. EGILAT was established in 2011 in response to commitments made by APEC Leaders in 2010, and under direction of APEC ministers responsible for trade in 2011.	Date Launched: 2011	FMB
30. APEC Meeting of Ministers Responsible for Forestry (MMRF)	The MMRF is a high-level policy dialogue among Asia-Pacific economies that encourages greater cooperation in addressing regional challenges and opportunities including forest cover increase, illegal logging and climate change mitigation. It seeks to exchange experiences on promoting good governance and transparency in the trade of legal timber, timber products and front services while enhancing & sustaining local forest industries.	Date Launched: First Meeting 2011	FMB
31. APEC Mining Task Force (MTF)	In 2007, APEC Ministers endorsed the establishment of the Mining Task Force (MTF). The MTF derives its mandate from priorities set by APEC Leaders and Ministers and from directions provided by Ministers Responsible for Mining. The Mining Task Force is composed of policy officials and experts who work with experts in government and academia, private industry, and regional and international organizations.	Date Launched: 2007	Mines and Geosciences Bureau (MGB)
32. APEC Oceans and Fisheries Working Group (OFWG)	APEC's Oceans and Fisheries Working Group (OFWG) was formed in 2011, following a decision to merge the former Marine Resource Conservation and Fisheries working groups which had been in operation since 1990 and 1991 respectively.	Date Launched: 2007	BMB
33. Asia-Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet)	The Asia-Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet) was proposed by China and co-sponsored by Australia and the United States at the 15th APEC Economic Leaders Meeting in Sydney, Australia in September 2007. APEC leaders adopted the proposal and included it in the Sydney Declaration on Climate Change, Energy Security and Clean Development to promote and improve sustainable forest management and rehabilitation in the region through capacity-building, information sharing, regional policy dialogues, and pilot projects.	Date Launched: September 9, 2007 - Date Adopted	FMB
34. Asia Pacific Forestry Commission (APFC)	The Asia-Pacific Forestry Commission (APFC) is one of the six Regional Forestry Commissions established by FAO in 1949 to provide a policy and technical forum for countries to discuss and address forest related issues on a regional basis and focus on issues pertinent to Asia and the Pacific. Areas of work include: 1) Promoting improvement in forest management for multiple benefits, 2) Forest Policy, Economics and Institutions, and 3) Fostering greater involvement of people in forestry.	Established 1949	FMB
35. Coordinating Committee for Geoscience Programmes in East and Southeast Asia (CCOP)	The Coordinating Committee for Geoscience Programmes in East and Southeast Asia (CCOP) is an intergovernmental organization that aims to facilitate and coordinate the implementation of applied geoscience programmes in East and Southeast Asia. It promotes capacity building, technology transfer, exchange of information and institutional linkages for sustainable resource development, management of geo-information, geo-hazard mitigation and protection of the environment. The Philippines is a founding member of CCOP, which was adopted as an intergovernmental organization by an MOU in 1987.	25-Mar-87	MGB

PHILIPPINES INTERNATIONAL AGREEMENTS ON ENVIRONMENT AND NATURAL RESOURCES

TREATIES/AGREEMENTS	FOCUS/OBJECTIVE	DATE	FOCAL OFFICE
	MULTILATERAL		
36. Coral Triangle Initiative (CTI)	The Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI-CFF) is a multilateral partnership of six countries (Indonesia, Malaysia, Papua New Guinea, Philippines, Solomon Islands and Timor-Leste also known as the "CT6") formed in 2007 to address the urgent threats facing the coastal and marine resources of one of the most biologically diverse and ecologically rich regions on earth.	Formally launched May 15, 2009	BMB
37. EANET - Acid Deposition Monitoring Network in East Asia	The Acid Deposition Monitoring Network in East Asia (EANET) started in 1998 as an intergovernmental initiative. At present, thirteen (13) countries participate in EANET (Cambodia, China, Indonesia, Japan, Lao PDR, Malaysia, Mongolia, Myanmar, Philippines, Republic of Korea, Russia, Thailand, and Vietnam). The following are the objectives of the EANET: 1. Create a common understanding of the state of the acid deposition problems in East Asia; 2. Provide useful inputs for decision-making at local, national and regional levels aimed at preventing or reducing adverse impacts on the environment caused by acid deposition; and 3. Contribute to cooperation on the issues related to acid deposition among participating countries.	Date Launched 1998	EMB
38. Sulu-Sulawesi Marine Eco-region (SSME)	A priority seascape of the Coral Triangle Initiative, the Sulu-Sulawesi Marine Eco-region addresses concerns related to the sustainable development of coastal and marine resources and food security in six countries: Indonesia, Malaysia, Papua New Guinea, the Philippines, the Solomon Islands, and Timor-Leste.	February 13, 2004 - Tri-national MOU on ECP implementation signed. Approved May 2009 in the Philippine Senate	BMB
	ASSOCIATION OF SOUTH EAST ASIAN NATIONS (ASEAN)		
39. ASEAN Agreement on the Establishment of the ASEAN Centre for Biodiversity	This Agreement is for the establishment and initial operation of the ASEAN Centre for Biodiversity (ACB) arising from the ASEAN Regional Centre for Biodiversity Conservation, a five-year project funded by the European Union. The ACB is an intergovernmental regional center of excellence that facilitates regional and global cooperation on the conservation and sustainable use of biodiversity. It serves the biodiversity management needs of the ten ASEAN member states through capacity building and trainings, research funding, database development and management. Eight ASEAN members have ratified the ACB Agreement: Brunei Darussalam, Lao PDR, Philippines, Singapore, Viet Nam and Myanmar, Thailand and the latest in 2013 is Malaysia.	Date ratified 2009 ; Date launched September 27, 2005	BMB
40. ASEAN Agreement on Transboundary Haze Pollution (AATHP)	This Agreement aims to prevent and monitor transboundary haze pollution as a result of land and/or forest fires which need to be mitigated through coordinated national efforts and more intense regional and international cooperation. The agreement also establishes the ASEAN Co-ordinating Centre for Transboundary Haze Pollution Control. It is managed by the ASEAN Ministers of Environment and other representatives from ASEAN member states.	Date signed June 10, 2002; Date ratified by the Philippines February 1, 2010	FMB

PHILIPPINES INTERNATIONAL AGREEMENTS ON ENVIRONMENT AND NATURAL RESOURCES

TREATIES/AGREEMENTS	FOCUS/OBJECTIVE	DATE	FOCAL OFFICE
	MULTILATERAL		
41. ASEAN-Republic of Korea Cooperation on Forestry (AFoCo)	The ASEAN-RoK Forest Cooperation (AFoCo) is a regional cooperation mechanism in the forest sector between ASEAN Member States and the Republic of Korea (ROK) which was initiated as the first step taken following ROK's proposal for the establishment of the Asia Forest Cooperation Organization (AFoCO). It aims to promote rehabilitation of degraded lands, promote sustainable forest management, and combat desertification.	August 5, 2012 (Entry into force)	FMB
42. Memorandum of Understanding on ASEAN Sea Turtle Conservation and Protection (1997)	In the MOU, ASEAN Governments recognized the significance of the sea turtle populations and their habitats in ASEAN waters.	Date and Place Signed: September 12, 1997 - Bangkok	BMB
43. Ministerial Statement on ASEAN-ROK Special Ministerial Meeting on Forestry 2014	In the Statement, Ministers responsible for Forestry and Forest-related activities from the ASEAN Member State (AMS) and the Republic of Korea (ROK) noted the on-going dialogue for the establishment of ASEAN-ROK Forest Cooperation (AFoCo) among the AMS, ROK and other prospective countries.	Date and Place Signed: December 11, 2014 - Busan, Republic of Korea	
44. ASEAN Joint Statement on Climate Change 2014 (2014 - 25th ASEAN Summit)	The Statement urged Parties to take immediate action in ratifying the Doha Amendments to the second commitment period of the Kyoto Protocol.	Date and Place Signed: November 12, 2014 - Nay Pyi Taw, Myanmar	
45. Statement by the ASEAN Environment Ministers for the Twelfth Meeting of the Conference of the Parties to the Convention on Biological Diversity (2014)	A joint Statement was made by the ASEAN Environment Ministers to the Twelfth Meeting of the Conference of the Parties to the Convention on Biological Diversity (CBD COP 12) conveyed at the High-level Segment of CBD COP 12 on 15 October 2014 in Pyeongchang, Republic of Korea to express their commitment to the implementation of the CBD Strategic Plan for Biodiversity 2011-2020 and the Aichi Targets. In reiterating ASEAN's commitment to biodiversity conservation, the Ministers noted the essential role of biodiversity for sustainable development in the development of Sustainable Development Goals.	Date and Place Signed: October 15, 2014 - Pyeongchang, ROK	
46. Bangkok Resolution on ASEAN Environmental Cooperation (2012)	ASEAN environment ministers resolved to continue to implement the action lines on environmental sustainability in the ASEAN Socio-Cultural Community Blueprint in an effective and timely manner towards a clean and green ASEAN Community.	Date and Place Signed: September 26, 2012 - Bangkok, Thailand	
47. New Delhi ASEAN-India Ministerial Statement on Biodiversity (2012)	Ministers responsible for environment and their representatives from ASEAN and India met in New Delhi and discussed areas of common interest focused on biodiversity.	Date and Place Signed: September 7, 2012 - New Delhi, India	
48. Joint Statement of ASEAN Environment Ministers for the Eleventh Meeting of the Conference of the Parties to the Convention on Biological Diversity (2012)	ASEAN environment ministers renewed the commitments made in the ASEAN Leaders' Statement on Climate Change at the 19th ASEAN Summit in November 2011, the ASEAN Leaders' Statement on Joint Response to Climate Change at the 16th ASEAN Summit in April 2010, the ASEAN Declaration on Environmental Sustainability at the 13th ASEAN Summit in November 2007, and the 2003 ASEAN Declaration on Heritage Parks.	Date and Place Signed: October 29, 2010 - Hyderabad, India	

PHILIPPINES INTERNATIONAL AGREEMENTS ON ENVIRONMENT AND NATURAL RESOURCES

TREATIES/AGREEMENTS	FOCUS/OBJECTIVE	DATE	FOCAL OFFICE
	MULTILATERAL		
49. Agreement Between the Governments of the Member States of the Association of Southeast Asian Nations and the Republic of Korea on Forest Cooperation	The agreement serves as a platform to foster cooperation in forestry and dialogue towards the establishment of Asian Forest Cooperation Organization (AFoCO) which aims to facilitate forest cooperation and undertake projects to rehabilitate degraded forest land and prevent deforestation.	Date and Place Signed: November 18, 2011 - Bali	
50. Leaders' Statement on Climate Change to COP-17 UNFCCC and CMP-7 Kyoto Protocol (19th ASEAN Leaders' Summit, 2011)	The Statement urged all Parties to the UNFCCC to work together to secure agreements under the two-track process established under the Bali Roadmap and the Bali Action Plan of the Ad Hoc Working Group on Long-term Cooperative Action (AWG-LCA) and the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG-KP) and to reduce global greenhouse gas emissions so as to hold the increase in global average temperature below 2ºC above pre-industrial levels	Date and Place Signed: November 17, 2011 - Bali, Indonesia	
51. Statement on ASEAN Plus Three Youth Actions on Environment 25 April (2010)	The ASEAN Plus Three Youth Environment Forum 2010: Creating a Climate for Change was participated in by 140 ASEAN Plus Three Youths, selected on the basis of their contributions and commitments to youth environmental activities. The forum was held on 22-25 April 2010. Participants shared information and experiences on environment and climate change.	Date and Place Signed: April 25, 2010 - Brunei Darussalam	
52. ASEAN Leaders' Statement on Joint Response to Climate Change (16th ASEAN Summit, 2010)	Heads of State renewed their commitments made in the ASEAN Joint Statement on Climate Change to the 15th session of the COP to the UNFCCC and the 5th session of the Conference Parties serving as the Meeting of Parties (CMP) to the Kyoto Protocol (2009), the ASEAN Declaration on the 13th session of COP to the UNFCCC and the 3rd session of the CMP to the Kyoto Protocol (2007), and the ASEAN Declaration on Environmental Sustainability (2007) and made declarations toward a global solution to the challenge of climate change at COP 16/CMP 6 and an ASEAN Community resilient to climate change.	Date and Place Signed: April 9, 2010 - Ha Noi, Vietnam	
53. ASEAN Joint Statement on Climate Change to COP-15 to the UNFCCC and CMP-5 to the Kyoto Protocol (15th ASEAN Summit, 2009)	In this Statement, heads of government reaffirmed that Parties should protect the climate system for the benefit of present and future generations and further reaffirmed that the UNFCCC and its Kyoto Protocol continue to be the basic framework and legal instrument for the international community to combat global climate change.	Date and Place Signed: October 24, 2009 - Cha-am Hua Hin, Thailand	
54. Singapore Resolution on Environmental Sustainability and Climate Change (11th AMME, 2009)	Ministers of AMS responsible for the environment made resolutions on the topics of Regional Environmental Protection and Management, Biodiversity and Natural Resources Conservation, Climate Change.	Date and Place Signed: October 29, 2009 - Singapore	
55. Ministerial Statement of the Inaugural EAS Environment Ministers Meeting (2008)	The Inaugural East Asia Summit (EAS) Environment Ministers Meeting held in Ha Noi, Viet Nam on 9 October 2008 was attended by the Environment Ministers of the 10 AMS, and Australia, People's Republic of China, Republic of India, Japan, Republic of Korea, and New Zealand. The meeting was an important initial step to actualize the visions of the EAS Leaders on environmental cooperation, noting that ASEAN as the driving force working with other participating countries in the EAS, and to discuss ways and means to put these ideas into practice through regional cooperative efforts and activities.	Date and Place Signed: October 9, 2008 - Ha Noi, Viet Nam	
56. ASEAN Declaration on Environmental Sustainability (13th ASEAN Summit, 2007)	Heads of the AMS reiterated the need to build an ASEAN Community that is economically vibrant and environmentally friendly, so that the present and future generations can enjoy a clean and sustainable environment and reaffirmed the goals of both the Yangon and the Cebu Resolution on Sustainable Development.	Date and Place Signed: November 20, 2007 - Singapore	

PHILIPPINES INTERNATIONAL AGREEMENTS ON ENVIRONMENT AND NATURAL RESOURCES

TREATIES/AGREEMENTS	FOCUS/OBJECTIVE	DATE	FOCAL OFFICE
	MULTILATERAL		
57. ASEAN Declaration on the 13th Session of the Conference of the Parties to the UNFCCC and the 3rd Session of the CMP to the Kyoto Protocol (2007)	AMS heads reaffirmed their resolve to achieve the objectives of sustainable development and implement their relevant commitments to address climate change, based on respective capabilities, and in accordance with the UNFCCC and the Kyoto Protocol with the aim of stabilizing greenhouse gas concentrations.	Date and Place Signed: November 20, 2007 - Singapore	
58. Singapore Declaration on Climate Change, Energy and the Environment (3rd EAS Summit, 2007)	Heads of Government of ASEAN, Australia, China, India, Japan, Korea and New Zealand, on the occasion of the Third East Asia Summit (EAS) made a number of declarations on climate change, energy and environment.	Date and Place Signed: November 21, 2007 - Singapore	
59. ASEAN Statement on Strengthening Forest Law Enforcement and Governance (FLEG), 2007	ASEAN Ministers on Agriculture and Forestry (AMAF), recognizing that forest resources play a vital role that sustains human, animal and plant life, as well as in mitigating climate change in their capacity as carbon sink made a statement during the 29th AMAF Meeting.	Date and Place Signed: November 1, 2007 - Bangkok, Thailand	
60. Cebu Resolution on Sustainable Development (2006)	Ministers of ASEAN Member States responsible for the environment reiterate their commitment to address global environmental issues through national and regional cooperation and active participation at international fora, and call upon the global community to continue to work to enhance such collaboration and launch the Third ASEAN State of the Environment Report 2006.	Date and Place Signed: November 10, 2006 - Cebu, Philippines	
61. ASEAN Declaration on Heritage Parks (2003)	The document declared national protected areas listed in Appendix I as ASEAN Heritage Parks. For the Philippines, heritage parks declared in 1984 are: a) Mt. Apo National Park in Davao del Sur and North Cotabato, and b) Iglit-Baco National Park in Oriental Mindoro.	Date and Place Signed: December 18, 2003 - Yangon, Myanmar	
62. Yangon Resolution on Sustainable Development (2003)	Ministers responsible for the environment from the ASEAN member countries emphasized that sustainable development could be achieved by addressing environmental protection, economic growth, and socio-cultural development in an integrated and coordinated manner; and recognized that effective environmental and natura resources management, and sustainable utilization of these resources are critical to alleviate poverty, promote healthy living, reduce the incidence of diseases, and enhancing economic growth in the ASEAN region.	Date and Place Signed: December 18, 2003 - Yangon, Myanmar	
63. The Third Meeting of the ASEAN Agriculture and Forestry Ministers and the Ministers of the People's Republic of China, Japan and Republic of Korea [AMAF Plus Three] (2003)	ASEAN Ministers of Agriculture and Forestry and the Ministers of the People's Republic of China, Japan and the Republic of Korea held their third meeting in Kuala Lumpur, Malaysia on 22 August 2003.	Date and Place Signed: August 22, 2003 - Kuala Lumpur, Malaysia	
64. Declaration on ASEAN Post-2015 Environmental Sustainability and Climate Change Agenda	ASEAN Heads of State took cognizance of the growing need to address global and transboundary environmental concerns and ASEAN's obligations to its people in ensuring environmental sustainability for our region and to achieve sustainable development. They also emphasized the important role that the ASEAN Member States can play in carrying out collective action to address challenges for mutual benefit and the common good.	Date and Place Signed: November 21, 2015 - Kuala Lumpur, Malaysia	

PHILIPPINES INTERNATIONAL AGREEMENTS ON ENVIRONMENT AND NATURAL RESOURCES

TREATIES/AGREEMENTS	FOCUS/OBJECTIVE	DATE	FOCAL OFFICE
	MULTILATERAL		
65. ASEAN Joint Statement on Climate Change to the 21st Session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP21)	In this joint statement during the 27th ASEAN Summit, Heads of State recalled their previous commitments on climate change. They highlighted the need to further scale up adaptation and mitigation efforts given the findings of the Intergovernmental Panel on Climate Change's (IPCC's) Fifth Assessment Report (AR5) and emphasized the reality that technology transfer, capacity building and financial assistance are vital to supporting developing countries including least developed countries in implementing Nationally Appropriate Mitigation Actions (NAMAs), National Adaptation Plan of Actions (NAPAs) or National Adaptation Plans (NAPs), as well as Intended Nationally Determined Contributions (INDCs) effectively and efficiently in the long run.	Date and Place Signed: November 21, 2015 - Kuala Lumpur, Malaysia	
66. ASEAN Ministerial Meeting on Environment (AMME)	The first ASEAN Ministerial Meeting on Environment (AMME) was held in 1981. The AMME is attended by ministers in charge of the environment from ASEAN member states in order to promote ASEAN environmental cooperation and to ensure the implementation of the environmental decisions made by the heads of government. ASEAN environmental cooperation recently focused on ten priority areas of regional importance as reflected in the Blueprint for the ASEAN Socio-Cultural Community (ASCC Blueprint) 2009-2015. With the current ASEAN Socio-Cultural Community Blueprint 2025, environmental focus is on sustainability and resilience.	1981 - First meeting	DENR Central Office
67. ASEAN Ministerial Meeting on Minerals (AMMin)	Under the Vientiane Action Programme (VAP) 2004-2010, ASEAN leaders called for enhanced trade and investment in the minerals sector and greater cooperation in the utilization of mineral resources. To realize this policy agenda, the Ministerial Understanding (MU) on ASEAN Cooperation in Minerals was signed to formalize regional cooperation to: develop the minerals sector to be an engine for greater economic growth and social progress in the ASEAN region; enhance trade and investment in the ASEAN minerals sector; and promote environmentally sound and socially responsible mineral development practices in the sustainable management and optimum utilization of mineral resources.	2005 - Date established	MGB
68. ASEAN Senior Officials Meeting on Minerals (ASOMM)	Under the Vientiane Action Programme, the ASEAN Senior Officials Meeting on Minerals (ASOMM-1) was first held in 1996 following the adoption of the Program of ASEAN Cooperation in Minerals in 1995. By virtue of the 2005 Ministerial Understanding on ASEAN Cooperation in Minerals, ASOMM became the operating arm of the ASEAN Ministerial Meeting on Minerals (AMMin) in coordinating and implementing programmes, projects and activities as well as the policy directions set by the AMMin.	Established 1996	MGB
69. ASEAN Senior Officials on Forestry (ASOF)	The ASEAN Senior Officials on Forestry (ASOF) was organized in 1988 as one of the subsidiary bodies under the ASEAN Cooperation in Food, Agriculture and Forestry guided by the ASEAN Ministers on Agriculture and Forestry (AMAF) and supported by Senior Officials Meeting (SOM). ASOF discusses the progress of the implementation of the policy framework related to ASEAN Cooperation in Forestry.	1988	FMB

PHILIPPINES INTERNATIONAL AGREEMENTS ON ENVIRONMENT AND NATURAL RESOURCES

TREATIES/AGREEMENTS	FOCUS/OBJECTIVE	DATE	FOCAL OFFICE
	MULTILATERAL		
70. ASEAN Senior Officials on the Environment (ASOEN)	ASEAN cooperation on the environment began with the establishment of the ASEAN Experts Group on the Environment (AEGE) under the ASEAN Committee on Science and Technology (COST). In 1989, the AEGE became the ASEAN Senior Officials on the Environment (ASOEN). ASOEN meets yearly to consider the reports of its working groups, which also meet annually, and provide operational policy guidance on the various environmental programs implemented. The Philippines was the lead country in the area of coastal and marine environment during the development and implementation of the Blueprint for the ASEAN Socio-Cultural Community (ASCC Blueprint) 2009–2015.	Established 1989	DENR Central Office
71. ASEAN Task Force on Peatlands (ATFP)	The ASEAN Task Force on Peatlands was established to assist the Committee (COM) under the Conference of the Parties to the ASEAN Agreement on Transboundary Haze Pollution (AATHP) in monitoring and supporting the implementation of the ASEAN Peatland Management Strategy APMS 2016-2020). Its' main role is to realize the objectives of the APMS through oversight of the design and implementation as well as monitoring of the ASEAN Programme on Sustainable Management of Peatland Ecosystems (APSMPE) (2014 –2020) and other relevant programs/projects and facilitate cooperation with relevant partners, and to report the progress of the implementation of the APMS to COM of AATHP.	Established September 23, 2013	BMB
72. ASEAN Working Group on a Pan-ASEAN Timber Certification Initiative (AWG-PATCI)	The AWG-PATCI was created in 2002 as an ad hoc working group under the ASEAN Senior Officials on Forestry (ASOF) to explore concrete measures for regional cooperation in timber certification between ASEAN Member States. The main objective of the working group is to support ASOF and ASEAN Ministers on Agriculture and Forestry (AMAF) in decision making and implementation process by providing specific policy oriented and focused research and policy analysis including capacity building activities relevant to legality and sustainability, and trade in legal timber products.	Date established : 2002	FMB
73. ASEAN Working Group on Multilateral Environmental Agreements (AWGMEA)	The AWGMEA is concerned with regional cooperation among ASEAN Member States in promoting capacity building, sharing experiences and best practices, and acting collectively to implement the MEAs to synergize their efforts to contribute effectively in addressing global environmental issues. In 2006, two technical clusters were formed: the Atmosphere Technical Cluster and the Chemical Technical Cluster.	First meeting 17-18 May 1999	EMB
74. ASEAN Working Group on Water Resources Management (AWGWRM)	The AWGWRM was established to enhance regional cooperation on freshwater management. It aims to: (1) promote networking and engage in collaborative action towards the practical implementation of integrated water resources management; (2) promote and facilitate the exchange of relevant information, expertise, technology and know-how among water resource agencies of member countries; and (3) provide or make arrangements for relevant trainings, education and awareness-raising campaigns.	Jul-02	National Water Resources Board (NWRB)
75. ASEAN Regional Knowledge Network on Forest and Climate Change (ARKN-FCC)	The ARKN-FCC was initiated at the 11th Meeting of the ASEAN Senior Officials on Forestry (ASOF) and held its Inaugural Workshop on 30-31 October 2008. It is a venue for ASEAN Member States to share their knowledge and experiences and identify experts and research institutions in the issues of forests and climate change such as Reducing Emissions from Deforestation and Forest Degradation (REDD) in Developing Countries and Afforestation/Reforestation Clean Development Mechanism (A/R CDM).	Date established: August 1, 2008	FMB

PHILIPPINES INTERNATIONAL AGREEMENTS ON ENVIRONMENT AND NATURAL RESOURCES

TREATIES/AGREEMENTS	FOCUS/OBJECTIVE	DATE	FOCAL OFFICE
	MULTILATERAL		
76. ASEAN Regional Knowledge Network on Forest Law Enforcement and Governance (ARKN-FLEG)	he ASEAN Regional Knowledge Network on FLEG (ARKN-FLEG) was established during the 11th ASEAN Senior Officials on Forestry (ASOF) Meeting on 1 August 2008 in Malaysia and endorsed by the 30th AMAF meeting in October 2008. It is composed of FLEG experts from leading research institutions in ASEAN and among the ASOF as network members as well as resource persons. The aim of the ARKN-FLEG is to encourage the use of regional knowledge networks to broaden the ASEAN base of knowledge in forestry and provide support in implementing the Work Plan for Strengthening Forest Law Enforcement and Governance (FLEG) in ASEAN (2008-2015).	Established: August 1, 2008	FMB
77. ASEAN Social Forestry Network (ASFN)	The ASEAN Social Forestry Network (ASFN) is a government driven social forestry network in Southeast Asia, with the goal of strengthening ASEAN Cooperation in Social Forestry through the sharing of information and knowledge. ASFN links government forestry policy-makers directly with other network members from civil society, research organizations, academia, private sector and experts of related fields.	Aug-05	FMB
78. ASEAN Wildlife Enforcement Network (AWEN)	Launched in 2005, the ASEAN-WEN is a collaboration among the ten ASEAN member nations to facilitate inter-agency and cross-border collaboration in the fight against wildlife trafficking in Southeast Asia	Established on December 1, 2005	BMB
79. Brunei Darussalam–Indonesia–Malaysia–Philippines - East ASEAN Growth Area (BIMP-EAGA)	The Brunei Darussalam–Indonesia–Malaysia–Philippines East ASEAN Growth Area (BIMP-EAGA) was formed by the four governments in March 1994 with the goal of increasing trade, investment, and tourism in the region. BIMP-EAGA comprises Palawan and Mindanao in the Philippines; the Sultanate of Brunei Darussalam; ten provinces of Kalimantan, Sulawesi, Maluku, and Irian Jaya in Indonesia; and the states of Sabah and Sarawak and the Federal Territory of Labuan in Malaysia. BIMP-EAGA aims to realize sustainable economic development in part by coordinating the management of ecosystems and common resources in Strategic Pillar 4.	Launched March 1994	DENR Central Office
	BILATERAL		
80. Collaborative Research Reef Agreement on Autonomous Monitoring Structures (ARMS) Project	This collaborative research agreement with the Smithsonian Institution is intended for scientific research in biodiversity.This is part of a larger research previously initiated by Smithsonian Institution and the US National Oceanographic and Atmospheric Administration for biodiversity assessment of crypto-biota using ARMS as a standardized biodiversity monitoring tool.	Date of Validity: 2015-2017	BMB
81. Collaborative Project - Comparative Biogeography and Conservation of Philippine Vertebrates	At the Kansas University Biodiversity Institute about 100 scientists and graduate students study the planet's species, ecosystems and past cultures. The work they do is crucial and critical to understanding the diversity of life and for predicting the future: changes in populations, threatened species, the spread of disease and the influence of pest species.	Date of Validity: 2015 - 2020	BMB
82. Collaborative Project - Biodiversity Research, Education Outreach and Conservation Genetics of Philippine Amphibians, Reptiles and Invertebrates	The Sam Noble Oklahoma Museum of Natural History features 7 galleries, interactive displays and fossils from Oklahoma and around the world. It is one of the world's largest university-based natural history museums.	Date of Validity: 2015 - 2020	BMB

PHILIPPINES INTERNATIONAL AGREEMENTS ON ENVIRONMENT AND NATURAL RESOURCES

TREATIES/AGREEMENTS	FOCUS/OBJECTIVE	DATE	FOCAL OFFICE
	MULTILATERAL		
83. Memorandum Of Agreement (MOA) on Philippine Crocodile National Recovery Plan: Australasian Program	The International Union for Conservation of Nature (IUCN) Red List of Threatened Species (world's most comprehensive inventory of the global conservation status of plant and animal species) lists the Crocodylus mindorensis (Mindoro Crocodile) as critically endangered. The loss of this reptile's habitat due to human migration drives the Crocodylus mindorensis to near extinction. Also known as the Philippine freshwater crocodile, it thrives in small lakes, river tributaries and marshes, particularly in the islands of Mindoro, Northern Palawan, Masbate, Negros, Samar, Mindanao and in the Sulu archipelago.	Date of Validity: 2014 - 2019	BMB
84. MOU between Korea National Arboretum and Ecosystems Research Conservation	The mission of the Korea National Arboretum is to conserve and develop plant resources through comprehensive research and to promote the public's understanding of the forests. The Arboretum covers an area of 1,157 hectares and houses 15 specialized plant gardens, forest museum, forest zoo, a herbarium and seed bank.	Date of Validity: 2014 - 2015	Ecosystems Research and Development Bureau (ERDB)
85. MOU between the Korea Environment Corporation (KECO) and the DENR, Philippines on Cooperation in the Field of Environmental Protection and Sustainable Development	Korea Environment Corporation (KECO) aims to contribute to eco-friendly development of Korea through the effective operation of greenhouse gas reduction programs to prevent environmental pollution, improve the environment, facilitate resource recycling and respond to climate change. (Law No. 11446, The KECO Act)	Date of Validity: 2015 - 2020	EMB
86. MOU between the Department of Environment and Natural Resources of the Republic of the Philippines and the Korea Forest Service of the Republic of Korea on Cooperation in the Field of Forestry	The Korea Forest Service has the overall responsibility for the establishment and implementation of forest policies and laws. This Memorandum of Understanding between Korea Forest Service and the Department of Energy and Natural Resources concretizes the parties' recognition of the benefits derived from closer cooperation in the field of forestry.	Date of Validity: 2012 - 2017	FMB
87. Cooperation in Management, Research and Protection of Natural Protected Areas	The agreement provides the framework for cooperation between Philippines and New Zealand in areas of mutual interest particularly with (i) management techniques for protected areas including national parks (ii) restoration of habitats and rehabilitation of endangered species (iii) protection for migrating birds including preservation of their natural habitats (iv) biological monitoring, research and survey (v) exchange of relevant staff or experts	Date of Validity: 2007 - Present	DENR Central Office
88. MOA on Co's Digital Flora of the Philippines: Cybertaxonomy to the Rescue of Conservation	Co's Digital Flora of the Philippines (CDFP) is a digital checklist of Philippine vascular plants that aims to present a continuously updated account of all native and naturalized species of vascular plants in the Philippines with diagnostic photographs for each taxon.	Date of Validity: 2012 - 2017	BMB
89. Implementation Agreement Technical Assistance on: Preparation of a National REDD+ Mechanism for Greenhouse Gas Reduction and Conservation of Biodiversity in the Philippines (National REDD+ System Philippines)	The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) has been implementing projects to promote economic, ecological and social development in the Philippines on behalf of the German Government since the 1970s. Their work in the Philippines focuses on the areas of peace and security, the environment, rural development and climate change. This Technical Assistance on the Preparation of a National REDD+ Mechanism for Greenhouse Gas Reduction and Conservation of Biodiversity in the Philippines (National REDD+ System Philippines) provided by The Deutsche Gesellschaft fur Internationale Zusammenarbeit (GIZ) exemplify the existing solid cooperation between the Philippines and Germany in the areas of environment and climate change.	Date of Validity: 2012 - 2017	FMB

PHILIPPINES INTERNATIONAL AGREEMENTS ON ENVIRONMENT AND NATURAL RESOURCES

TREATIES/AGREEMENTS	FOCUS/OBJECTIVE	DATE	FOCAL OFFICE
	MULTILATERAL		
90. MOU for the cooperation in the implementation of the Sulu-Sulawesi Marine Ecoregion (SSME) Comprehensive Action Plan	This project is being implemented in three countries: Indonesia, Malaysia, Philippines. Lead executing agencies are: Indonesia's Ministry of Marine Affairs and Fisheries (MMAF); Malaysia's Ministry of Science, Technology and Innovation (MOSTI); Philippines' Department of Environment and Natural Resources (DENR). The collaboration seeks to: (i) Develop, Adopt, Implement and Monitor Climate-smart spatial development plans explicitly incorporating ecosystem-based adaptation to climate change, and (ii) Coordinate the SSME Comprehensive Action Plan and jointly implement selected bi/tri national projects on MPA and MPA networks (e.g. sustainable fisheries and livelihoods, and threatened, migratory and charismatic species)	Date of Validity: 2012 – 2017	BMB

Source: DENR - Office of the Undersecretary for Environment and International Environmental Affairs (http://intl.denr.gov.ph/)

Appendix 14

Overview of Stages of the EIA Process

Appendix 14 Overview of Stages of the EIA Process

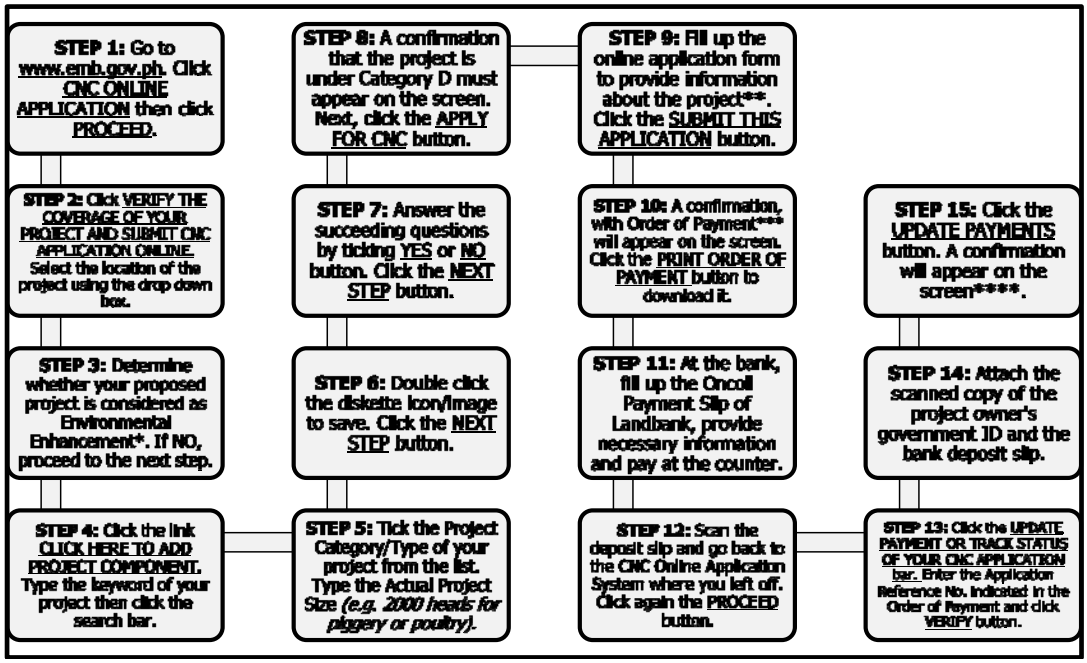
1.0 SCREENING	**Screening** determines if a project is covered or not covered by the PEISS. If a project is covered, screening further determines what document type the project should prepare to secure the needed approval, and what the rest of the requirements are in terms of EMB office of application, endorsing and decision authorities, duration of processing.
2.0 SCOPING	**Scoping** is a Proponent-driven multi-sectoral formal process of determining the focused Terms of Reference of the EIA Study. Scoping identifies the most significant issues/impacts of a proposed project, and then, delimits the extent of baseline information to those necessary to evaluate and mitigate the impacts. The need for and scope of an Environmental Risk Assessment (ERA) is also done during the scoping session. Scoping is done with the local community through Public Scoping and with a third party EIA Review Committee (EIARC) through Technical Scoping, both with the participation of the DENR-EMB. The process results in a signed Formal Scoping Checklist by the review team, with final approval by the EMB Chief.
3.0 EIA STUDY and REPORT PREPARATION	The **EIA Study** involves a description of the proposed project and its alternatives, characterization of the project environment, impact identification and prediction, evaluation of impact significance, impact mitigation, formulation of Environmental Management and Monitoring Plan, with corresponding cost estimates and institutional support commitment. The study results are presented in an **EIA Report** for which an outline is prescribed by EMB for every major document type.
4.0 EIA REPORT REVIEW and EVALUATION	**Review of EIA Reports** normally entails an EMB procedural screening for compliance to minimum requirements specified during Scoping, followed by a substantive review of either composed third party experts commissioned by EMB as the EIA Review Committee for PEIS/EIS-based applications, or DENR/EMB internal specialists, the Technical Committee, for IEE-based applications. EMB evaluates the EIARC recommendations and the public's inputs during public consultations/hearings in the process of recommending a decision on the application. The EIARC Chair signs EIARC recommendations including issues outside the mandate of the EMB**.** The entire EIA review and evaluation process is summarized in the Review Process Report (RPR) of the EMB, which includes a draft decision document.
5.0 DECISION MAKING	**Decision Making** involves evaluation of EIA recommendations and the draft decision document, resulting to the issuance of an ECC, CNC or Denial Letter. When approved, a covered project is issued its certificate of Environmental Compliance Commitment (ECC) while an application of a non-covered project is issued a Certificate of Non-Coverage (CNC). Endorsing and deciding authorities are designated by AO 42, and further detailed in this Manual for every report type. Moreover, the Proponent signs a sworn statement of full responsibility on implementation of its commitments prior to the release of the ECC. The ECC is then transmitted to concerned LGUs and other GAs for integration into their decision making process. **The regulated part of EIA Review is limited to the processes within EMB control. The timelines for the issuance of decision documents provided for in AO 42 and DAO 2003-30 are applicable only from the time the EIA Report is accepted for substantive review to the time a decision is issued on the application**
6.0 MONITORING, VALIDATION, and EVALUATION/ AUDIT	**Monitoring, Validation and Evaluation/Audit** stage assesses performance of the Proponent against the ECC and its commitments in the Environmental Management and Monitoring Plans to ensure actual impacts of the project are adequately prevented or mitigated.

- Source: Revised Procedural Manual for DAO03-30 (Aug. 2007, 2nd Printing: Jan. 2008) EMB/DENR

Appendix 15

Online Application for CNC/ECC/CMR

Appendix 15 Online Application for CNC/ECC/CMR



**Environmental Enhancement (Category C) are projects or undertakings not falling under Environmentally-Critical Projects (Category A) or Non-Environmentally-Critical Projects (Category B), which are intended to directly enhance the quality of the environment or directly address existing environmental problems.*

***For other projects, please provide a detailed project description. The copy of the project layout should be less than 5 MB to proceed to the next step.*

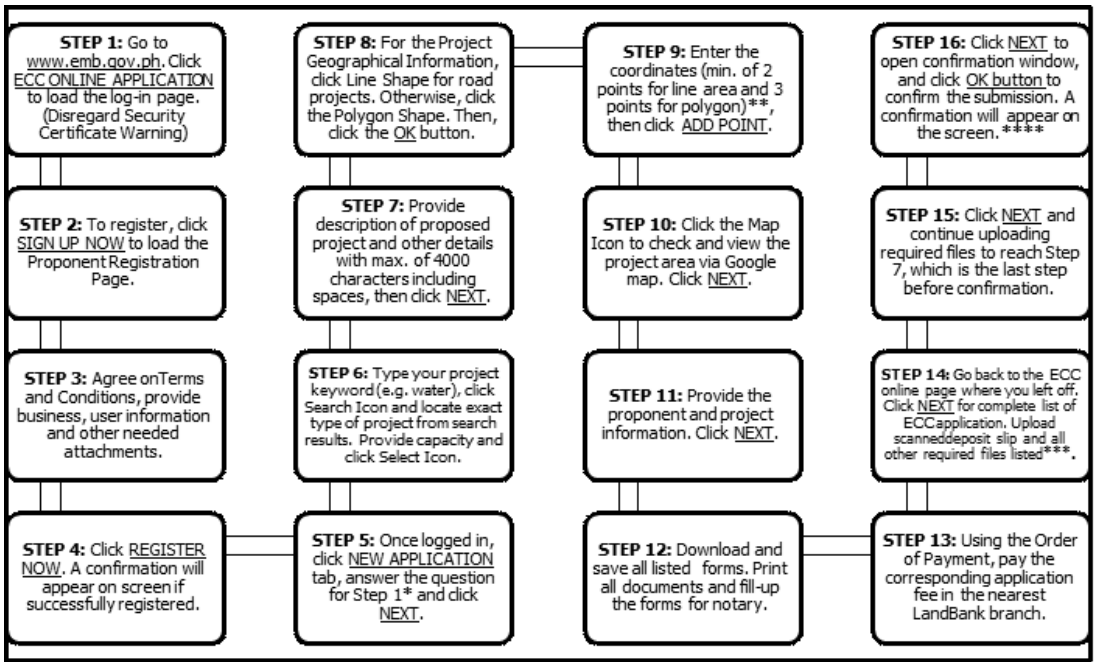
**** Secure a duplicate copy of the order of payment for reference. Do not lose the Application Reference No. This will be used in updating payment and tracking the status of application.*

*****To track status of application, go back to the CNC Online System and click again the "Update Payment or Track Status of your Application" bar after 7 working days and download the approved CNC.*

Source: "CNC Online User Manual". Retrieved May 30 2016 from EMB website at:

http://119.92.161.13/projectchecker/CNCOnlineSteps.pdf

Figure A15.1 CNC Online System Procedure



**Project with existing ECC or established prior to 1982 with expansion or modification is not covered by the ECC Online Application System. For this, personally visit the EMB regional office where the project is located.*

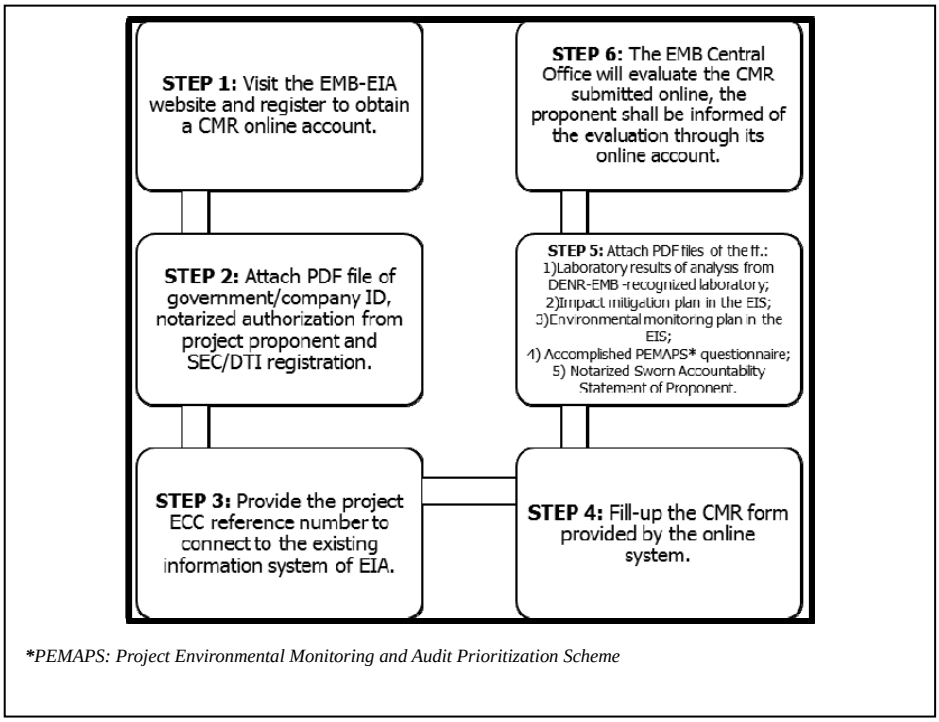
***Pad "0" to comply with the number of characters in the longitude and latitude (e.g.: 14o 12" 3' should be entered as 14o 012" 003.0000'). Coordinates should be entered in sequence from point to point. Make sure to double check the coordinates before and after adding the point. You can remove erroneous point by clicking the corresponding delete icon. However, clicking the REMOVE AREA button will remove the whole area.*

****You may sign out the system while preparing the other requirements. All information that were entered on this stage are completely saved in the database which can be retrieved anytime*

*****Once the ECC Application is approved, it will appear in your 'For Action' page. Print the ECC and affix your signature for notary. Return to the same page to upload the notarized copy of the ECC. The Notarized ECC together with the signed version will become accessible to other agencies and the public from the E-Library of the EMB website.*

Source: "ECC Online Application System User Guide for ECC Applicants". Retrieved June 1 2016, EMB website: http://119.92.161.21/live/Help/Applicant.pdf

Figure A15.2 ECC Online System Procedures



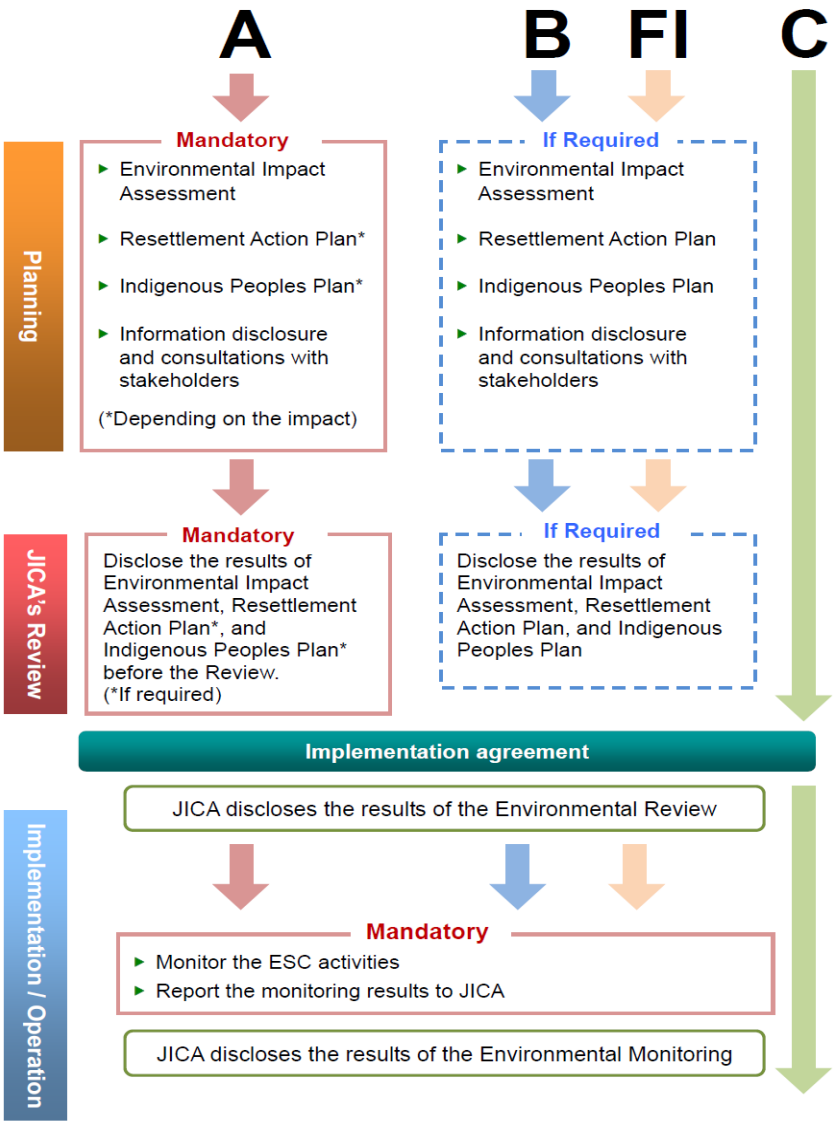
Source: EMB Memorandum Circular 2016-001

Figure A15.3 CMR Online System Procedures

Appendix 16

Examples of the JICA Environmental and Social Considerations Procedures by Category

Appendix 16 Examples of the JICA Environmental and Social Considerations Procedures by Category



Source: The Basics of Environmental and Social Considerations, Introduction to the JICA Guidelines for Environmental and Social Considerations, August 2013, JICA

Figure: JICA Environmental and Social Considerations Procedures by Category (Example)

Appendix 17

Environmental and Social Conditions in Three Cities

Appendix 17 Environmental and Social Conditions in Three Cities

1. Las Pinas City Project Site

Environmental and social conditions in Las Pinas City have been reviewed based mainly on the, other publications and site visits which are as summarized below.

(a) Pollution

1) Air Quality

Table A17.1 shows a list of values of Total Suspended Particulates (TSP) in Las Piñas City from 2000 to 2003. In addition, Figure A17.1 shows a chart of PM_{10} in Las Pinas in 2015.

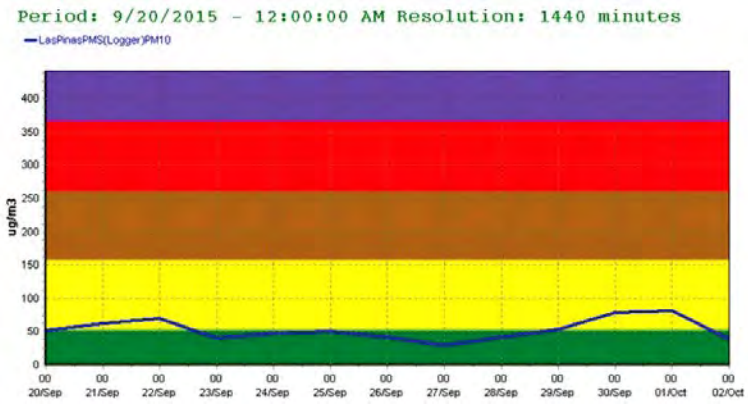
Table A17.1 TSP in Las Pinas City

Data Source	Pollutant	2000	2001	2002	2003	Average
EMB (NCR)/DENR 2007	TSP (ug/Nm^3)	80	67	78	37	65.5

Note: Annual/Long term ug/Nm^3 average is 90ug/Nm^3

Source: Las Pinas City Comprehensive Land Use Plan 2016-2025

- The average TSP in Las Piñas City from 2000 to 2003 was 65.5ug/Nm^3 which is below the international standard for safe air of 90 ug/Nm^3.
- Based on the DENR report, the highest concentration of TSP is only along major thoroughfares like the Alabang Zapote Road.
- In September 2015, PM_{10} of Las Piñas ranges from approximately an index value of 45ug/Nm^3, not increasing more than 100.
- Like most areas in Metro Manila, Las Piñas exhibits poor ambient air due to air pollution mainly because of transportation emissions especially during heavy traffic.



Source: Las Pinas City Comprehensive Land Use Plan 2016-2025

Figure A 17.1 PM10 in Las Pinas in 2015

2) Water Quality

Table A17.2 shows water quality of Zapote River of the major body of water in Las Piñas city, which is heavily polluted.

Table A 17.2 Water Quality Assessment of the Paranque-Zapote River System (2006)

Data Source	Indicators	Value	Standard	Assessment	Ratings
CLUP/SEP	DO (ng/l)	1.19	5	Failed	Poor
	BOD (mg/l)	41.02	10	Failed	
	SS change (mg/l)	12.62	30	Passed	
	pH	7.98	6.5-8.5	Passed	
	Temperature change	0.92	3	Passed	

Source: Las Pinas City Comprehensive Land Use Plan 2016-2025

3) Wastes

Table A 17.3 shows data on solid waste in Las Piñas city which is managed by the City as follows.

- Solid waste collection is administered by the city government using its facilities such as garbage trucks and city personnel.
- The collected solid wastes are currently being disposed at the Rodriguez Sanitary Landfill in compliance with RA 9003.

Table A 17.3 Solid Waste Generation by Source in Las Pinas city (2011-2013)

Item			2011	2012	2013
Estimated Population (from census 2010)			561,350	570,163	579,115
Estimated Solid Waste Generation (m^3)			372,532	378,381	384,322
Breakdown of Waste Generators (m^3)	Restaurants	7.5%	27,939.9	28,378.58	28,824.15
	Shops	9.4%	35,018.01	35,567.81	36,126.27
	Markets	7.8%	29,057.5	29,513.72	29,977.12
	Medical	0.3%	1,117.596	1,135.143	1,152.966
	Street Sweeping	0.4%	1,490.128	1,513.524	1,537.288
	River Clean-up	0.5%	1,862.66	1,891.905	1,921.61
	Households	74.1%	276,046.2	280,380.3	284,782.6

Source: Las Pinas City Comprehensive Land Use Plan 2016-2025 summarized by JICA Survey Team

4) Soil Contamination

With regard to soil contamination, at the land of L-A a soil taste was conducted by Maynilad to validate the following concerns.

- The L-A land is in proximity to the lot previously occupied by a manufacturer of fluorescent lamps and bulbs.
- The manufacturer site is immediately across the Alabang - Zapote Road and is at higher ground with L-A.
- Hence, the probability of heavy metal soil contamination was considered.

The random soil sampling was done on March 13 and 15, 2013 at three different points (site A, B, C) on the premises of L-A.

Table A17.4 shows the result of the soil analysis which concluded that only trace amount of mercury and is below the limit as compared to standard set by different international entities.

Table A 17.4 Result of Soil Analysis (Land of L-A) (2013)

Parameters (mg/kg)	Site A		Site B		Site C		Standards		
	Depth		Depth		Depth		US EPA	Taiwan EPA	University of Oregon
	1.5m	2m	1m	2m	1.5m	2m			
Antimony	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	0.20-10.0
Arsenic	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	75	60	0.10-40.0
Cadmium	0.65	0.85	0.91	0.38	0.60	0.54	85	20	0.01-2.00
Mercury	<0.004	0.026	0.012	0.012	0.016	0.012	840	10	0.01-0.50
Lead	36.64	24.42	31.34	36.37	27.83	28.97	420	2000	2.0 - 300
Copper	153.08	145.14	161.63	62.0	106.67	101.96	4,300	400	2.0 - 100
Nickel	17.85	11.55	7.35	23.10	39.64	8.92	75	200	5.0 - 500
Chromium	11.60	<0.20	<0.20	10.61	36.76	13.03	3,000	250	5.0 – 1,000

Source: Land Acquisition Report, South Septage Treatment Plant April 22, 2014 A Project Under Metro Manila Wastewater Management Project (MWMP), MAYNILAD

5) Noise and Vibration

There is no specific data on Nosie and vibration in Las Pinas. As a reference, Table A 17.5 shows data on a noise level monitoring survey conducted by the Department of Public Works and Highways (DPWH) under Technical Assistance from JICA in May 2006 for an Environmental Impact Statement (EIS) study for the Cavite-Laguna (CALA) East-West National Road Project.

Table A17.5 Result of Noise Level Monitoring (2006)

Air Quality Station ID* (Noise ID*)	Description	Average Noise Level (dB)**			
		Moring	Day Time	Evening	Night Time
AQ1 (NL1)	Barangay Buwaya Uno, Daang Hari, Imus Cavite (Residential area).	56.9	64.6	55.7	49.8
AQ2 (NL2)	Barangay Tapia. 1.5km from town proper of Gen Trias, Cavite (Residential area).	52.9	56.4	56.2	50.2
AQ3 (NL3)	Morzon Subdivision, Barangay Burol Main, Dasmariñas Cavite (Residential area).	59.8	57.4	53.4	52.2
AQ4 (NL4)	R.C. Sta Rosa Centro, Sta Rosa Laguna. Right side of Brittany Subdivision, about 10 m away from the roadside	52.5	52.9	52.6	51.5
AQ5 (NL5)	Barangay Biga I, Silang Cavite. Along Emilio Aguinaldo Highway, left side approx. 6m from the gate of WB resort.	56.0	56.9	56.8	54.2
AQ6 (NL6)	Barangay San Antonio, San Pedro, Laguna. Approx.10m from Nibagan Bridge across the Carwash station (Roadside area).	73.8	74.0	74.3	68.3
AQ7 (NL7)	Barangay Panapanaan 5, intersection of Tirona-Aguinaldo Highway, Bacoor, Cavite	76.1	77.9	70.9	69.1
AQ8 (NL8)	Annex Municipal Hall. Barangay Mangahan, Gen Trias, Cavite (Roadside area).	77.5	82.4	85.1	72.9

Note: Measurements at each station were conducted for 24 hours at 10 minutes continuous measurement per hour.
* Sampling stations for noise level are the same for air quality (See Figure A17.6)
** Average noise level means the maximum value in each time classification

Source: EIS, Cavite-Laguna (CALA) East-West National Road Project Oct. 2006 DPWH under TA from JICA.

Table A17.6 shows ambient noise standards of the Philippines.

Table A17.6 Standards for Noise (dB(A))

AREA CLASSIFICATION (based on dominant land-use)	Daytime (0901 to 1800H)	Morning (0501 to 0900H) and Evening (1801 to 2200H)	Nighttime (2201 to 0500H)
Class AA (Areas 100 m from schools, hospitals, playground etc.)	50	45	40
Class A (residential purposes)	55	50	45
Class B (commercial areas)	65	60	55
Class C (light industrial areas)	70	65	60
Class D (heavy industrial areas)	75	70	65

Source: 1978 NPCC Rules and Regulations Implementing PD 984

(b) Natural Environment

1) Climate

The climate in Las Piñas is Type 1 according to the Modified Coronas Classification of the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA). There are two pronounced seasons: dry from November to April and wet from May to October.

As reference, Table A17.7 shows climate data of the Cavite province in which Las Pinas is located.

Table A 17.7 Climate in Cavite Province (2011)

Data Source	Month	Average Temperature (℃)	Average Rainfall (mm)
Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), Sangley Point Field Office	January	27.4	69.7
	February	28.0	Trace
	March	28.5	48.0
	April	29.4	3.0
	May	30.7	252.7
	June	29.2	735.5
	July	28.8	393.1
	August	28.8	488.2
	September	28.5	423.1
	October	29.1	172.1
	November	28.7	157.2
	December	27.7	198.5

Source: Cavite Socio-economic and Physical Profile 2011(summarized by JICA Survey Team)

2) Geology

Table A17.8 shows geological aspects in Las Pinas.

Table A17.8 Geological Aspects in Las Pinas

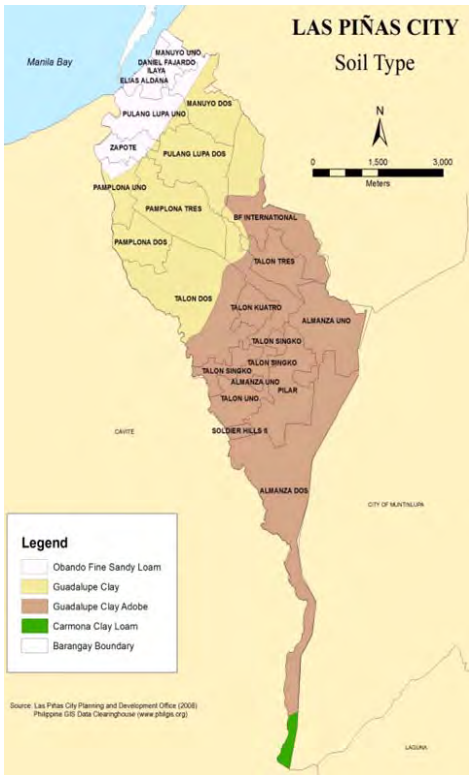
Geology	Description
Soil	• The alluvial plain in Las Piñas is composed of sand and clay with shell fragments. • The alluvium is observed to extend to depths of about 10 m to 20 m. • The hilly portion is composed of sandstone, conglomerate, mudstone and stuff, and reaches a thickness of 2,000 m. • Figure A 17.2 shows a soil map of Las Pinas City.
Rock Formation	• Las Piñas consists of two terrain units: a western undulating section; and an eastern alluvial portion that extends into the Manila Bay. • Underlying the undulating to gently sloping terrain is a gently dipping sequence of pyroclastic rocks essentially made up of tuffs, tuffaceous sandstones and conglomerates belonging to the Guadalupe formation. • This formation is represented by massive to thickly bedded lithic tuff and tuffaceous sandstone as revealed by grading operations along the western area.
Active Faults	• The Philippine Institute of Volcanology and Seismology (PHIVOLCS) found no active fault crossing the area of Las Piñas City. • The nearest fault is the creeping fault segment of the West Valley Fault in the Muntinlupa-San Pedro-Biñan area.

Source: Las Pinas City Comprehensive Land Use Plan 2016-2025 summarized by JICA Survey Team

6) Topographical Aspect

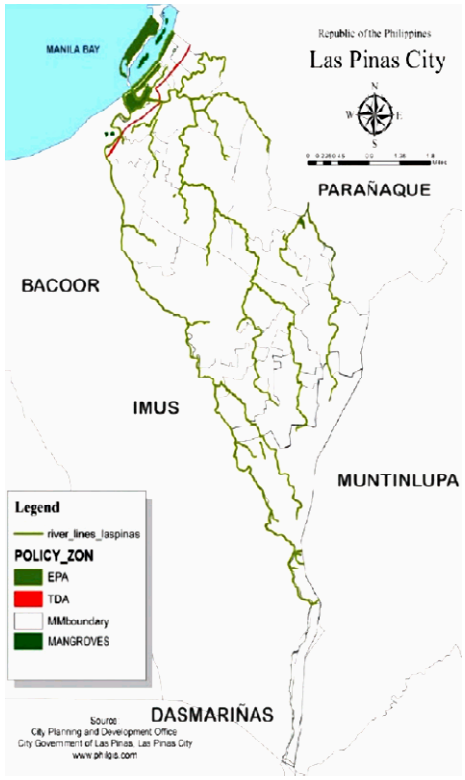
Las Piñas is located at the mouths of the Zapote and Las Piñas Rivers and is generally characterized by flat lands with elevations ranging from 0 to 10 m above mean sea level (AMSL).

- Alluvial plains extend inland to a distance of about two km. Rivers, creeks and marine ponds can be found within the area.



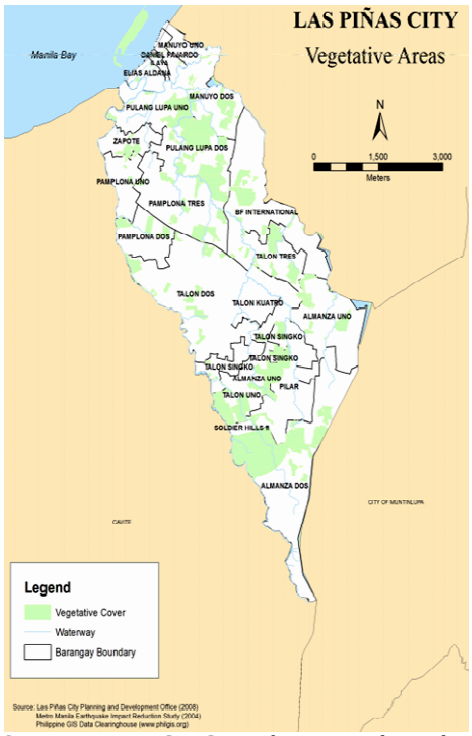
Source: Las Pinas City Comprehensive Land Use Plan 2016-2025

FigureA17.2 Soil Map (Las Pinas)



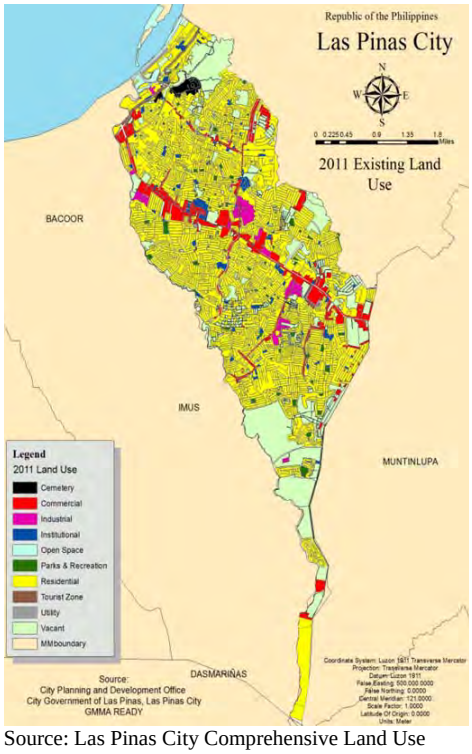
Source: Las Pinas City Comprehensive Land Use Plan 2016-2025

Figure A17.3 Conservation Area Map (Las Pinas)



Source: Las Pinas City Comprehensive Land Use Plan 2016-2025

Figure A17.4 Vegetation Map (Las Pinas)



Source: Las Pinas City Comprehensive Land Use Plan 2016-2025

Figure A17.5 Land Use Map (Las Pinas)

- The land slopes gently behind this alluvial plain and reaches its predominant elevation of 20 to 40 m AMSL.
- A gently undulating hill can be found at its southern portion in Barangay Almanza Dos at the boundary of Bacoor town and Muntinlupa City, which has an elevation of around 80 m (AMSL).

7) Protected Areas

As shown in the Conservation Areas Map (Figure A17.3), areas such as the Manila Bay coastal area particularly the "Las Piñas -Parañaque Critical Habitat and Ecotourism Area (LPPCHEA)" where was recognized as a wetland of international importance by *the Ramsar Convention* on March 15th 2013, the Las Piñas and Zapote River System and creeks are included in the Environmental Preservation Area (EPA), and thus form part of the conservation area.

8) Flora and Fauna

Different types of bamboos as well as other tree species have been planted alongside riverbanks and creeks to prevent soil erosion. These different bamboo species are cultured at the Las Piñas Bambusetum under the Sagip-Ilog Project of the Villar Sipag at Tiyaga Foundation.

According to the City Agriculture Office, there is an estimated four hectares of mangroves planted in the coastal area as of 2013, 0.5 ha of which have just recently been planted in coordination with DENR. DENR also planted 2,500 seedlings of mangroves and 2,000 seedlings of talisay trees at Isla Sto. Niño. Another 2,000 seedlings of mangroves were planted at Barangay Ilaya through the National Power Corporation (NPC). (Figure A17.4)

Table A17.9 summarizes flora and fauna in LPPCHEA.

Table A17.9 Flora and Fauna in LPPCHEA (Las Pinas)

Category		Description
Flora	Mangroves	• Within LPPCHEA are mangrove swamps containing a total of eight (8) species of mangroves, which serve as a breeding and nesting ground for both the resident and migratory birds. Recently, the DENR has re-introduced the *Nilad* (*Scyphiphora hydrophyllacea*), a mangrove species native to the Philippines, where the name of "*Maynila*" (Manila), its capital city was derived.
	Beach-type species	• Six (6) species of beach-type trees are also found within the site making it a beach forest nestled within the urban setting.
	Other tree species	• The site serves as a living laboratory that showcases endemic and indigenous trees. • In fact, the area harbours quite a number of Philippine native tree species, some of which are endemic and cannot be found elsewhere in the world. • There are also tree species in LPPCHEA from which some of the cities and municipalities in the country were named after. For instance, the Antipolo city, the Pilgrimage Capital of the Philippines was named after the Antipolo (Artocarpus blancoi) tree. • Trees which are exclusively found in the Philippines and nowhere else in the world but are present in the area include: the Bignay (Antidesma bunius), Kamagong (Diospyros philippinensis) and the Yakal (Shorea laevis). • Other tree species which also serve as food for the birds like Guava (Psidium guajava), Atis • (Annona squamosa) and Bignai (Antidesma bunius) are also found in the area.

Category		Description
Fauna	Avifauna	• Presence of birds is one of the compelling reasons LPPCHEA was proclaimed as a critical habitat. • In fact, during the onset of the winter season in the northern hemisphere, thousands of migratory birds flock in the area to rest and feed. One of these is the IUCN listed vulnerable species, the Chinese Egret (Egretta eulophotes), which population has declined over the years due to threats in habitat lost. • Therefore, a sighting of these birds in the area is a mere evidence of the LPPCHEA's international importance. Another thing is the establishment of the Black-crowned Night Heron (Nycticorax nycticorax) in the area. • As per the DENR's accounting, this bird species was once migratory but has permanently resided in the area. • Their roosting and breeding ground is within the thick mangrove stand inside the Freedom Island. The Philippine Duck (Anas luzonica), also a vulnerable and endemic bird species cannot be found elsewhere within the National Capital Region but LPPCHEA. Any birdwatching trip here wouldn't be considered complete without the sighting of these ducks.
	Macro benthos	• Macro-invertebrates comprised of polychates, mollusc, and crustaceans also abound the area. • Among the group, molluscan fauna are the most abundant. • Polychaetes are represented by mud worms (Nereis sp.), while mollusk is comprised of twenty-three (23) species of bivalves and fourteen (14) species of gastropods. Crustaceans are represented by striped barnacle • (Amphibalanus amphitrite).
	Fish species	• In 2001 researchers from Ecosystems Research and Development Bureau (ERDB) recorded eight (8) species of fishes. • Four species were caught during the day sampling, which included milkfish (Chanos chanos), dusky frillgoby (Bathygobius forma fuscus), striped ponyfish (Leiognathus fasciatus), and long-arm mullet (Valamugil cunnesius). • During the night sampling, four additional species were caught. These were silver sillago (Sillago sihama), fourlined terapon (Pelates quadrilineatus), fringescale sardinella (Sardinella fimbriata), and whipfin silverbiddy (Gerres filamentosus). • Majority of the fishes in the study were at their juvenile to sub-adult sizes. • This finding supports the fact that mangroves serve as nursery areas for a number of fishes.

Source: "Information Sheet on Ramsar Wetlands (RIS): LPPCHEA". Updated February 2013. Ramsar Convention Secretariat

9) Hydrology

Table A17.10 shows hydrological aspects in Las Pinas.

Table A17.10 Hydrological Aspects in Las Pinas

Hydrology	Description
River Systems	• Las Piñas is one of the coastal cities of Metropolitan Manila that lies along the Manila Bay with a coastal length of approximately three km. • Among its tributaries are the two major river systems, namely, the Las Piñas River (2.9 km) and Zapote River (18.3 km). • A total of 18 creeks can be found within the city, with some running through several barangays. • Out of the 18 creeks, only three are tributaries of the Zapote River.
Groundwater systems	• The groundwater systems within MWSS service area consist of alluvial sediments in coastal areas of Manila Bay, Laguna de Bay and Marikina Valley and pyroclastic Guadalupe sedimentary formation underlying most of the National Capital Region (NCR). • Deposited in Las Piñas is the Manila Bay Alluvium.
Drainage Systems	• Water from the northern portion of the city drains into creeks that are linked to the Las Piñas River. • Water from the southern portion drains into the creeks linked to Zapote River. • Both rivers empty into the Manila Bay.

Source: Las Pinas City Comprehensive Land Use Plan 2016-2025 summarized by JICA Survey Team

(c) Social Environment

1) Population

The population of Las Piñas City in 2010 totaled 551,886 of the entire population, or an increase

of 16.98 % from the year 2000 population of 471,767.

2) Household

A total of 127,723 households are in Las Piñas City, according to NSO report of 2010.

3) Land Use

The land use of Las Pinas is shown in Figure A17.5.

4) Employment

According to the National Statistical Office (NSO) 2010 Census of Population, 67.23% (371,046) of the population of Las Piñas City belonged to the labor force or working- age population (15 to 64 years old).

5) Heritage

Table A17.11 summarizes historical corridor sites and landmarks in Las Pinas.

Table A17.11 Historical Corridor Sites and Landmarks in Las Pinas

Category	Site Name	Remarks
Historical Corridor named by RA8003 in 19995	• Las Piñas Church and Bamboo Organ • Las Piñas Bridge • Asinan Area • P. Diego Cera Bridge • Old District Hospital	These tourism sites still exist except for the Asinan Area and the Old District Hospital.
Landmarks as the Historical Corridor	• Manpower Building	
	• Las Piñas General Hospital and Trauma Center • "Spanish type" façade	Located in Barangay Pulanglupa Uno
Other landmarks	• Gabaldon School building	Located in Barangay Elias Aldana (currently being used as office of the District School Superintendent) which is one of the few existing structures in Metro Manila designed by American Architect William Parsons,
	• the Plaza Quezon in Bgy. Elias Aldana	Located in Bgy. Elias Aldana
	• Old Fire Station which is also	Located in Barangay Daniel Fajardo (used to be the old Municipal Hall)
	• Old Zapote Bridge	Figured significantly during the Philippine Revolution, is the site of numerous skirmishes between the Filipino revolutionary forces and the Spaniards.

Source: Las Pinas City Comprehensive Land Use Plan 2016-2025 summarized by JICA Survey Team

2. Imus City Project Site

Environmental and social conditions in Imus City have been reviewed based mainly on the *"Imus City Comprehensive Land Use Plan (CLUP) 2007-2017"*, other publications and site visits which are as summarized below.

(a) Pollution

1) Air Quality

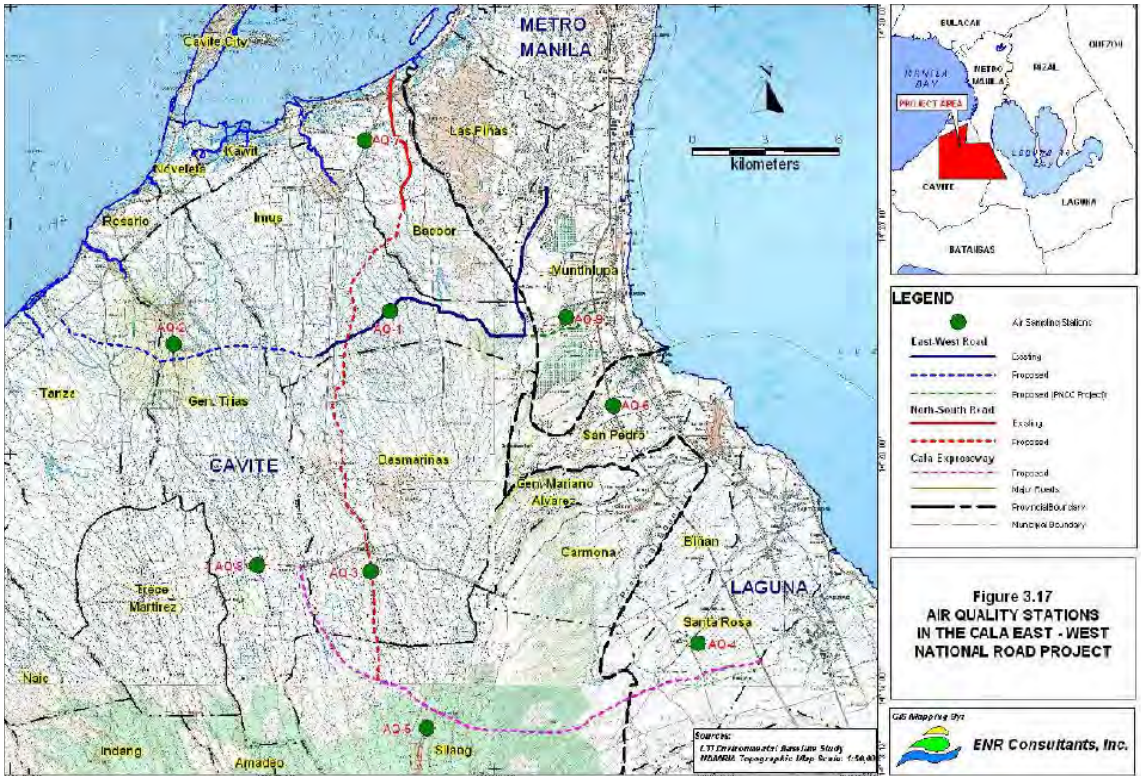
There is no specific data on air quality in Imus. According to the CLUP, industrial sites and

heavy vehicular traffic areas along Aguinaldo Highway are found to have a level of air pollution 2-3 times higher than acceptable standards. In addition, as a reference, Table A17.12 shows data on Air Quality monitoring surveys conducted by the Department of Public Works and Highways (DPWH) under Technical Assistance from JICA in November 2005 for an Environmental Impact Statement (EIA) study for the Cavite-Laguna (CALA) East-West National Road Project.

Table A17.12 Air Quality Survey Results in Cavite (Nov. 2005)

Parameters	DENR Standards	AQ1	AQ2	AQ3	AQ4	AQ5	AQ6	AQ7	AQ8	AQ9
TSP	230µg/Ncm	87	65	63	44	139	252	364	329	95
SO_2	180µg/Ncm	37	42	22	22	56	77	105	83	28
NO_2	150µg/Ncm	44	56	31	31	28	22	38	41	37
CO	35µg/Ncm	ND	ND	ND	ND	ND	ND	ND	1.0	ND
O_3	140µg/Ncm	55	22	88	5	18	87	55	32	22
Pb	1.5µg/Ncm	0.022	0.043	0.009	0.021	0.161	0.387	0.433	0.322	0.054
SPM	-	35	29	31	19	113	212	289	267	73
NO	-	29	34	17	21	17	14	23	26	21

ND: Not Detected
Source: EIS, Cavite-Laguna (CALA) East-West National Road Project Oct. 2006 DPWH under TA from JICA



AQ1-AQ 8: refer to Table A17.5, AQ9: Sitio Makabuhay Dulo, New Bilibid Prison Compound, Muntinlupa City
Source: EIS, Cavite-Laguna (CALA) East-West National Road Project Oct. 2006 DPWH under TA from JICA

Figure A17.6 Air Quality Monitoring Sites

2) Water Quality

Water quality monitoring surveys of Imus rivers were conducted by EMB/DENR (Region 4-A) in 2015.

Table A17.13 shows the survey results and assessments.

Table A17.13 Water Quality Monitoring of Imus River (2015)

Item	Monitoring Station	BOD_5 (mg/L)	DO (mg/L)	pH	TSS (mg/L)	NH_3 (mg/L)	PO_4 (mg/L)
Statistical Analysis of Imus River Water Quality	1	13.43	8.07	7.59	15.57	0.023	1.16
	2	12.14	2.97	7.67	27.43	0.028	2.27
	3	15.00	4.37	7.57	34.86	0.045	1.93
	4	12.71	5.7	7.63	25.14	0.02	1.91
	5	25.57	4.61	7.61	19.14	0.501	1.95
	6	9.14	4.03	7.89	145.43	0.021	1.61
	7	1.43	7.47	8.25	8.57	0.013	0.85
	8	6.43	5.96	7.85	14.14	0.012	0.82
	Mean	11.98	5.40	7.76	36.29	0.08	1.56
Water Quality Assessment of the Imus River System* (2015)	Standard**	7.0 (max.)	5.0 (min.)	6.5-9.0	80.0 (max.)	0.05 (max.)	0.5 (max.)
	Remarks***	Over the standard	Within the standard	Within the range	Within the standard	Over the standard	Over the standard
	Assessment***	Failed	Passed	Passed	Passed	Failed	Failed

**Imus River was classified as Class C, as stated in this source.*
*** Standards for Class C were extracted from DENR AO 2016-08*
****Remarks and assessment were derived after reviewing this document and the DENR AO 2016-08*
Source: "Annual Accomplishment Report of Manila Bay Unit CY 2015". EMB Regional Office No. IV-A, CALABARZON

3) Waste

According to “Imus City Comprehensive Land Use Plan (CLUP) 2007-2017”, the city has no permanent dumping site. A controlled Dumpsite located in Pasong Buaya is currently used as dumping ground for the city wastes.

Table A17.14 shows data on waste generation in Imus in 2014.

Table A17.14 Wastes Generation (Dec. 2014)

Data Source	City	Residential Wastes (tons/day)	Market Wastes (tons/day)	Total (tons/day)
Provincial Government Environment and Natural Resources Office	Imus	130	3	133

Source: Cavite Socio-economic and Physical Profile 2014 (summarized by JICA Survey Team)

4) Noise and Vibration

There is no specific data on Noise and Vibration in Imus. As a reference, refer to Table A17.5 (data on noise level monitoring surveys in Cavite conducted by DPWH under Technical Assistance from JICA in May 2006 for an EIS for the Cavite-Laguna (CALA) East-West National Road Project.)

(b) Natural Environment

1) Climate

There are two pronounced seasons in the city as follows.

- The dry season: November to April.
- The wet season: May to October.

Climate in Imus is similar as in the whole province of Cavite (see Table A17.7).

2) Protected Areas

In Imus city, there is no natural protected area at all.

3) Flora and Fauna

The principal crops are palay and vegetables. Other crops like corn, pineapple, sugarcane, coconuts and fruits trees are also planted but not in commercial scale. Bamboo shrubs abound along the river banks. The soil in Imus is generally suited to lowland rice production and vegetable growing such as ampalaya, pole sitao, upo, bell pepper, eggplant, okra, etc. The principal crops are palay and vegetable. Mangoes are the dominant fruit bearing trees in Imus.

4) Geology

Table A17.15 shows geological aspects in Imus.

Table A17.15 Geological Aspects in Imus

Geology	Description
Soil	• The soils at the northern and eastern portions of the town are Guadalupe silt loam while the area bordering the Municipality of Dasmariñas is Guadalupe clay.
Rock and Deposits	• The Laguna tuff is the primary rock composition in Imus. Vitric and lapili tuff agglomerates comprise the greater bulk of this formation. • Volcanic ash, dust and glass shards are the primary composition of the vitric tuff, while angular pebbles, scoria and cobbles of pumice comprise the lapili tuff. • The poorly sorted rocks produce more porous and permeable beds. • This formation has an average thickness of 200 meters. • Alluvium deposits mostly sand, silt and clay are the greater bulk of the recent deposits. Deltaic deposits are composed of tine to medium sand with considerable amount of clay and sea shells. • Alluvium near the volcanic centers contains clay derived from the weathering of the cementing materials of the pyroclastic rocks.

Source: Imus City Comprehensive Land Use Plan (CLUP) 2007-2017

5) Topographical Aspect

The topography of the Municipality of Imus is flat to gently sloping (0-3% slope). The northern and central portions of the town are level to nearly level lands with slopes not exceeding 3%. The southern part is gently sloping (3-5% slope), while the southern portion exceeds 5 %.

The elevation ranges from almost sea level in the western corner to as high as 70 meters above sea level in the southeastern corner.

6) Hydrology

Table A17.16 shows hydrological aspects in Imus.

Table A17.16 Hydrological Aspects in Imus

Hydrology	Description
Hydrologic Profile	• The hydrologic profile of the city indicates a continuous and layered source of groundwater and disconnected aquifers composed of alluvium deposits and agglomerates, sandy tuff and cinder beds.
River Systems	• The major water tributary in the city starts from the watershed areas of upland municipalities of Tagaytay and Indang. • There are three (3) rivers cutting across the town as follows. 1. Imus River: passes through Anabu I, Anabu II, Tanzang Luma, Palico and Toclong II (with stretch of 38.4 kilometers, is the major tributary of water in Imus) 2. Julian River: passes through Malagasang II, Malagasang I, Bucandala, Bayan Luma, and branches into two in Carsadang Bago and Medicion I, and meets again in Toclong II 3. Alang-ilang River: passes through Malagasang II, Alapan II, Pag-asa and Noveleta. Pasong Buaya in the eastern portion of the town, is also a drainage basin of the Zapote River which runs eastward parallel to Molino Road.

Source: Imus City Comprehensive Land Use Plan (CLUP) 2007-2017

(c) Social Environment

1) Population

Table A17.17 shows population data in Imus.

Table A17.17 Projected Population

2010*	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
301,624	314,986	328,940	343,512	358,729	374,621	391,217	408,548	426,646	445,547	465,285

***actual data**
Source: National Statistics Office (NSO), Imus CPDO Projections

2) Household

Table A17.18 shows household data in Imus.

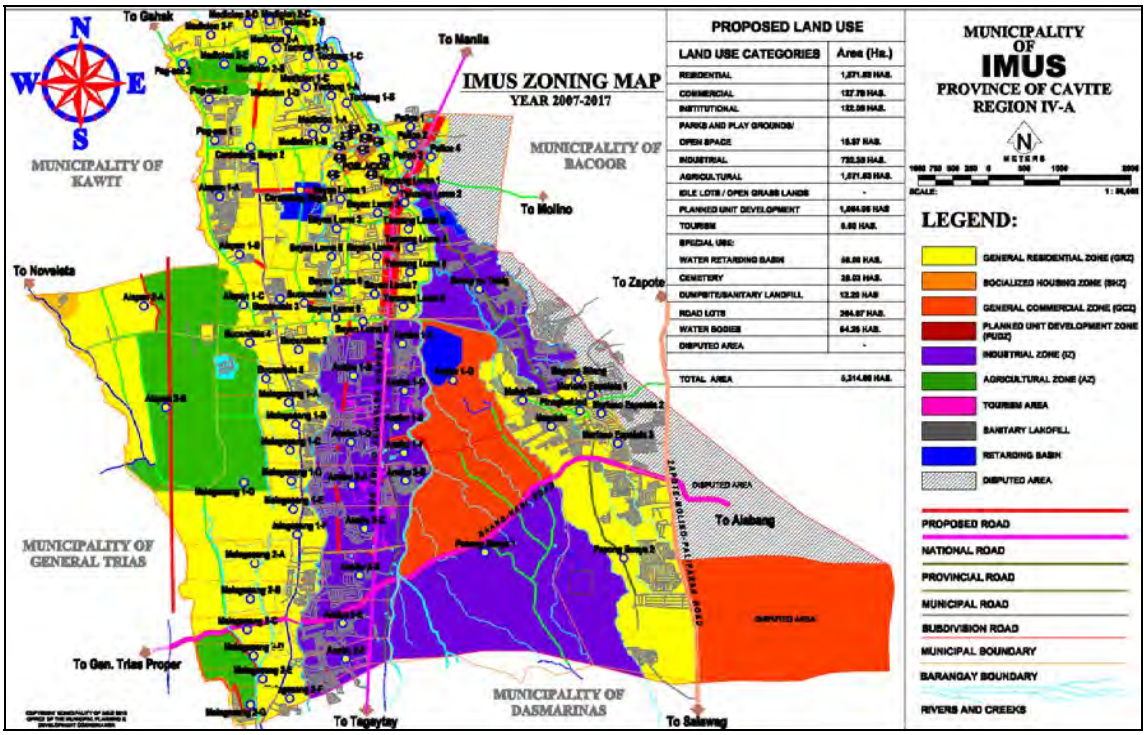
Table A17.18 Projected Households (2011-2020)

2010*	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
72,182	76,159	80,356	84,783	89,455	94,384	99,584	105,071	110,861	116,969	123,414

***actual data**
Source: National Statistics Office (NSO), Imus CPDO Projections

3) Land Use

The land use of Imus is shown in Figure A17.7.



Source: Imus City Comprehensive Land Use Plan (CLUP) 2007-2017

Figure A17.7 Land Use Map of Imus

4) Employment

Table A17.19 shows data on employment in Imus.

Table A17.19 Employment in Imus

Projection	2010*	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Productive Population (15-64 yrs. old)	204,249	213,297	222,746	232,613	242,919	253,679	264,916	276,653	288,908	301,708	315,072
Employed	164,645	171,939	179,556	187,509	195,817	204,491	213,549	223,010	232,889	243,207	253,980
Unemployed	39,604	41,358	43,190	45,104	47,102	49,188	51,367	53,643	56,019	58,501	61,092
Not Economically Active (over 64 yrs. old)	11,482	11,991	12,522	13,077	13,656	14,260	14,892	15,552	16,241	16,961	17,712

***actual data**
Source: National Statistics Office (NSO), Imus CPDO Projections

5) Heritage

Table A17.20 summarizes historical sites and, monuments and markers in Imus.

Table A17.20 Historical Sites, Monuments and Markers in Imus

Category	Site Name	Description
Historical Sites	• Pasong Santol	10-15-minute drive from the town proper, is the site of the battle against Spanish force in 1897. It is located in Anabu II.
	• Isabel Bridge	located at Palico and a two-minute drive from the town proper. A concrete arch bridge with marker, it signifies the battle that took place the Philippine-Spanish war.
	• Site of Battle of Alapan of 1898	paved the way for the birth of the First Philippine Republic. It is where the Philippine Flag sewn in Hongkong by Marcella Agoncillo received its Baptism on Fire on May 28, 1898. Located at Alapan I Elementary School, the battle site is a 10-15-minute drive from the town proper. The site was declared by the National Historical Institute as a national historical landmark thru Resolution Number 5 Series of 1993 signed on May 26, 1993.
	• General Pantaleon Garcia	was used by the Spanish Constables as headquarters during the war. At present, the same serves as the Provincial Headquarters of the Philippine National Police. It is also where the Imus Museum is located.
	• Cathedral, Imus	is an exponent of old Hispanic Architecture and exudes an ambiance conducive to monastic life and spiritual meditation
	• Town Plaza	is also one of the municipality's scenic attractions which was refined and beautified in 1990 through the funding assistance from Philippine Tourism Authority.
Monuments and Markers	• Heneral Licerio Topacio Y Cuenca	The marker is located across the Gen. Licerio Topacio Park, where the house of this revolutionary hero stood.
	• Labanan sa Imus	This identifying mark shows the nine life-sized figures made of bronze of Gen. Emilio Aguinaldo and his "revolutionaries" moving forward to victory from the Spanish forces. It is located near the headquarters of the Cavite Philippine National Police command and was unveiled and blessed on September 3, 1996.
	• Arsenal ng Imus	was established in 1896 by Filipino-Chinese blacksmith, later general, Jose Ignacio Paua, to manufacture and repair guns and lantakas for the revolutionary government during the Philippine revolution against Spain and the Philippine-American War. This plaque is located just outside Imus Historical Museum.
	• Flaviano Yengko Marker	The marker was installed by the National Historical Commission on December 22, 1974 at the Bantayan, Poblacion IV-B, Imus, Cavite.
	• Tulay Tomas Mascardo Marker	The marker is located at Tanzang Luma – Palico, Imus, Cavite on December 17, 1973.
	• Imus Historical Marker	This marker installed in 1954, can be found near two vintage artillery pieces situated just across the Imus Catholic Church and the Imus Municipal Hall.
	• Enriqueta T. Virata Marker	The marker located at Medicion II-C Imus, Cavite was installed on July 14, 1984.

Source: Imus City Comprehensive Land Use Plan (CLUP) 2007-2017 summarized and amended by JICA Survey Team

3. Kawit Municipality Project Site

Environmental and social conditions in Kawit Municipality have been reviewed based mainly on the "*Comprehensive Land Use Plan 2012-2022, Kawit Municipality*", other publications and site visits which are as summarized below.

(a) Pollution

1) Air Quality

There is no specific data on air quality in Kawit. As a reference, refer to Table A17.12 (data on Air Quality monitoring surveys conducted by DPWH under Technical Assistance from JICA in November 2005 for an EIS study for the Cavite-Laguna (CALA) East-West National Road Project.)

2) Water Quality

Predominantly a residential locality, pollution in Kawit's river ways is caused primarily by domestic wastewater, sewer or sewerage. The high level of nutrients in these wastes, when in surface water, encourage the growth of algae and weed that consume up the water's oxygen level which is not a place for marine life to thrive.

Other surface water pollutants such as chemicals and metals are the major contributors to the environment problem. From upland localities of the province of Cavite in its industrial zones, countless establishments' activities discharge or let off untreated wastewater with toxic chemicals, metals, and solvents. All materials have been learned to be harmful to marine life and ecosystem.

From these same upland areas, their agriculture contributes as well in polluting our rivers, directly from or through seepage, of those toxic chemicals used in fertilizers, pesticides, insecticides and others.

3) Waste

Solid waste management in Kawit Municipality and its issues are summarized in Table A17.21.

Table A17.21 Solid Waste Management in Kawit Municipality

Solid Waste Management	Description	Issues
1. Collection	Three (3) Garbage Trucks	The LGU foresees the urgent need to acquire new garbage trucks on a regular basis
2. Waste Quantity	39 Tons/day	Ever-increasing day after day
3. Material Recovery Facility (MRF)	3MRFs are presently under construction in Barangays Binakayan-Aplaya, San Sebastian and Wakas II.	The target of the LGU is to provide each and every Barangay with their own MRF by the year 2022
3. Disposal method/site	An idle 2,000 m^2 rice-land in an abandoned agricultural lot located in Barangay Batong Dalig serves as an open dumpsite.	Since the temporary dumping grounds is an 'open' dumpsite, the municipality needs to replace, as it is duty-bound to, with the indispensable MRFs so as to comply with the provisions of RA 9003.

Source: Comprehensive Land Use Plan 2012-2022, Kawit Municipality summarized by JICA Survey Team

4) Noise and Vibration

There is no specific data on Noise and Vibration in Kawit. As a reference, refer to Table A17.5 (data on noise level monitoring survey conducted by DPWH under Technical Assistance from JICA in May 2006 for an EIS for the Cavite-Laguna (CALA) East-West National Road Project.)

(b) Natural Environment

1) Climate

Kawit is categorized under the Type 1 of climate classification where there are distinct wet and dry season. (Source: Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA) Sangley Point Field Office, 2009)

- Rainy months are generally observed from the months of May through October with August as the peak rainy month with an average rainfall of 313 mm.
- The rest of the months of the year are considered dry season.

Table A17.22 shows meteorological situation in Kawit Municipality

Table A17.22 Meteorological Situation in Kawit Municipality

Monthly Temperature	Relative Humidity	Prevailing Wind	Average Wind Speed
24.0℃-31.5℃ (Coolest: Jan.) (Warmest: May)	70%-82% (Mean Monthly)	East - Southeast (ESE) (February through May and October)	Two (2) miles / hour

Source: Comprehensive Land Use Plan 2012-2022, Kawit Municipality summarized by JICA Survey Team

2) Weather Disaster

Kawit Municipality, geographically located on the northern part of the island province of Cavite, is vulnerable to several types of natural hazards (stormy, monsoon winds, heavy rains, and storm surges brought about by typhoons that pass along Southern Luzon regions) as summarized below.

- Based on historical records, 8-12 typhoons per year passed the region.
- The seven (7) shoreline Barangays are susceptible to storm surges and southwest monsoons.
- The rest of the Barangays are subject to stormy winds and heavy rains, triggering soil erosions, flooded rivers and tributaries.
- Significant and devastating weather disturbances that struck this locality are as shown in Table A17.23.

Table A17.23 Devastating Weather Disturbance in Kawit Municipality

Name of Disturbance	Period	Wind speed (kph)
Milenyo	Sept. 28-29, 2006	140-180
Reming	Nov. 30- Dec. 01, 2006	250
Frank	June. 21-22, 2008	100
Ondoy	Sept. 2009	140

Source: Comprehensive Land Use Plan 2012-2022, Kawit Municipality

- Lately, torrential southwest monsoon (habagat) rains have inundated almost all barangays of

Kawit as in the case of the southwest monsoon rains as intensified by Typhoon Storm Maring in August 19-21, 2013 making disaster risk management a pressing issue for the municipality.

3) Protected Areas

In Kawit municipality, there is no natural protected area at all.

4) Flora and Fauna

Mangroves forest are abundant in various coastal barangays of the municipality namely Wakas 2, Sta. Isabel, Poblacion and Binakayan.

5) Geology

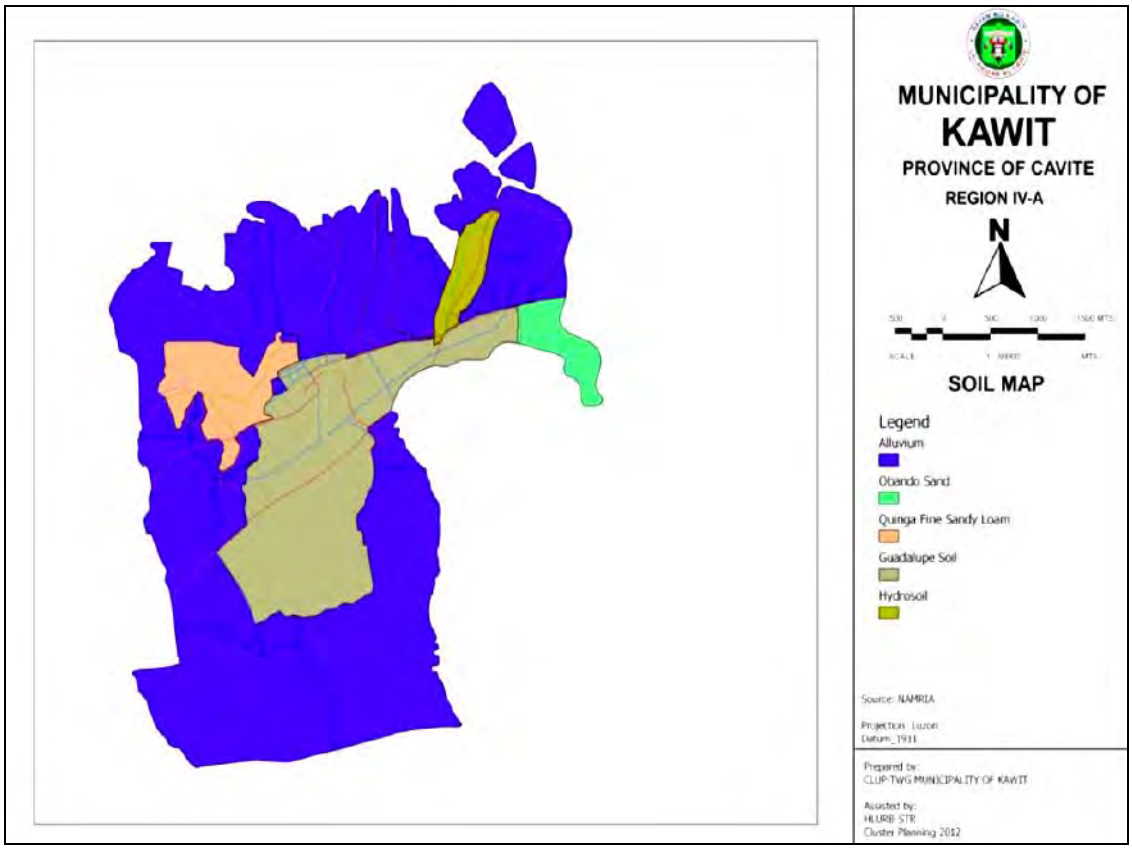
The entire Municipality is alluvium in nature as summarized below.

- Fluviatile alluvium is made up of transported rock weathering products and unconsolidated volcanic detritus.
- It occurs as old and new beach sands and silt deposits which normally contains clay and gravely tenses.
- The formational geologic boundary covers the outskirt of Kawit.
- There are no existing major faults in the province.
- Soil type in Kawit is summarized in Table A17.24 and shown in Figure A17.4.

Table A17.24 Soil Type in Kawit Municipality

Soil Type	Description
Hydro soil	• This type of soil is found in the particular portion of Binakayan near the coast and in the southern portionof Marulas. • This type of soil is described as sandy in texture with small amount of clay and organic matter. • The soil generally consists of submerged elements of the swamps, marine ponds, salt beds of the Bacoor Bay and vicinity. • The texture of the sub-aqueous horizons ranges from sand to sandy clay.
Quingua Fine Sandy Loam	• This type of soil is found on the northwest portion of Kawit particularly in the Barangays of Sta. Isabel, Wakas II and Magdalo. • The soil is typically a river deposit of sandy material. • The depth of the surface soil varies according to the level of the river flood terrace. • Usually it ranges from light brown to pale brown. • This type of soil is most suitable for vegetable growing, particularly tomatoes, beans, cowpeas, and mangoes.
Guadalupe Soil	• This type of soil is found in the majority of the Municipality such as San Sebastian, BatongDalig, Tabon I, II, and III, Panamitan, Gahak, Wakas I, Poblacion , Kaingen and part of Binakayan. • Guadalupe clay is part of Guadalupe series, which is the continuation of the series established in Rizal province. • Guadalupe soil is underlain by volcanic materials of various degrees of disintegration and weathering. • The depth of the surface soil ranges from 20 to 30 centimeters. • It is very dark brown to nearly black coarse granular when dry. • For this type of soil, the undisturbed soil is hard and compact, and breaks and cracks easily, rendering cultivation quite difficult. • However, this soil gives minimum yield of lowland rice due to lack of moisture in the substratum. Rice plants can suffer badly during drought condition.
Obando Sand	• This type of soil is found in the northeastern portion of Binakayan. • The soil is sandy loam in nature and is suitable for vegetable growing.

Source: Comprehensive Land Use Plan 2012-2022, Kawit Municipality summarized by JICA Survey Team



Source: Comprehensive Land Use Plan 2012-2022, Kawit Municipality

Figure A17.2 Soil Map of Kawit

6) Topographical Aspect

The topographical aspect of Kawit is generally flat due to the fact that Kawit is a coastal municipality where the average land elevation is just over a meter above sea level.

7) Hydrological Aspect

Table A17.25 shows hydrological aspect in Kawit.

Table A17.25 Hydrological Aspect in Kawit Municipality

Waters/Rivers	Description
Territorial Waters	Kawit's territorial waters covering 612.3 ha as part of the Bay is the major source of saltwater replenished by the South China Sea.
Major River	The municipality is cut by two (2) major rivers namely Ilang Ilang River on the eastside and Imus River on the west side.
Tributary River	There exist five (5) tributary rivers in the municipality namely Marulas River, Panamitan River, Santoyong, Taguilid and Malamok Rivers.

Source: Comprehensive Land Use Plan 2012-2022, Kawit Municipality summarized by JICA Survey Team

(c) Social Environment

1) Population

Table A17.26 shows a transition of population in Kawit Municipality based on the National Statistical Organization (NSO) Census of Population.

Table A17.26 Population in Kawit Municipality

Data Source	Year	Population	Growth Rate
NSO 2010, Census of Population	1990	47,755	-
	1995	56,993	3.87%
	2000	62,751	2.08%
	2007	76,405	2.75%
	2010	78,209	2.23%
Projected	2016	89,256	-

Source: Comprehensive Land Use Plan 2012-2022, Kawit Municipality summarized by JICA Survey Team

2) Household

Table A17.27 shows household in Kawit Municipality based on the National Statistical Organization (NSO) Census of Population.

Table A17.27 Household in Kawit Municipality

Data Source	Year	No. of Household	Household Size
NSO 2010, Census of Population	2010	17,946	4.43
	2011	16,128	4.41

Source: Comprehensive Land Use Plan 2012-2022, Kawit Municipality summarized by JICA Survey Team

3) Land Use

Land use in Kawit Municipality is summarized as shown in Table A17.28.

Table A17.28 Land Use in Kawit Municipality

Land Use Categories	**Area (ha)**
1. Residential	539.85
2. Commercial	212.28
3. Industrial	10.80
4. Infrastructure/utilities	57.73
5. Institutional	13.75
6. Parks/Playgrounds/Recreational Spaces	2.70
7. Cemetery	8.00
8. Waste Management	2.00
9. Tourism	1.00
10. Agriculture	890.13
Total	1,738.24

Source: Comprehensive Land Use Plan 2012-2022, Kawit Municipality

4) Employment

Table A17.29 summarizes employment in Kawit.

Table A17.29 Employment in Kawit

Employment	2011	2012	2013	2014	Jan. to Mar. 2014	Jan. to Mar.2015
Number of Employees (New Registration)	229	447	564	1,449	NDA	467
Number of Employees (Renewal Registration)	1,186	1,507	1,524	4,851	NDA	4,998
Number of Employees (New and Renewal)	1,415	1,954	2,088	6,300	NDA	5,465
Growth in the number of jobs in the locality (New and Renewal)	2011-2012		2012-2013		2013-2014	
	38.09%		6.86%		201.72%	

Source: Cities and Municipalities Competitiveness Index, National Competitiveness Council Philippines (http://www.competitive.org.ph/cmcindex/pages/historical/?lgu=Kawit)

5) Heritage

Table A17.30 summarizes historical sites in Kawit.

Table A17.30 Historical Sites in Kawit

Site	Description
1. Gen. Emilio Aguinaldo Shrine	• The Aguinaldo Shrine is a national shrine located in Kawit, Cavite where the independence of the Philippines from Spain was declared on June 12, 1898. • To pay homage for the declaration of the Philippine Independence, June 12 of each year was declared as national holiday all over the country. • Now it is known as Araw ng Kalayaan or Independence Day, the Philippine flag is raised at the azotea/balcony of the shire by top government officials every June 12th of each year. • The shrine is the ancestral home of General Emilio Aguinaldo, the First President of the First Republic of the Philippines. • The house was first built in 1845 made from wood and thatch, and reconstructed in 1969. (Source: www.nhcp.gov.ph,)
2. General Baldomero Aguinaldo Shrine	• Gen. Baldomero Aguinaldo was the first cousin of Gen. Emilio Aguinaldo and became his right hand. • He was the president of the Magdalo Council which was established in Imus, Cavite. • He was the First President of the Asociacion de los Veteranos de la Revolucion Filipina. • This restored historical edifice was originally built in 1906 and served as the official residence of Gen. Baldomero Aguinaldo and his family. (Source: www.nhcp.gov.ph, 2000)
3. Battle of Binakayan Monument	• The encounter in Binakayan is one in a two-pronged branch of offensive against Spaniards on November 9-11, 1896. • The second encounter was in Kalero, Noveleta wherein hundreds of Spanish soldiers were killed by Filipinos. • During the uprising, Gen. Gregoria Montoya, known as the “Joan of Arc of the Philippines” was with the revolutionary forces. She hailed inTabon, Kawit, Cavite. • Two hundred fifty (250) Spanish soldiers surrendered in "Polvorin" (Pulborista) after a brief encounter with Filipino soldiers. • The Spanish forces were totally demoralized. It is the second victory of the Filipino Revolutionaries under the leadership of Gen. Emilio Aguinaldo in the Second Philippine Revolution. (Source: www.nhcp.gov.ph, 2000)
4. General Candido Tirona Monument	• Gen. CandidoTirona Monument is located at Poblacion, Kawit Cavite. • This monument was built in memory of Gen. Candido Tirona who was the first revolutionary Captain Municipal in the Philippines. • He was one of the "Heroes of Binakayan Battle that took place on Nov. 9-11,1896" in which the Spanish forces under the over-all command of Governor and Cpt. Gen. Ramon Blanco were decisively defeated. • Born on Aug. 29, 1863, he was the son of a wealthy couple, Estanislao and Juana Mata, both native of Kawit. He was also the compadre of Gen. Emilio Aguinaldo. (Source: www.nhcp.gov.ph, 2000)
5. St. Mary Magdalene Parish Church	• St. Mary Magdalene Church in Kawit, Cavite is one of the oldest churches in the Philippines. • It was initially built by wood in 1638 and was erected by six Filipino families who hailed from the towns of Maragondon and Silang. St. Mary Magdelene is the Patroness Saint of Kawit. In 1737, the cornerstones were built. • However, they were destroyed in 1831 by a strong typhoon. • It was handled by the Secular priests in 1786 and then by the Recolletos in 1894. • The present structure was constructed in 1737. • In 1869, Gen. Emilio Aguinaldo, the president of the first Philippine Republic was baptized in this church. • Aguinaldo's birth certificate is kept inside a glass cabinet on the left side of the altar A life-size statue of St. Mary Magdalene is stored inside the parish church of Kawit. (Source: www.google.com)

Source: Comprehensive Land Use Plan 2012-2022, Kawit Municipality summarized by JICA Survey Team

Appendix 18

Environmental Checklist

<table>
<tr><th>Category</th><th>Environmental Item</th><th>Main Check Items</th><th>Yes: Y
No: N</th><th>Confirmation of Environmental Considerations
(Reasons, Mitigation Measures)</th></tr>
<tr><td rowspan="2">1 Permits and Explanation</td><td>(1) EIA and Environmental Permits</td><td>(a) Have EIA reports been already prepared in official process?
(b) Have EIA reports been approved by authorities of the host country's government?
(c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied?
(d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?</td><td>(a)N
(b)N
(c)N
(d)N</td><td>(a) ECC/CNN shall be obtained for the proposed projects in Las Pinas, Imus and Kawit respectively.

A matrix guideline for determining the category in which the projects fall is prepared and attached as “Annex A Project Thresholds for Coverage Screening and Categorization” in the “Revised Guidelines for Coverage Screening and Standardized Requirements under the PEISS, EMB MC 005 July 2004, EMB/DENR”. In accordance with the Annex A, sewerage system projects are subject to “3.8.5 Domestic wastewater treatment facility” under “3.8 Waste Management Projects” in “3. Infrastructure Projects” as shown in the following table.

<table>
<tr><th rowspan="3">Projects/Description</th><th colspan="3">Covered (Required to secure ECC)</th><th>Not covered (may secure CNC)</th><th rowspan="3">Project size parameters/ Remarks</th></tr>
<tr><th>Category A: ECP</th><th colspan="2">Category B: Non-ECP</th><th>Category D</th></tr>
<tr><th>EIS</th><th>EIS</th><th>IEE Checklist</th><th>PD (Part I only)</th></tr>
<tr><td colspan="6">3. INFRASTRUCTURE PROJECTS</td></tr>
<tr><td colspan="6">3.8 Waste Management Projects</td></tr>
<tr><td>3.8.5 Domestic wastewater treatment facility (inducing septage treatment facility)</td><td>None</td><td>≧5,000m^3</td><td>>30m^3 but <5,000m^3</td><td>≦30m^3</td><td>Based on system capacity</td></tr>
</table>
ECP: Environmentally Critical Project

As for sewer line systems, according to EMB/DENR, those lines are regarded as parts of the STP facilities. Therefore, those proposed projects including sewer lines are Category B (Non-ECP)

In addition, project sites in Las Pinas, Imus and Kawit City/Municipality may be located in “Areas frequently visited and/or hard-hit by natural calamities (geologic hazards, floods, typhoons, volcanic activity etc.)” specified in DAO 03-30. Therefore, the proposed projects in Las Pinas, Imus and Kawit are expected to fall under Environmentally Critical Areas ECAs).

Based on the recognition above, projects of Category B in ECA are required to secure ECC.

(b) Not yet
(c) Not applicable at the moment
(d) Not applicable at the moment</td></tr>
<tr><td>(2) Explanation to the Local Stakeholders</td><td>(a) Have contents of the project and the potential impacts been adequately explained to the Local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the Local</td><td>(a)N
(b) N</td><td>(a) Not applicable at the moment
(b) Not applicable at the moment</td></tr>
</table>

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		stakeholders? (b) Have the comment from the stakeholders (such as local residents) been reflected to the project design?		
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a)	(a) Based on technical reviews, and environmental and social situations several possible alternative sits in Las Pinas, Imus and Kawit have been examined
2 Pollution Control	(1) Water Quality	(a) Do pollutants, such as SS, BOD, COD, pH contained in treated effluent from a sewage treatment plant comply with the country's effluent standards? (b) Does untreated water contain heavy metals?	(a) Y (b) N	(a) The proposed STP of CAS (Conventional Activated Sludge) are designed to meet Maynilad's design standard which complies with the country's effluent standads. (b) Only domestic waste water will be treated in each STP (Industrial waste water which may contain heavy metals are out of scope
	(2) Wastes	(a) Are wastes, such as sludge generated by the facility operations properly treated and disposed of in accordance with the country's standards?	(a) Y	(a) After the de-watering of the sludge will be disposed of in accordance with the country's standards as Maynilad commonly practices.
	(3) Soil Contamination	(a) If wastes, such as sludge are suspected to contain heavy metals, are adequate measures taken to prevent contamination of soil and groundwater by leachates from the wastes?	(a) Y	(a) Only domestic waste water will be treated in each STP (Industrial waste water which may contain heavy metals are out of scope
	(4) Noise and Vibration	(a) Do noise and vibrations generated from the facilities, such as sludge treatment facilities and pumping stations comply with the country's standards?	(a) Y	(a) Most of the pumps are submerged pumps. In addition, ground based pumping stations are planned to be installed in buildings to be reduced the noise and vibration appropriately.
	(5) Odor	(a) Are adequate control measures taken for odor sources, such as sludge treatment facilities?	(a) Y	(a) Maynilad has internal guidelines on odor control of "Employer's Requirement for Plant Odor control system". In addition, Maynilad has technical conventional designs on odor controls in STPs.
3 Natural Environment	(1) Protected Areas	(a) Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	(a)N	(a) Proposed project sites in Las Pinas, Imus and Kawit are not located in such protected areas at all.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? (b) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? (c) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem? (d) Is there a possibility that the project will adversely affect aquatic environments, such as rivers? Are adequate measures taken to reduce the impacts on aquatic environments, such as aquatic organisms?	(a) N (b) N (c) N (d) N	(a) Not applicable (Proposed project sites in Las Pinas, Imus and Kawit are not encompass such ecosystem) (b) Not applicable (Proposed project sites in Las Pinas, Imus and Kawit are not encompass such ecosystem) (c) Not applicable (Proposed project sites in Las Pinas, Imus and Kawit are not encompass such ecosystem) (d) Not applicable (Domestic waste water are to be treated in proposed STPs)
4 Social Environment	(1) Resettlement	(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? (b) Is adequate explanation on compensation and resettlement given to affected people prior to resettlement? (c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement? (d) Is the compensations going to be paid prior to the resettlement? (e) Is the compensation policies prepared in document? (f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities,	(a)Y/N (b)Y/N (c)Y/N (d)Y/N (e)Y/N (f)Y/N (g)Y/N (h)Y/N (i)Y/N (j)Y/N	(a) 1. Las Pinas: Project Site of L-A has been already acquired by Maynilad without resettlement. ・ A guard house operated by Las Pinas City to oversee the city motor pool, garbage compactors and vehicle impounding are, was permitted by Maynilad within their acquired land for a while. ・ Maynilad already gave the City Government a formal notice to vacate their land before stating STP. ・ Maynilad is waiting for Las Pinas City Government's plans of relocating the office to a new location within the boundaries of Coastal Road, C-5. 2. Imus: In the both sides of approach area for the Project Site of C-B, there are two houses (two households but one extended family of total 16 people are living). ・ Those families are living on the premises as a land keeper for the land assigned by the landowner without land rent. ・ According to interviews with the family member, the owner as well as the family want to sell the land and relocate the houses due to flooding in the typhoon seasons. 3. Kawit: In the Project Site of K-3, there is no residential house at all (only farming huts are located in the approach area of the land) (b)(c)(d)(e)(f)(g)(h)(i)(j) 1. Lasd Pinas: For the land acquisition of L-A, "Land Acquisition Report, South Septage Treatment Plant was prepared by Maynilad in April 2014 in accordance with the Maynilad "Environmental and Social Safeguards Framework (ESSF)".

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		and indigenous peoples? (g) Are agreements with the affected people obtained prior to resettlement? (h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan? (i) Are any plans developed to monitor the impacts of resettlement? (j) Is the grievance redress mechanism established?		2. Land of C-B (Imus) and K-3 (Kawit) will be appropriately acquired in accordance with the Maynilad Safeguards of ESSF
	(2) Living and Livelihood	(a) Is there a possibility that changes in land uses and water uses due to the project will adversely affect the living conditions of inhabitants? (b) Is there a possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts, if necessary?	(a)N (b)N	(a) Not applicable (b) Not applicable
4 Social Environment	(3) Heritage	(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	(a)N	(a) Not applicable
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	(a)N	(a) Not applicable
	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples? (b) Are all of the rights of ethnic minorities and indigenous peoples in relation to lands and resources respected?	(a)N (b)N	(a) Not applicable (b) Not applicable

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(6) Working Conditions	(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project? (b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials? (c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.? (d) Are appropriate measures taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?	(a)N (b)Y (c)Y (d)Y	(a)(b)(c)(d) Following laws and regulations on working conditions are to be applied for construction projects in the Philippines 1. Presidential Decree 422 (1974), as Amended “Labor Code of the Philippines” This law states the responsibility of the Department of Labor and Employment (DOLE) as the agency to set and monitor safety and health standards in all workplaces. (Please refer to Page 28, Article 162 of Attachment 1: 1974_PD442_Labor Code) 2. DOLE Occupational Safety and Health Standards (As Amended, 1989) This contains all relevant standards on Occupational Safety and Health Standards (OSHS) in workplaces, accident prevention measures, etc., specifically under Rule 1060 to Rule 1960. (Please refer to Attachment 2: 1989_DOLE OSHS) 3. DOLE Department Order 13, Series of 1998 This contains guidelines covering OSHS specifically for construction industry. (Please refer to Attachment 3: 1998_DOLE DO13) 4. DOLE Department Order 16, Series of 2001 This contains amendments to OSHS Rule 1030 on Training of Personnel in Occupational Safety and Health. (Please refer to Attachment 4: 2001_DOLE DO16) 5. DOLE Department Order No. 128-13, Series of 2013 This contains amendments to OSHS Rule 1414 on Scaffoldings. (Please refer to Attachment 5: 2013_DOLE DO128)
5 Others	(1) Impacts during Construction	(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)?(b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts?(c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?(d) If the construction activities might cause traffic congestion, are adequate measures considered to reduce such impacts?	(a)(b)(c)(d) Y	(a)(b)(c)(d) During construction phase relevant laws and regulations such as “1978 NPCC Rules and Regulations Implementing PD 984 (noise)”, IRR “NATIONAL BUILDING CODE OF THE PHILIPPINES (PD 1096)” and others are applied.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(2) Monitoring	(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? (b) What are the items, methods and frequencies of the monitoring program? (c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)? (d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	(a) Y (b) Y (c) Y (d) Y	(a) Maynilad has organized the Environmental Management Department (EMD) which is handling operation on environmental and social considerations for their projects including the monitoring activities for their projects (b) PEISS requires and regulate environmental monitoring actives for the ECC/CNC projects (c) Maynilad has organized the Environmental Management Department (EMD). (d) PEISS requires and regulate environmental monitoring actives and reporting systems for the ECC/CNC projects
6 Note	Note on Using Environmental Checklist	(a) If necessary, the impacts to transboundary or global issues should be confirmed (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	(a)N	(a) Not applicable

1) Regarding the term “Country’s Standards” mentioned in the above table, in the event that environmental standards in the country where the project is located diverge significantly from international standards, appropriate environmental considerations are required to be made. In cases where local environmental regulations are yet to be established in some areas, considerations should be made based on comparisons with appropriate standards of other countries (including Japan's experience).
2) Environmental checklist provides general environmental items to be checked. It may be necessary to add or delete an item taking into account the characteristics of the project and the particular circumstances of the country and locality in which the project is located.