

Source: JICA Study Team (2012)

FIGURE 9.5.4-13 LOCATION OF RIVER RESORT AREAS

(4) River Use

To determine the stakeholders' dependency on rivers found in the project area, several questions were included in the survey of **195** stakeholders¹. Specifically they were asked the following questions:

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

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

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

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

Source: JICA Study Team (2012)

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

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

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

Source: JICA Study Team (2012)

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

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

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

Source: JICA Study Team (2012)

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

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

Source: JICA Study Team (2012)

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

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

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

Source: JICA Study Team (2012)

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

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

Source: JICA Study Team (2012)

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

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

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

Source: JICA Study Team (2012)

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

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

Source: JICA Study Team (2012)

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

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

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

Source: JICA Study Team (2012)

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

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

Source: JICA Study Team (2012)

(5) Effect of Urbanization on Water Quality

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

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

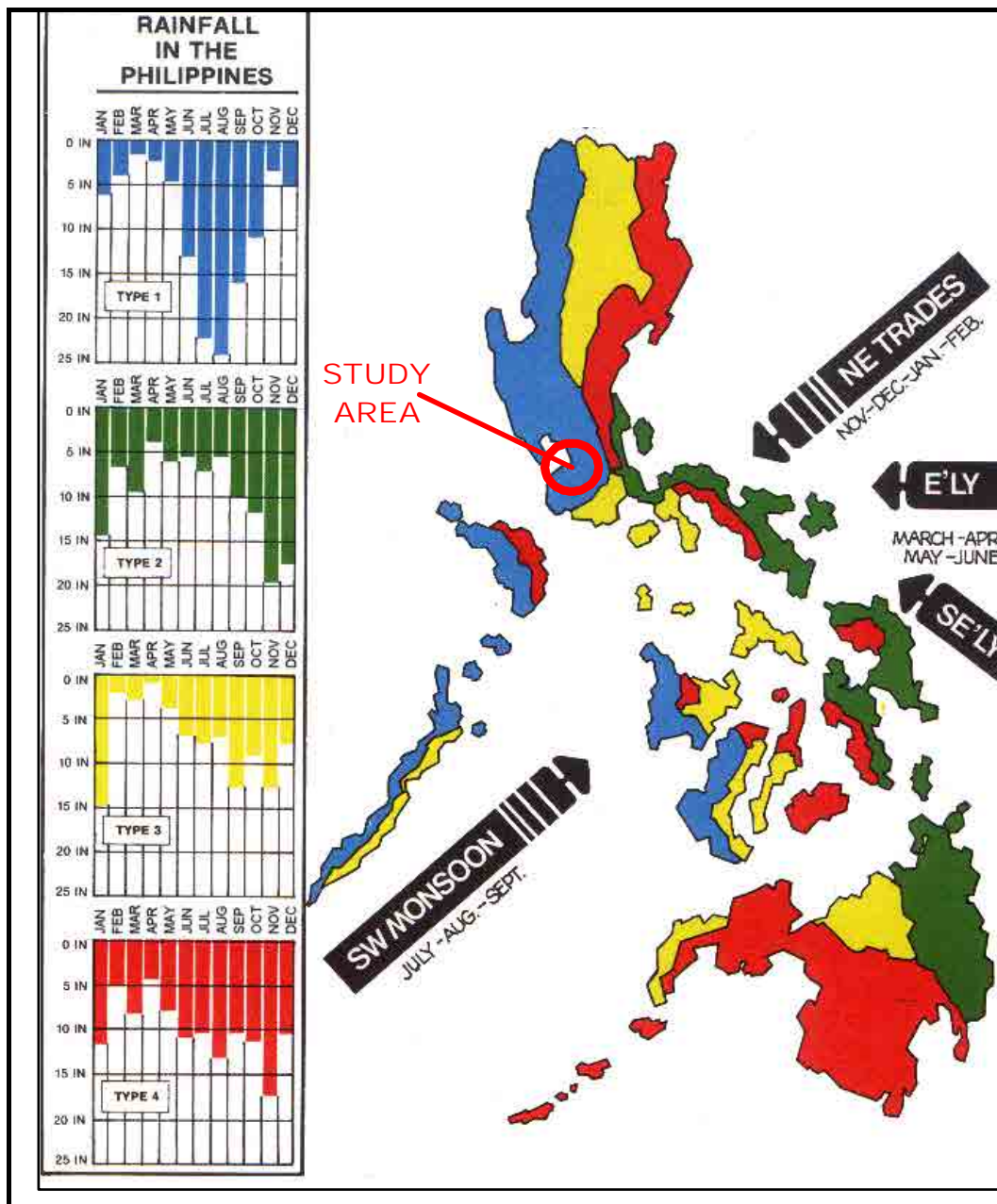
9.5.4.3 The Air

(1) Meteorology

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

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

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



Source: PAGSA

FIGURE 9.5.4-14 CLIMATE MAP OF THE PHILIPPINES

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

Rainfall

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

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

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

Temperature

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

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

Relative Humidity

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

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

Tropical Cyclones (Typhoons)

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

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

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

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

Wind

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

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

TABLE 9.5.4-21 CLIMATOLOGICAL NORMAL VALUES

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

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

Source: PAGASA, 2012

TABLE 9.5.4-22 NORMAL VALUES

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

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

Source: PAGASA, 2012

(2) **Air Quality**

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

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

Station	Time and Date	Parameters (Concentration in µg/Ncm)		
		TSP	SO ₂	NO ₂
AQL1 Aguinaldo Highway Brgy. Biga II, Silang Cavite	0830-0930H 23 Dec 2011	64	29	9
	1335-1435H 22 Dec 2011	72	27	11
AQL2 Along Silang-GMA Road Brgy Sabutan, Silang, Cavite	0655-0755H 23 Dec 2011	118	31	10
	1402-1502H 22 Dec 2011	95	30	11
AQL3 Along Sabutan-Tibig Barangay Road Brgy. Tibig, Silang, Cavite	0948-1048H 23 Dec 2011	20	19	4
	1647-1747H 22 Dec 2011	51	19	3
AQL4 Nuvali-Laguna Blvd Near Entrance Gate of West Groove Subdivision, Santo Domingo, Santa Rosa City, Laguna	1007-1107H 06 Feb 2012	119	27	7
	1550-1650H 06 Feb 2012	102	25	8
AQL5 Laguna Blvd Near Laguna Techno Park Gate Brgy. Malamig, Biñan City, Laguna	0645-0745H 07 Feb 2012	147	29	9
	1320-1420H 06 Feb 2012	102	24	6
AQL6 Mamplasan Interchange Fronting Greenfields Subdivision Gate, Mamplasan, Biñan, Laguna	0840-0940H 13 Jan 2012	98	24	9
	1300-1400H 13 Jan 2012	89	20	8
DENR Standards (1-hour Sampling Average) (DAO 14)		Not more than 300 µg/Ncm	Not more than 340 µg/Ncm	Not more than 260 µg/Ncm

Source: JICA Study Team (2012)



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



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



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



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



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



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

Source: JICA Study Team (2012)

PHOTO BASELINE AIR QUALITY SAMPLING STATION

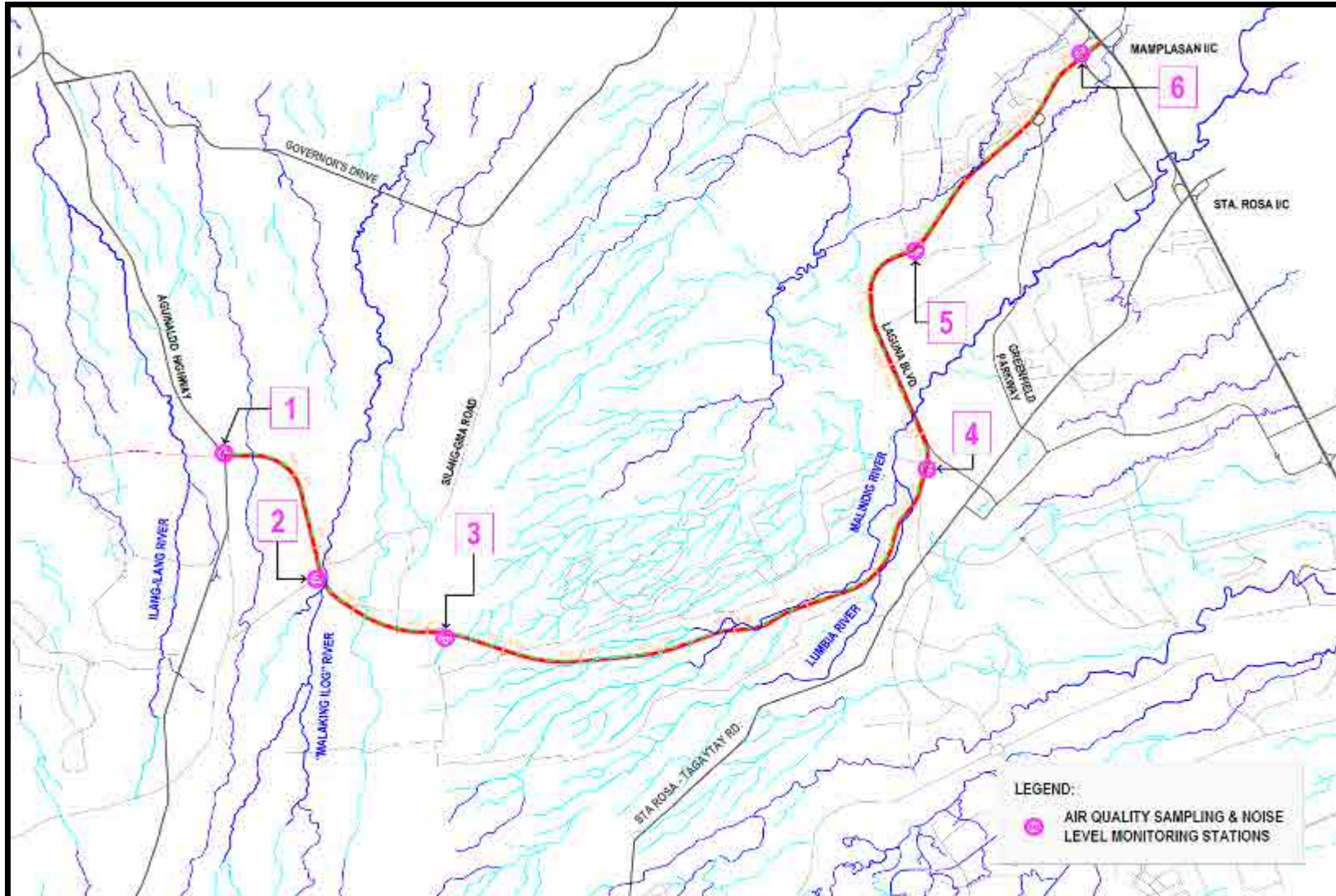
Total Suspended Particulates (TSP)

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

Gaseous Air Pollutants (SO₂ & NO₂)

The SO₂ levels observed in all the sampling sites **do not exceed the required standard of the DENR (340 µg/Ncm)** for a 1 hour sampling period. In fact, the recorded concentration levels presented in **Table 9.5.4-22**, which ranged between **19 µg/Ncm** to **31 µg/Ncm** are way below the permissible limit. It can also be discerned from the **Table** that a relative higher SO₂ concentration levels of **31 µg/Ncm** and **30 µg/Ncm** were recorded at Sta. 2 (Brgy. Sabutan) during the morning and afternoon sampling periods, respectively.

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



Source: JICA Study Team (2012)

FIGURE 9.5.4-15 AIR QUALITY AND NOISE LEVEL SAMPLING MAP

Air Quality Modeling

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

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

In this study, roadway is considered as an area source of road length of 50 meters long and the roadway width of 20 meters wide as one area source for each road section. Traffic volume forecasted to year 2017, 2020, and 2030 were used to determine the expected emission level for the 3 pollutant parameters such as Nitrogen Oxides (NO₂), Particulate Matter 10 (PM10) and Sulfur Dioxide (SO₂). The 2008 road transport emission factors from by United Kingdom (UK) - National Atmospheric Emission Inventory (NAEI) Programme was used in the study using speed coefficient by Euro vehicles given in TRL database Emission factors.

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

The Emission Factor used for NO₂, PM10 and SO₂ based on a motorway or expressway driving (80 km/hr average speed) was summarized in **Table 9.5.4-24** below:

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

	Diesel Car	Petrol Car	Buses	Rigid Trucks
NO₂ , g/km	0.425	0.534	6.219	4.455
PM10 , g/km	0.005	0.031	0.083	0.077
SO₂ , g/km	0.003	0.001	0.004	0.003

Source: National Atmospheric Emission Inventory (NAEI), UK

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

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

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

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

Source: JICA Study Team (2012)

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

TABLE 9.5.4-26 COMPUTED TOTAL EMISSION RATES PER AREA

	Year 2017	Year 2020	Year 2030
NO₂ , $g/s- m^2$	0.068365	0.083765	0.110267
PM10 , $g/s- m^2$	0.001168	0.001463	0.002039
SO₂ , $g/s- m^2$	0.000072	0.000094	0.000142

Source: JICA Study Team (2012)

The road sections considered in modeling are shown below:

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

The summary of maximum predicted ground level concentration (GLC) in ug/m^3 using the ISCST3 air quality model for each section with the following traffic forecast are shown in **Table 9.5.4-27** to **Table 9.5.4-29**.

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

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

TABLE 9.5.4-27 MAXIMUM GLC FOR NITROGEN DIOXIDE (NO₂)

Unit: µg/Ncm

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

Source: JICA Study Team (2012)

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

Unit: µg/Ncm

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

Source: JICA Study Team (2012)

TABLE 9.5.4-29 MAXIMUM GLC FOR SULFUR DIOXIDE (SO₂)

Unit: µg/Ncm

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

Source: JICA Study Team (2012)

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

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

Source: JICA Study Team (2012)

(3) Global Warming

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

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

TABLE 9.5.4-31 PREDICTED CO₂ EMISSION CAUSED BY THE CONSTRUCTION

	CO ₂ Emission Unit	Quantity	CO ₂ Emission
Road Section	1,383(t-C/km)	12.1 km	16,734 ton
Steel Structure Section	14,362(t-C/km)	km	43,086 ton
PC Structure Section	6,484(t-C/km)	km	18,804 ton
Inter-Change(IC)	440.5(t-C/IC)	4	1,762 ton
Facility Installation (lighting, telecom, information facilities etc.)	15.7(t-C/km)	18.1 km	284 ton
Total			78,908 ton

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

O/M period after the construction: CO₂ emission from traffic vehicles at the project vicinity area in target year. Traffic demand forecast in the project area.

The following table shows the comparison CO₂ emission of with and without project case in the target years.

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

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

Source: JICA Study Team (2012)

CO₂ emission per vehicle type per traveling speed (g-CO₂/km. vehicle): CO₂ emission volume is depends on traveling vehicle speed, the predictive calculation was applied by the vehicles and circular table of evaluation for road policy of Ministry of land, transport and tourism, Japan. The CO₂ emission per km per vehicle was applied 2 type vehicle in accordance with

different level of traveling speed. The following table shows CO₂ emission g-/km. vehicle.

TABLE 9.5.4-33 CO₂ EMISSION (G-CO₂/KM. VEHICLE)

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

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

9.5.4.4 Noise Level

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

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

Ambient Noise Level

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

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

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

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

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

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

Class C** "A section which is primarily reserved as a light industrial area".

Source: JICA Study Team (2012)

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

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

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

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

Source: JICA Study Team (2012)



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



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



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



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



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



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

Source: JICA Study Team (2012)

PHOTO BASELINE NOISE LEVEL SAMPLING STATION

Noise Modeling

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

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

Noise Calculation Formula

The noise level were calculated based on the following formula.

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

Where $\bar{a} = 3.6 \times 10^{-6}$

$n = 2$

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

V : Vehicle Speed (km/h)

Q : Traffic Volume (1000 veh/h)

d : distance from center line of highway (m)

$r_2 : \frac{\text{LightVehicle}}{\text{Totalvolume}} \times 100(\%)$

Calculations for Noise Reduction

a) Noise barrier

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

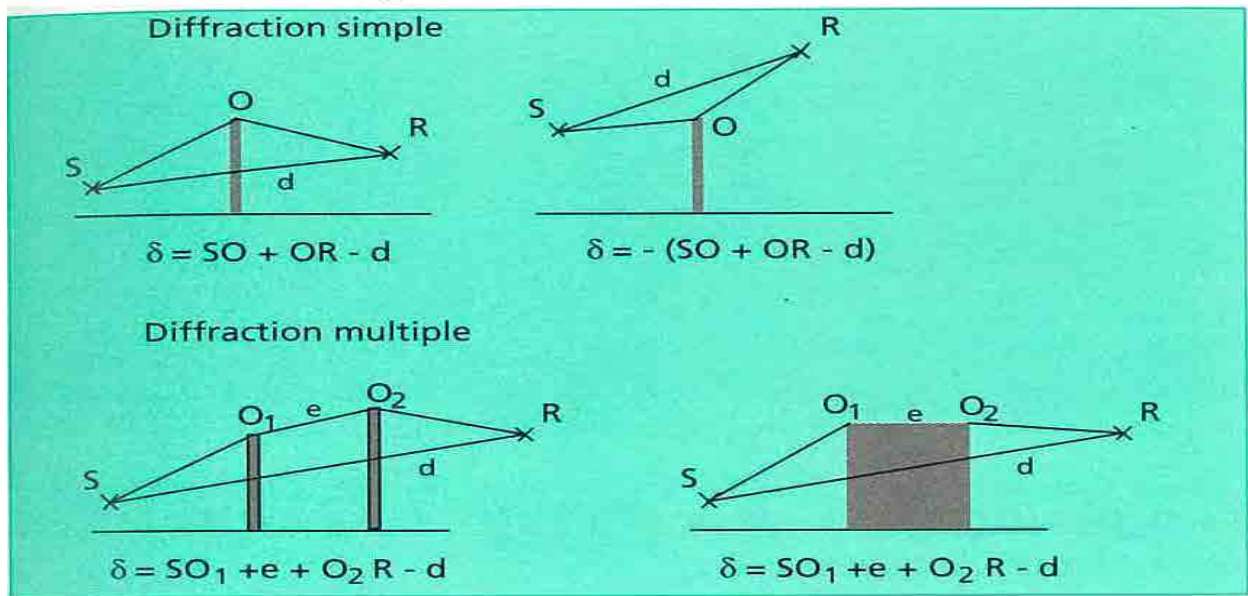
$$\Delta_{\text{diff}} = 7.5 \log (3 + 20N) + 1.2$$

Where N = Fresnel Number

$N = 2\delta/\lambda$

δ = path difference in meters
 λ = average wavelength of road noise spectrum
 = 0.50 m

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



SCHEMATIC DIAGRAM FOR THE DIFFRACTION METHOD OF EVALUATING NOISE REDUCTION

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

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

NOISE REDUCTION RESULTING FROM NOISE BARRIER

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

b) double-glassed window

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

buildings.

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

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

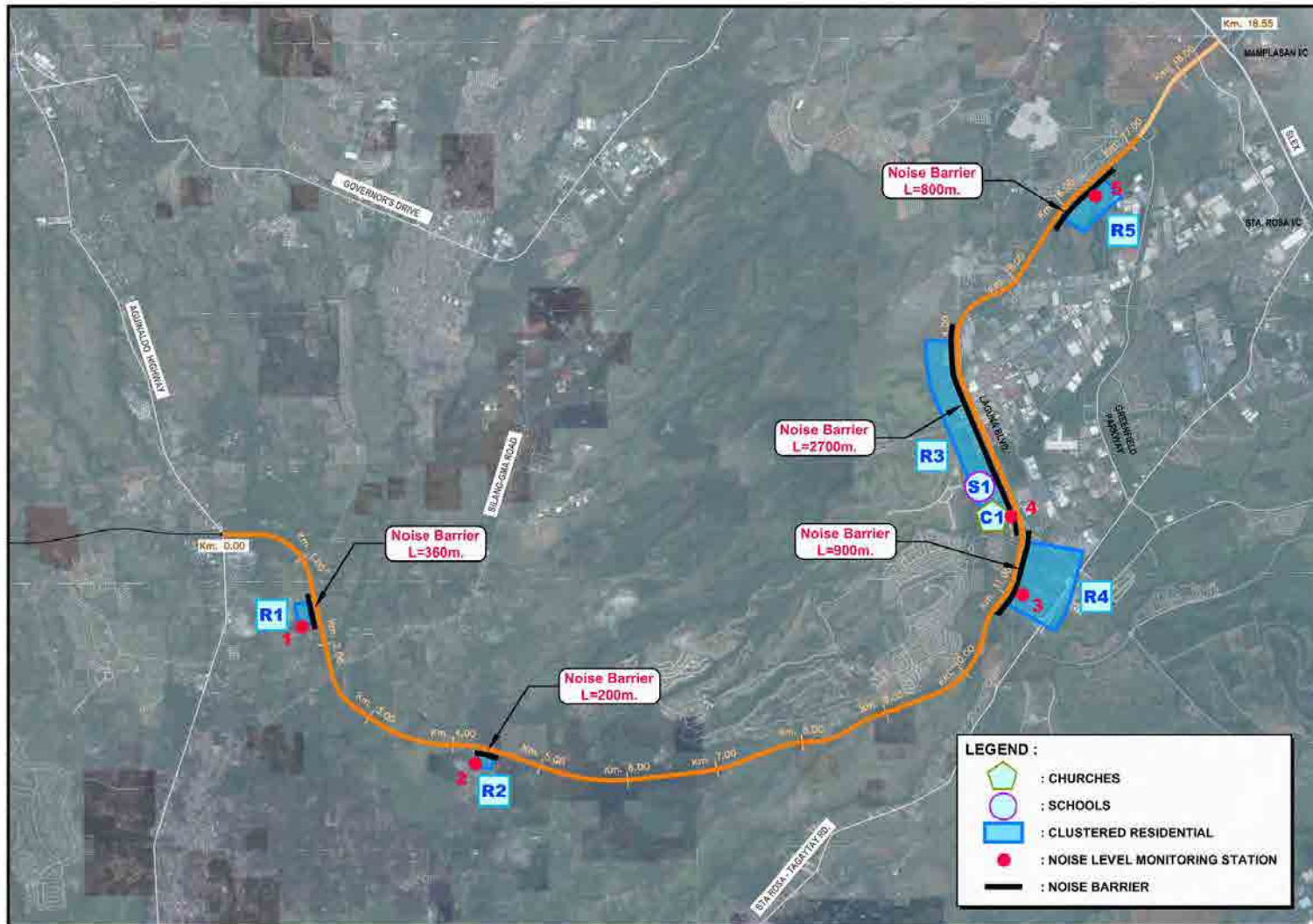
	Sensitive Receptor Along Expressway Alignment	Station Position and Location of Receptor from Alignment	Expressway Road Elevation (m)	Ground Elevation (m)	Source to Receptor Reference Distance (m)
Church:					
C1	St John Bosco Parish Church	11+980 North	84.043	77.023	40
School:					
S1	Caritas Don Bosco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

Source: JICA Study Team (2012)

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

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

Source: JICA Study Team (2012)



Source: JICA Study Team (2012)

FIGURE 9.5.4-16 NOISE PREDICTED STATION MAP

Result of Noise Modeling

The Sensitive Receptors (Church and Schools)

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

The Clustered Residential

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

All stations will be necessary to install noise barriers.

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

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

Source: JICA Study Team (2012)

Exceeds DENR Standard

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

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

Source: JICA Study Team (2012)

Exceeds DENR Standard

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

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

Source: JICA Study Team (2012)

Exceeds DENR Standard

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

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

Source: JICA Study Team (2012)

Exceeds DENR Standard

Summary of Noise Modeling Result

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

Countermeasure for compliance to DENR noise standard

- | |
|---|
| <ul style="list-style-type: none"> ● 3m Noise Barrier L = 4960m
(5 residential including church and school) ● Double-grazed windows for church and school |
|---|

9.5.4.5 Protected Areas

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

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

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

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

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

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

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



Source: JICA Study Team (2012)

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

9.5.5 Environmental Management Plan

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

9.5.5.1 Pre-Construction and Construction Phase

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

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

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing
Involuntary Relocation/Resettlement	<ul style="list-style-type: none"> A total of 36 structures (i.e. residential houses) with 50 households (or 197 people) will be affected and relocated. All of them are formal settlers. A total of about 77 farm land lots (or 64.7 ha.) will be affected. About 70.1% are land owners, about 5.2% are tenants. 24.7% are free occupants with permit of land owners. Number of people whose farm lands affected are estimated at about 460. 	<ul style="list-style-type: none"> To prepare Final RAP with full consensus with PAPS, and inventories of land and other assets. 	<ul style="list-style-type: none"> PMO-BOT with the Detailed Design (D/D) Consultant 	<ul style="list-style-type: none"> D/D Stage
	<ul style="list-style-type: none"> Loss of commercial crops like pineapple, coffee, coconut, papaya, cassava, and banana. 	<ul style="list-style-type: none"> To provide just (or fair) compensation, or land swapping (if feasible), and other supports that are stated in LARRIPP/WB OP 4.12. A final Resettlement Action Plan (RAP) with full consensus with the PAPS, and inventories of land and other properties shall be prepared prior to implementation of the project; and Just compensation in accordance with LARRIPP/WBOP 4.12 shall be accorded to PAPS for loss of assets and source of livelihood. 	<ul style="list-style-type: none"> PMO-BOT, Region IV-A, DEO, MRIC/CRIC PMO-BOT with D/D Consultant 	<ul style="list-style-type: none"> D/D Stage D/D Stage
	<ul style="list-style-type: none"> Disturbance to agricultural activities along the proposed CALA Expressway alignment. 	<ul style="list-style-type: none"> Temporary crossings shall be provided to ensure safe and unhampered movements of framers to and from their agricultural lands; and Just compensation in accordance with LARRIPP/WBOP 4.12 shall be accorded to PAPS for loss of assets and source of livelihood. 	<ul style="list-style-type: none"> PMO-BOT with D/D Consultant 	<ul style="list-style-type: none"> D/D Stage
	Local Economy/Employment and Livelihood	<ul style="list-style-type: none"> (+) Demands for labor to the construction and related work are expected to be increased temporarily, which further stimulates local economy. 	<ul style="list-style-type: none"> To assure priority employment of PAPS during construction. Construction contract between DPWH and the selected contractor shall specify this condition. 	<ul style="list-style-type: none"> PMO-BOT with D/D Consultant PMO-BOT with the Construction Supervision (C/S) Consultant

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing
	<ul style="list-style-type: none"> (-) Shops, small businesses and farmers locating on CALAX construction sites will have to be relocated. 	<ul style="list-style-type: none"> To provide just (or fair) income loss compensation and rehabilitation assistance. 	<ul style="list-style-type: none"> PMO-BOT, Region IV-A, DEO, MRIC/CRIC, D/D and C/S Consultant 	<ul style="list-style-type: none"> During RAP Implementation
Land Use	<ul style="list-style-type: none"> About 118.8 ha of lands, of which 64.7 ha. are farming/natural vegetation will be lost and changed to CALAX. These lots along the new road and around the interchanges might be converted to market places / shopping malls, or residential uses. Loss of fertile topsoil 	<ul style="list-style-type: none"> Respective LGUs shall amend city/municipality Land Use Plan and Zoning Ordinance to control unorderly urban development along CALAX and to restrict conversion of farm land to other land use purposes, and strictly enforce amended zoning ordinance. LGUs should also freeze the development within the proposed ROW. 	<ul style="list-style-type: none"> PMO-BOT, Region IV-A through Regional Development Council 	
		<ul style="list-style-type: none"> Construction activities shall be limited to the required ROW limit of 50-60m to minimize crop damage and loss of farm land. Unnecessary earth moving and related activities shall be minimized to prevent extensive loss of fertile topsoil. Unrecycled/unused topsoil shall be replaced/delivered to the adjacent farmlands. 	<ul style="list-style-type: none"> PMO-BOT with C/S Consultant 	<ul style="list-style-type: none"> During Construction Stage
Utilization of Local Resources	<ul style="list-style-type: none"> Design can be made to balance cut soil volume and embankment soil volume within the project, so borrow material can be minimized (available from the Project). Ready-mixed concrete available in the Project area. 	<ul style="list-style-type: none"> Detailed design shall adopt construction methods which utilize available local resources. 	<ul style="list-style-type: none"> PMO-BOT with D/D Consultant 	<ul style="list-style-type: none"> D/D Stage
			<ul style="list-style-type: none"> Contractor, PMO-BOT with C/S Consultant 	<ul style="list-style-type: none"> Construction Stage
		<ul style="list-style-type: none"> Construction contract between DPWH and the selected contractor shall specify maximum utilization of available local resources. 	<ul style="list-style-type: none"> PMO-BOT with D/D Consultant 	<ul style="list-style-type: none"> D/D Stage
			<ul style="list-style-type: none"> Contractor, PMO-BOT with C/S Consultant 	<ul style="list-style-type: none"> Construction Stage

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing
Farm Land	<ul style="list-style-type: none"> About 64.7 ha of farmland/ natural vegetation will be lost by this project in exchange to the expressway. Negative impact to farmers is expected in a form of loss of lands. 	<ul style="list-style-type: none"> To provide just (or fair) compensation, replacement of land when feasible and other supports such as disturbance compensation and rehabilitation assistance in accordance with LARRIPP/WB OP 4.12. 	<ul style="list-style-type: none"> PMO-BOT, Region IV-A, DEO, MRIC/CRIC, D/D and Consultant 	<ul style="list-style-type: none"> D/D Stage
		<ul style="list-style-type: none"> Detailed design shall be undertaken focusing on existing farm roads to assure accessibility to farm lands. 	<ul style="list-style-type: none"> PMO-BOT with D/D Consultant 	<ul style="list-style-type: none"> D/D Stage
Social Institutions, Social Infrastructure and Local Decision-making	<ul style="list-style-type: none"> During the construction, it might create difficulty in accessing to social infrastructures such as market or access to jobs due to the increasing in vehicles and congestion during construction. 	<ul style="list-style-type: none"> To construct temporary road within the road right-of-way for transporting construction materials, equipment and laborers. 	<ul style="list-style-type: none"> PMO-BOT with D/D Consultant 	<ul style="list-style-type: none"> D/D Stage
		<ul style="list-style-type: none"> To implement proper traffic management with close coordination with local police and Barangay captains. To provide proper information on construction schedule and traffic management plan. 	<ul style="list-style-type: none"> Contractor, PMO-BOT with C/S Consultant 	<ul style="list-style-type: none"> Construction Stage
Means of Livelihood for the Poor and Socially Vulnerable	<ul style="list-style-type: none"> About 84% of affected households belong to the poor (or below Region IV-A poverty threshold). (+) Demands for labor to the construction and related work are expected to be increased temporarily, which further stimulates local economy. 	<ul style="list-style-type: none"> Qualified skilled workers and laborers in the Direct Impact Areas (DIA) duly endorsed by the Brgy. Captains shall be given priority in hiring during implementation of the project. To include condition of priority employment of PAPs below poverty line into construction contractor's contract. 	<ul style="list-style-type: none"> PMO-BOT with D/D Consultant Contractor, PMO-BOT with C/S Consultant 	<ul style="list-style-type: none"> D/D Stage Construction Stage
		<ul style="list-style-type: none"> (-) Shops and small businesses locating on CALAX construction sites will have to be relocated. 	<ul style="list-style-type: none"> To provide just (or fair) compensation for income loss and rehabilitation assistance in accordance with LARRIPP/WB OP 4.12. 	<ul style="list-style-type: none"> PMO-BOT, Region IV-A, DEO, MRIC/CRIC
	<ul style="list-style-type: none"> 11 households (34%) whose houses are taken by the project rely on well for drinking water, 8 (25%) on piped water and 13 (41%) on purchase. 12 households (37%) rely on well for water for washing clothes and dishes, 14 (44%) on piped water and 6 (19%) on purchase. Wells are individually owned. Interruption of water supply in areas 	<ul style="list-style-type: none"> Affected wells shall be properly compensated at a market price. A box culvert shall be constructed under the expressway to provide access to the one river resort. Relocation and restoration of affected social service utilities shall be undertaken in the shortest possible time to minimize inconvenience to the affected public; 	<ul style="list-style-type: none"> PMO-BOT with D/D and C/S Consultant 	<ul style="list-style-type: none"> D/D and C/S Stage

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing
	<p>serviced by the wells located in Brgy. Sabutan, Silang, Cavite.</p> <ul style="list-style-type: none"> • There are 3 river resorts near the project site. Access to the site of one resort is affected. • There is no irrigation system in the project area. 	<ul style="list-style-type: none"> • Affected residents shall be notified in advance to enable them to prepare and undertake necessary measures. Notice to the public shall be posted at conspicuous areas such as municipal and Barangay halls, schools, and places of worships; and • Close coordination with concerned utility companies shall be undertaken to expedite relocation and restoration of the affected utilities. 		
Sanitation	<ul style="list-style-type: none"> • Sanitary condition around construction site is anticipated to become worse due to generation of wastes during the construction. 	<ul style="list-style-type: none"> • Temporary sanitation facilities such as garbage bins and portable toilets must be provided by the Contractor at the construction area. • Regular disposal of the solid and domestic wastes to the designated disposal areas duly-approved by respective LGUs and DPWH must be strictly complied with. • Weekly inspection of the work sites must be undertaken by DPWH to ensure proper management of the solid and domestic wastes generated. 	<ul style="list-style-type: none"> • PMO-BOT with C/S Consultant and Contractor 	<ul style="list-style-type: none"> • Construction Stage
Risk, HIV/AIDS, Infectious disease	<ul style="list-style-type: none"> • Long-term exposure of workers, especially heavy equipment operators to high noise level may lead to hearing impairment. • Long-term exposure of workers, especially heavy equipment operators to exhaust gas emissions may result to upper respiratory ailments. • Direct contact of workers handling toxic materials may lead to chronic diseases. 	<ul style="list-style-type: none"> • Workers shall be provided with adequate PPEs such as ear muffs, gas/protective masks, hard hats, safety boots, safety gloves, reflectorized vests, and other related safety gears; • Wearing of the provided PPEs shall be strictly implemented; • Personnel shall be trained on safety procedures and educated on health standards; • Personnel shall be comprehensively trained on handling of toxic materials; 	<ul style="list-style-type: none"> • PMO-BOT with C/S Consultant and Contractor 	<ul style="list-style-type: none"> • Construction Stage
	<ul style="list-style-type: none"> • Temporally increase in infectious and communicable diseases is possible during construction phase due to influx of construction workers. 	<ul style="list-style-type: none"> • Temporary sanitation facilities such as garbage bins and portable toilets must be provided by the Contractor at the construction area. 	<ul style="list-style-type: none"> • PMO-BOT with C/S Consultant and Contractor 	<ul style="list-style-type: none"> • Construction Stage

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing
	<ul style="list-style-type: none"> • Poor sanitary environment can generate and spread communicable diseases such as diarrhea, common cold, and such. • Possible spread of sexually transmitted diseases 	<ul style="list-style-type: none"> • Regular disposal of the solid and domestic wastes to the designated disposal areas duly-approved by respective LGUs and DPWH must be strictly complied with. • Weekly inspection of the work sites must be undertaken by DPWH to ensure proper management of the solid and domestic wastes generated. • To provide Information, Education and Communication (IEC) on healthy behavior and Sexually Transmitted Disease (STD) to the construction workers. • Proper waste segregation scheme will be strictly enforced; • Domestic and solid wastes generated by the workers shall be regularly hauled and disposed to designated dumpsite in Brgy. Lalaan 1 and Brgy. Tubuan 1, Silang, Cavite, and approved dumpsites in Biñan and Santa Rosa Cities; • Inspection of workers' camps and field offices shall be conducted daily to ensure good housekeeping; • Medical screening of migrant workers shall be undertaken during hiring period; • Regular medical check-up of workers shall be conducted; and • Group consultations shall be undertaken to promote awareness among the community on how to prevent transmission of STDs 		
Accident	<ul style="list-style-type: none"> • Accidents involving construction works, vehicles and machineries operation are anticipated. Traffic accidents may happen by construction vehicles and heavy machines during construction. • Fall down from higher position such as piers 	<ul style="list-style-type: none"> • To construct temporary construction road within road right-of-way, implement traffic management plan in coordination with local police and inform construction schedule, etc. to people within the project area to prevent traffic accidents. 	<ul style="list-style-type: none"> • PMO-BOT with C/S Consultant and Contractor 	<ul style="list-style-type: none"> • Construction Stage

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing
	and bridges may happen.	<ul style="list-style-type: none"> To educate construction workers on various construction safety measures, and strictly implement such safety measures. To provide adequate lighting and reflectors and construction warning signs at construction sites as well as at traffic accident-prone sections of related roads. To provide temporary fences so as ordinary people not to enter in the construction sites. 		
	<ul style="list-style-type: none"> Safety of residents and pedestrians near the construction areas. 	<ul style="list-style-type: none"> All excavation areas shall be enclosed with metal sheets and barriers shall be installed at the construction areas to limit access to the public, especially children; Pedestrians crosswalks shall be provided at critical construction areas such as built-up areas, schools, places of worships, hospitals, and residential areas; Adequate lighting and reflectorized warning signs shall be installed within the construction sites to ensure safety of public, especially during nighttime; and Well-trained traffic aides and flagmen shall be designated at critical construction sites such as those adjacent to residential and built-up areas to assist pedestrians ; 	<ul style="list-style-type: none"> PMO-BOT with C/S Consultant and Contractor 	<ul style="list-style-type: none"> Construction Stage
	<ul style="list-style-type: none"> Safety of motorist plying the E. Aguinaldo Highway, Silang, Cavite section, Nuvali Spine Road, Laguna Boulevard, Nuvali Road, Mamplasan Overpass-Greenfield Parkway Road, and other main and secondary roads crossed by the proposed CALA Expressway alignment. Safety of motorist at bridge and interchange construction sites. 	<ul style="list-style-type: none"> Adequate lighting and reflectorized warning signs shall be installed along the entire construction sites, particularly at critical areas such as bridge sites and interchange locations to ensure safety of motorists, especially during nighttime; A sound Traffic Management Plan (TMP) and re-routing schemes along major roads, bridge sites and interchange locations duly approved by the concerned LGUs shall be strictly implemented; 	<ul style="list-style-type: none"> PMO-BOT with C/S Consultant and Contractor 	<ul style="list-style-type: none"> Construction Stage

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing
		<ul style="list-style-type: none"> • Well-trained traffic aides and flagmen shall be assigned along the major roads, bridge sites, interchange locations, and other critical construction sites such as those adjacent to residential and built-up areas to direct traffic and assists motorists; and • Parking of idle construction equipment and vehicles along the roads shall be prohibited, especially during nighttime. 		
	<ul style="list-style-type: none"> • Possible traffic congestion along E. Aguinaldo Highway, Silang, Cavite section, Nuvali Spine Road, Laguna Boulevard, Nuvali Road, Mamaplasan Overpass-Greenfield Parkway Road, and other main and secondary roads intersected by the proposed CALA Expressway alignment. • Traffic congestion at bridge and interchange construction sites. 	<ul style="list-style-type: none"> • A sound TMP and re-routing schemes duly approved by the concerned LGUs shall be strictly implemented to minimize traffic congestion along bridge sites, interchange locations, and other busy construction areas; • Well-trained traffic aides and flagmen shall be assigned along the major roads, bridge sites, interchange locations, and other busy areas to direct traffic; • Parking/waiting time of construction vehicles and equipment along major roads and busy areas shall be limited to prevent traffic congestion; and • Delivery and transport of fabricated construction materials will be done during the nighttime. 	<ul style="list-style-type: none"> • PMO-BOT with C/S Consultant and Contractor 	<ul style="list-style-type: none"> • Construction Stage
Topography, Geographical Feature	<ul style="list-style-type: none"> • Possible occurrence of landslide and soil erosion along cut section and slope area. 	<ul style="list-style-type: none"> • To provide suitable angle of repose along cut area in order to prevent landslide and soil erosion. 	<ul style="list-style-type: none"> • PMO-BOT with D/D Consultant 	<ul style="list-style-type: none"> • D/D Stage
		<ul style="list-style-type: none"> • To provide sodding for slopes to prevent erosion. • To minimize a removal of vegetation and tree cutting 	<ul style="list-style-type: none"> • PMO-BOT with C/S Consultant and Contractor 	<ul style="list-style-type: none"> • Construction Stage
Soil Erosion	<ul style="list-style-type: none"> • During the construction stage, erosion is likely to occur mainly by intense rain. 	<ul style="list-style-type: none"> • To provide proper temporary drainage system to prevent water concentration at certain locations. 	<ul style="list-style-type: none"> • PMO-BOT with D/D Consultant 	<ul style="list-style-type: none"> • D/D Stage
		<ul style="list-style-type: none"> • To provide temporary dike within the road 	<ul style="list-style-type: none"> • PMO-BOT 	<ul style="list-style-type: none"> • Construction

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing
		right-of-way to prevent flow of eroded soils. <ul style="list-style-type: none"> For high cut or embankment construction section, to cover embankment by vinyl sheet during heavy rain for prevention of slope collapse. 	with C/S Consultant and Contractor	Stage
Groundwater	<ul style="list-style-type: none"> Groundwater table at project site is between GL-6m and GL-10m deep. Groundwater level might temporarily be dropped during construction by cutting off of recharge source e.g. surface water flow. Hazardous material may seep into the ground water. Possible contamination of groundwater table due to oil seepage and indiscriminate disposal of toxic chemicals (i.e. paints and used oils) 	<ul style="list-style-type: none"> To seal, remove, or contain solid wastes and other construction hazardous materials off from bare ground to prevent seeping into the ground especially when it rains. To install and manage portable toilets for construction workers properly. To maintain machineries and generators and prevent oil leakage. Motor pool areas shall be located away from existing groundwater sources to prevent contamination; Storage depots for used oils and other toxic wastes shall be provided in the motor pool area to temporarily hold these materials prior to disposal; and Regular disposal of hazardous wastes such as used oils, worn out parts, and related materials shall be handled by DENR-accredited company and shall be disposed to DENR-approved sites. 	<ul style="list-style-type: none"> PMO-BOT with C/S Consultant and Contractor 	<ul style="list-style-type: none"> Construction Stage
Flora, Fauna and Biodiversity	<ul style="list-style-type: none"> There is no rare, threatened and endangered flora and fauna species in the vicinity of the proposed alignment. 9393 trees may be affected in order to acquire RROW. Temporary disturbance to wildlife movements and activities, particularly avifauna (bird). 	<ul style="list-style-type: none"> To minimize the loss of trees applying many planting trees in vacant space of RROW and vicinity area. “Permit to Cut” shall be secured prior to any tree cutting activities along the alignment; Balling/relocation of trees shall be carefully undertaken; Tree cutting shall be limited within the required ROW of 50-60m; 	<ul style="list-style-type: none"> PMO-BOT with D/D Consultant PMO-BOT with C/S Consultant and Contractor 	<ul style="list-style-type: none"> D/D Stage Construction Stage

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing
		<ul style="list-style-type: none"> • Replacement of cut trees in reforestation area/s designated by the DENR-FMB Region IV-A shall be undertaken. Ratio and types of species to be introduced shall be determined by the DENR-FMB Region IV-A; • Planting of trees along National Roads as per DPWH D.O. 131, series of 1995) shall be strictly implemented; • Temporary but unavoidable bird activities such as feeding and nesting can be performed at adjacent forest patches and grassland areas; • Bird poaching shall be strictly prohibited; and • Workers shall be educated on wildlife fauna conservation and protection, especially avifauna to discourage possible poaching. 		
Landscape	<ul style="list-style-type: none"> • Adverse impact on landscape is expected. 	<ul style="list-style-type: none"> • To adopt the landscape design during Detailed Engineering Design Stage and discuss the impact of landscape with people. 	<ul style="list-style-type: none"> • PMO-BOT with D/D Consultant 	<ul style="list-style-type: none"> • D/D Stage
Global Warming	<ul style="list-style-type: none"> • It is estimated that total emission of CO2 will be about 78,908 tons during construction phase. 	<ul style="list-style-type: none"> • To use clean filters and mufflers of engines. • To minimize idling of engines. • To minimize traveling frequencies between construction sites and origin by making and executing efficient construction materials transportation schedule. • To prohibit old model equipment and vehicles. • To follow mitigation measures suggested for AIR POLLUTION. • To off-set this impact, plant enough trees along expressway and interchange sites. 	<ul style="list-style-type: none"> • PMO-BOT with D/D Consultant • PMO-BOT with C/S Consultant and Contractor 	<ul style="list-style-type: none"> • D/D Stage • Construction Stage
Air Pollution	<ul style="list-style-type: none"> • Air quality was measured at 6 stations in dry season (2012). Results shows that highest values of TSP, SO2 and NO2 are 147 (DENR Standard: 300), 31 (DENR Standard: 340) and 11 (DENR Standard: 260), respectively. All parameters are far below DENR standards. (DAO-14) 	<ul style="list-style-type: none"> • To spray exposed ground with water to minimize dust re-suspension. • To cover temporary stockpiles of excavated materials and construction spoils with tarpaulin or sack materials. • To transport and dispose construction spoils regularly to hauled areas duly-approved by 	<ul style="list-style-type: none"> • PMO-BOT with C/S Consultant and Contractor 	<ul style="list-style-type: none"> • Construction Stage

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing
	<ul style="list-style-type: none"> Air pollution will be expected due to emissions from construction vehicles and dust generated from construction activities during construction period. In dry and wet weather pollutants and particulates matters disperse to further distance and might affect sensitive area such as hospital and residential area 	<ul style="list-style-type: none"> the DENR/LGUs. To perform regular maintenance of construction vehicles, heavy equipment and machineries. Follow mitigation measures suggested for GLOBAL WARMING. Aggravation of air pollution shall be minimized by adoption of above measures, considering that most of construction sites are located in the rice field areas. 		
	<ul style="list-style-type: none"> Possible increase in the TSP level in the affected areas due to dust re-suspension. 	<ul style="list-style-type: none"> Exposed and cleared construction areas shall be regularly sprayed with water to minimize dust re-suspension; A 20kph speed limit along the construction areas, particularly at dust sensitive receptor areas such as residential, schools, and hospitals shall be strictly enforced; Temporary stockpiles of unrecycled materials and construction spoils shall be covered with tarpaulin or sack materials to prevent re-suspension of particulate matters; Construction spoils shall be regularly hauled and disposed to areas duly-approved by the DENR and/or concerned LGUs; Delivery and hauling trucks shall be provided with tarpaulin or sack material to minimize dust re-suspension; Quarterly TSP monitoring at dust sensitive receptor areas shall be conducted during the pre-construction and construction phases of the project. 	<ul style="list-style-type: none"> PMO-BOT with C/S Consultant and Contractor Contractor with supervision of PMO-BOT and C/S Consultant 	<ul style="list-style-type: none"> Construction Stage Construction Stage
	<ul style="list-style-type: none"> Possible increase in the concentration levels of SO₂ and NO₂ due to exhaust gas emissions from various construction vehicles, equipment, and machineries. 	<ul style="list-style-type: none"> PMS of construction equipment and machineries, and vehicles shall be strictly complied with to ensure these are in good working condition at all times; Daily routine check-up of construction 	<ul style="list-style-type: none"> PMO-BOT with C/S Consultant and Contractor 	<ul style="list-style-type: none"> Construction Stage

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing
		vehicles, equipment, and machineries must be strictly complied with; and		
		<ul style="list-style-type: none"> Quarterly SO₂ and NO₂ sampling at air pollution sensitive areas will be conducted during the pre-construction and construction phases of the project. 	<ul style="list-style-type: none"> Contractor with supervision of PMO-BOT and C/S Consultant 	<ul style="list-style-type: none"> Construction Stage
Water Pollution	<ul style="list-style-type: none"> Water quality was measured at 3 stations in dry season (2012). Total Coliform exceeds DENR Standard at all stations. Other parameters (ph, TSS, Lead, Dissolved Oxygen and BOD) did not exceed DENR (DAO-34). It is important not to worsen water quality than at present. Possible decrease in water flow rate of the rivers and creeks crossed by the CALA Expressway alignment due to impediment caused by improper management of construction spoils and debris, particularly stripped vegetation. 	<ul style="list-style-type: none"> To adopt construction method minimizing generation of water pollution (e.g. Extra care shall be made to prevent cut/embankment and other materials to fall into the river). To seal, remove, or contain solid wastes and other construction hazardous materials off from bare ground to prevent seeping into the ground especially when it rains. To install and manage portable toilets for construction workers properly. To maintain machineries and generators and to prevent oil leakage. Nets shall be provided at bridge construction sites to prevent debris from falling into the waterways and cause water flow impediment; Temporary rechanneling of stream flow along major waterways such as Malaking Ilog River, Lumbia River, and Malindig river shall be considered; Construction spoils and debris, particularly stripped vegetation shall be regularly hauled and disposed to designated dumpsite in Brgy. Lalaan 1 and Brgy. Tubuan 1, Silang, Cavite and designated dumpsites in Biñan and Sta. Rosa Cities. Aggravation of water quality will be minimized by adoption of above measures. 	<ul style="list-style-type: none"> PMO-BOT with C/S Consultant and Contractor 	<ul style="list-style-type: none"> Construction Stage
			<ul style="list-style-type: none"> Contractor with supervision of PMO-BOT and C/S Consultant 	<ul style="list-style-type: none"> Construction Stage
	<ul style="list-style-type: none"> Possible increase in the present level of total coliform content of the waterways crossed by the proposed CALA Expressway 	<ul style="list-style-type: none"> Temporary sanitation facilities, particularly portable toilets and garbage bins shall be provided at all construction sites, temporary 	<ul style="list-style-type: none"> PMO-BOT with C/S Consultant and 	<ul style="list-style-type: none"> Construction Stage

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing
	alignment, particularly Malaking Ilog River, Lumbia River, and Malindig River due to improper management of solid and domestic wastes to be generated by the construction workers during implementation of the project.	<p>field offices, and workers' camp sites to ensure proper solid and domestic wastes management;</p> <ul style="list-style-type: none"> • Proper waste segregation shall be strictly implemented; • Solid and domestic wastes generated by the workers shall be regularly hauled and disposed to designated dumpsite in Brgy. Lalaan 1 and Brgy. Tubuan 1, Silang, Cavite and designated dumpsites in Biñan and Sta. Rosa Cities; • Daily inspection of the workers' campsites, temporary field offices, and all construction areas provided with temporary sanitation facilities shall be strictly implemented to ensure proper wastes and sanitation management; and • Coliform level monitoring along selected waterways shall be conducted twice a year. 	Contractor	
	<ul style="list-style-type: none"> • Possible increase in the siltation level of the waterways crossed by the proposed CALA Expressway alignment, particularly Malaking Ilog River, Lumbia River, and Malindig River due to surface run-off. 	<ul style="list-style-type: none"> • Earth moving activities and related construction works shall be cautiously undertaken to minimize soil disturbance that may cause surface run off, particularly along cut and slope areas adjacent to the waterways; • Temporary silt traps shall be constructed along the waterways to prevent siltation caused by surface run-off, particularly during high precipitation periods; • Exposed and open construction areas adjacent to the waterways shall be re-vegetated to prevent surface run-off, particularly during high precipitation periods; and • TSS level monitoring along selected waterways shall be conducted twice a year. 	<ul style="list-style-type: none"> • PMO-BOT with C/S Consultant and Contractor 	<ul style="list-style-type: none"> • Construction Stage
	<ul style="list-style-type: none"> • Possible increase in pH level of the 	<ul style="list-style-type: none"> • Concrete pouring and road surfacing at bridge 	<ul style="list-style-type: none"> • PMO-BOT 	<ul style="list-style-type: none"> • Construction

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing
	<p>waterways crossed by the proposed CALA Expressway alignment particularly Malaking Ilog River, Lumbia River, and Malindig River during bridge construction due to concrete spillage.</p>	<p>construction sites shall be closely supervised to prevent spillage into the waterways;</p> <ul style="list-style-type: none"> • Nets shall be installed at bridge construction sites to prevent contamination of the waterways in case of accidental concrete spillage during pouring; and • Washing of transit mixers and related construction equipment along the waterways shall be strictly prohibited to prevent increase in pH level. 	<p>with C/S Consultant and Contractor</p>	<p>Stage</p>
	<ul style="list-style-type: none"> • Possible increase in the oil and grease level of the waterways crossed by the proposed CALA Expressways alignment, particularly Malaking Ilog River, Lumbia River, and Malindig River due to oil spillage from heavy equipment and machineries during bridge construction. 	<ul style="list-style-type: none"> • Public Maintenance System (PMS) of the construction equipment and machineries shall be strictly complied with to ensure that these are in good working conditions at all times; • Washing of construction equipment and machineries along the waterways shall be strictly prohibited to prevent oil and grease contamination; and • On-site repair and maintenance of the construction equipment shall be strictly prohibited. 	<ul style="list-style-type: none"> • PMO-BOT with C/S Consultant and Contractor 	<ul style="list-style-type: none"> • Construction Stage
Soil Contamination	<ul style="list-style-type: none"> • During the construction, excavated soil, surface water and oil from vehicles and machineries may pollute the ground. 	<ul style="list-style-type: none"> • To seal, remove, or contain solid wastes and other construction hazardous materials off from bare ground to prevent seeping into the ground especially when it rains. • To install and manage portable toilets for construction workers properly. • To maintain machineries and generators and prevent oil leakage. • Aggravation of soil contamination shall be minimized by adoption of above measures. 	<ul style="list-style-type: none"> • PMO-BOT with C/S Consultant and Contractor 	<ul style="list-style-type: none"> • Construction Stage
Solid Waste	<ul style="list-style-type: none"> • Construction debris and excavated soil are generated during the construction. Human waste will be generated from workers during construction and operation. 	<ul style="list-style-type: none"> • To seal, remove, or contain solid wastes and other construction wastes. • To dispose them at the disposal sites approved by respective LGUs and DPWH. • To select eco-friendly waste disposal methods. 	<ul style="list-style-type: none"> • PMO-BOT with C/S Consultant and Contractor 	<ul style="list-style-type: none"> • Construction Stage

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing
		<ul style="list-style-type: none"> To edificate and educate construction workers. To conduct EIS on the disposal site if the site is to be newly developed for the project. Effect of waste shall be minimized by adoption of above measures. 		
Noise	<ul style="list-style-type: none"> Noise level was measured at 6 stations in dry season (2012). Noise level at all stations exceeded DENR Standard (DAO-14). It is important to adopt measures not to worsen noise level than at present. Noise occur from machineries and vehicles used during construction work, hence construction work and transporting of materials need to be carefully done. 	<ul style="list-style-type: none"> To bore piles should be adopted during foundation works instead of pile driving. To use noise suppressors equipped machineries. To work in day time or non-critical time to minimize noise disturbance to adjacent residential areas. To install temporary noise barriers at noise sensitive areas such as residential, schools, and places of worships to maintain noise level at permissible limit. To strictly prohibit overloading on trucks. PMS of the construction equipment and machineries shall be strictly complied with to ensure that these are in good working conditions at all times. Aggravation of noise and vibration shall be minimized by adoption of above measures. 	<ul style="list-style-type: none"> PMO-BOT with C/S Consultant and Contractor 	<ul style="list-style-type: none"> Construction Stage
			<ul style="list-style-type: none"> Contractor with supervision of PMO-BOT and C/S Consultant 	<ul style="list-style-type: none"> Construction Stage
Offensive Odor	<ul style="list-style-type: none"> Possible offensive odor might be generated from construction vehicles and portable toilets for workers during construction. 	<ul style="list-style-type: none"> To seal, remove, or contain solid wastes and other construction wastes. To dispose them off in an LGU approved solid wastes disposal site. To install and manage portable toilets for construction workers properly. To do good camp management. 	<ul style="list-style-type: none"> PMO-BOT with C/S Consultant and Contractor 	<ul style="list-style-type: none"> Construction Stage
Traffic Congestion	<ul style="list-style-type: none"> During the construction, trucks transporting construction materials will cause traffic congestion. 	<ul style="list-style-type: none"> To implement traffic management plan in coordination with local police. To transport materials during off-peak hours. To prohibit parking of construction-related vehicles on the national/provincial roads. To use temporary construction road built 	<ul style="list-style-type: none"> PMO-BOT with D/D and Consultant 	<ul style="list-style-type: none"> D/D and Stage

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing
		within the acquired road right-of-way as much as possible. <ul style="list-style-type: none"> • To educate truck drivers. 		

9.5.5.2 Operation and Management (O & M) Phase

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

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

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing
Involuntary Relocation/ Resettlement	<ul style="list-style-type: none"> Chances of PAFs degrade quality of livelihood after relocation 	<ul style="list-style-type: none"> PAF's recovery way of life after resettlement needs to be taken care of. DPWH shall monitor impacts after construction. 	<ul style="list-style-type: none"> PMO-BOT 	<ul style="list-style-type: none"> O&M Stage
Local Economy/ Employment Livelihood	<ul style="list-style-type: none"> The newly constructed CALA Expressway will: <ul style="list-style-type: none"> Provide fast, safe, comfortable and reliable means of transport in Cavite and Laguna Provinces; Decongest traffic of roads in Cavite and Laguna Provinces; Support economic development by providing better transport access to economic/ industrial zones in the area; and Support sound urbanization in the areas traversed by the CALA Expressway 	<ul style="list-style-type: none"> periodic inspection and maintenance of the newly constructed CALA Expressway based on standard DPWH inspection and maintenance procedures for roads and bridges shall be undertaken to maximize optimum service to road users; 	<ul style="list-style-type: none"> Expressway Operator 	<ul style="list-style-type: none"> O&M Stage
	<ul style="list-style-type: none"> Changed way of life and loss of livelihood of tenant/subsistence farmers due to land use conversion by the developers/landowners 	<ul style="list-style-type: none"> To educate and finance farmers so as for them to adopt above. To include in the Toll Concession Agreement the priority employment of PAPs for O & M activities. 	<ul style="list-style-type: none"> LGU and Expressway Operator 	<ul style="list-style-type: none"> O&M Stage
Land Use	<ul style="list-style-type: none"> Possible conversion of marginally utilized agricultural lands adjacent to the newly constructed CALA Expressway, particularly in Brgy. Kaong, Sabutan, Tibig, Carmen, and Inchican in silang, Cavite into other uses. 	<ul style="list-style-type: none"> Concerned LGUs must pass necessary ordinances and strictly implement such to support existing legislations prohibiting illegal conversion of agricultural lands into other uses. 	<ul style="list-style-type: none"> LGU 	<ul style="list-style-type: none"> O&M Stage
Farm Land	<ul style="list-style-type: none"> Estimated monetary values of crops that would yield in the land acquired for CALAX were estimated to be 570,000 pesos per year. Some of PAPs who lose farm land might face financial difficulty if their losses of income sources are not properly compensated or alternative means of compensation have been provided. 	<ul style="list-style-type: none"> To adopt high productivity farming methods and high yield seeds. To educate and finance farmers so as for them to adopt above Proper compensation such as job training and prioritized job opportunity. 	<ul style="list-style-type: none"> LGU 	<ul style="list-style-type: none"> O&M Stage

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing
Accident	<ul style="list-style-type: none"> • CALAX will be built as 4-lane divided facility with center median and international geometric design standard is adopted therefore, occurrence of accidents will be unlikely due to quality of the facility. Accident may occur only when a driver does not follow traffic rules and regulations. Traffic on existing roads will be decreased, thus accidents will be expected to reduce. • Traffic accident on ordinary roads will occur at the entrances/exits to/from the expressway. • Safety of motorists plying the newly constructed CALA Expressway 	<ul style="list-style-type: none"> • Provide traffic signal controlled intersection with channelization to minimize traffic accidents. • Provide sidewalks with guardrails, pedestrian crossings on the ordinary roads near interchanges. • Educate drivers, who works in trucking company, Japanese manufacturing company located in the project area to follow traffic rules and regulations. • Install traffic signboards at appropriate places. • Regularly repair roads and bridges to ensure good condition for vehicle movement. • Road signs and markings, information display board, and streetlights, especially along bridges and interchanges shall be properly maintained; and • Periodic inspection and maintenance of the newly constructed CALA Expressway based on standard DPWH inspection and maintenance procedures for roads and bridges shall be undertaken to maximize optimum service to road users. 	<ul style="list-style-type: none"> • LGU and Expressway Operator/PM O-BOT 	<ul style="list-style-type: none"> • O&M Stage
Flora, Fauna and Biodiversity	<ul style="list-style-type: none"> • There is no rare, threatened and endangered faunal and flora species in the vicinity of the proposed alignment. 	<ul style="list-style-type: none"> • To plant many trees in vacant space of RROW and maintain the watering for grass and trees. 	<ul style="list-style-type: none"> • Expressway Operator 	<ul style="list-style-type: none"> • O&M Stage
Landscape	<ul style="list-style-type: none"> • Viaduct structure will be constructed along residential area and commercial area. Adverse impact on landscape is expected. 	<ul style="list-style-type: none"> • To clean the viaduct structure for keeping a good view. 	<ul style="list-style-type: none"> • Expressway Operator 	<ul style="list-style-type: none"> • O&M Stage

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing																				
Global Warming	<p>Amount of GHG e.g. CO₂ is expected to increase along CALAX as number of vehicles on CALAX increases. However, overall CO₂ including related ordinary roads, is estimated to decrease 89,330 tons and 121,753 tons in 2017 and 2030, respectively compared with the without Project case.</p> <p>CO₂ estimation(With CALAX (Laguna Section and Without) unit; ton/year</p> <table border="1"> <thead> <tr> <th>Year</th> <th>W/O case</th> <th>With case</th> <th>W-W/O</th> </tr> </thead> <tbody> <tr> <td>2017</td> <td>3,614,788</td> <td>3,525,457</td> <td>-89,330</td> </tr> <tr> <td>2020</td> <td>4,197,951</td> <td>4,076,198</td> <td>-121,753</td> </tr> </tbody> </table>	Year	W/O case	With case	W-W/O	2017	3,614,788	3,525,457	-89,330	2020	4,197,951	4,076,198	-121,753	<ul style="list-style-type: none"> To use clean filters and mufflers of engines To minimize idling of engines To maintain vehicle mechanics, engines, oil filter, exhaust pipe, and such in proper shape To prohibit old model vehicles To strengthen vehicle emission regulation 										
Year	W/O case	With case	W-W/O																					
2017	3,614,788	3,525,457	-89,330																					
2020	4,197,951	4,076,198	-121,753																					
Air Pollution	<p>Predicted air qualities such as NO_x, SO₂ and PM-10 are less than 1µg/Ncm with CALAX. During O & M period, all parameters are estimated to be below DENR Standards. (DAO-14)</p> <p>Maximum Predicted Air Quality along CALAX(Laguna section)</p> <table border="1"> <thead> <tr> <th>Year</th> <th>NO_x (µg/ Ncm)</th> <th>SO₂ (µg/ Ncm)</th> <th>PM-10 (µg/ Ncm)</th> </tr> </thead> <tbody> <tr> <td>2017</td> <td>11.724</td> <td>31.0009</td> <td>147.014</td> </tr> <tr> <td>2020</td> <td>11.884</td> <td>31.0011</td> <td>147.019</td> </tr> <tr> <td>2030</td> <td>12.163</td> <td>31.0017</td> <td>147.027</td> </tr> <tr> <td>DENR</td> <td>260</td> <td>340</td> <td>300</td> </tr> </tbody> </table>	Year	NO _x (µg/ Ncm)	SO ₂ (µg/ Ncm)	PM-10 (µg/ Ncm)	2017	11.724	31.0009	147.014	2020	11.884	31.0011	147.019	2030	12.163	31.0017	147.027	DENR	260	340	300	<ul style="list-style-type: none"> To clean the dust on road daily in order to reduce fine particles. To spread water on the road and plants along the road. 	<ul style="list-style-type: none"> Expressway Operator 	<ul style="list-style-type: none"> O&M Stage
Year	NO _x (µg/ Ncm)	SO ₂ (µg/ Ncm)	PM-10 (µg/ Ncm)																					
2017	11.724	31.0009	147.014																					
2020	11.884	31.0011	147.019																					
2030	12.163	31.0017	147.027																					
DENR	260	340	300																					
	<ul style="list-style-type: none"> Possible increase in TSP level in areas along the newly constructed CAL Expressway due to increase in vehicular traffic volume. 	<ul style="list-style-type: none"> To do campaign for minimizing idling of engines and using clean filters and mufflers of engines. 	<ul style="list-style-type: none"> LTO 	<ul style="list-style-type: none"> O&M Stage 																				
	<ul style="list-style-type: none"> Possible increase in TSP level in areas along the newly constructed CAL Expressway due to increase in vehicular traffic volume. 	<ul style="list-style-type: none"> Survival rate of the treest planted along the newly constructed CALa Expressway (DPWH D.O. 131, series of 1995) shall be continuously monitored. Trees not only act as natural sieves for re-suspended dust particles, but also enhance aesthetics of the road sides; and The Philippine Clean Air Act and Anti-Smoke Belching Law shall be strictly implemented by the concerned government agencies. 	<ul style="list-style-type: none"> Expressway Operator 	<ul style="list-style-type: none"> O&M Stage 																				

Item	Potential Impact	Mitigation/Enhancement Measures	Responsible Organization	Implementing Timing
	<ul style="list-style-type: none"> Possible increase in the level of gaseous air contaminants such as SO₂ and NO₂ due to increase in vehicular traffic volume. 	<ul style="list-style-type: none"> Survival rate of the trees planted along the newly constructed CALA Expressway (DPWH D.O. 131, series of 1995) shall be continuously monitored. Trees absorb gaseous air pollutants and convert them into oxygen through transpiration process; and The Philippine Clean Air Act and Anti-Smoke Belching Law shall be strictly implemented by the concerned government agencies. 	<ul style="list-style-type: none"> Expressway Operator 	<ul style="list-style-type: none"> O&M Stage
Water Pollution	<ul style="list-style-type: none"> Litters on road surface and eroded soils from embankment slope may cause water pollution, however, minimal impact. 	<ul style="list-style-type: none"> Implement proper road maintenance. To install proper drainage systems. To remove the solid waste stuff under the culvert before and after rainy season. 	<ul style="list-style-type: none"> Expressway Operator 	<ul style="list-style-type: none"> O&M Stage
Noise	<ul style="list-style-type: none"> Predicted noise level at church and school (2 points) along CALAX are 69.5 dBA during day time period and 65.8 dBA for night time period on year 2020. Since the noise level standard of DENR during the day time and night time are 50 dBA and 40 dB respectively, noise level of all point exceed the standard. For residential area (5 points), predicted noise level on year 2020 are from 65.0 to 71.0 dBA during day time period and from 61.3 to 67.3 dBA during night time period. Since the noise level standard of DENR during the day time and night time are 65 dBA and 55 dB respectively, all points exceed noise standard during daytime and nighttime. It is necessary to reduce noise levels and make them acceptable based on the DENR regulation and/or at least the present average noise level of the area. 	<ul style="list-style-type: none"> Noise barriers can achieve 12.9 dBA noise level reduction according to noise model prediction. Noise barriers will be constructed at the sensitive areas along CALAX before operation. Double-glazed windows installation will be adopted for the very sensitive buildings. When noise measurement results show that noise level is exceeding DENR Standard, additional countermeasures to reduce noise level will be implemented. 	<ul style="list-style-type: none"> Expressway Operator Contractor, PMO-BOT, C/S Consultant 	<ul style="list-style-type: none"> O&M Stage Construction Stage

9.5.6 Environmental Monitoring Plan

9.5.6.1 Environmental Monitoring Plan

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

The DENR ambient air quality guideline for critical pollutants, for noise in general area and for water quality are shown in **Table 9.5.6-2**, **Table 9.5.6-3**, and **Table 9.5.6-4**, respectively.

TABLE 9.5.6-1 ENVIRONMENTAL MONITORING PLAN (CONSTRUCTION STAGE)

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

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

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

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

TABLE 9.5.6-2 DENR NATIONAL AMBIENT AIR QUALITY GUIDELINE FOR CRITERIA POLLUTANTS

Pollutant	Short Term (a)			Long Term (b)		
	µg/Ncm	ppm	Ave. Time	µg/Ncm	ppm	Ave. Time
Suspended Particulate Matter (e) - TSP	230 (f)		24 hours	90	--	1 year (c)
PM -10	150 (g)		24 hours	60	--	1 year (c)
Sulfur Dioxide (SO ₂) (e)	180	0.07	24 hours	80	0.03	1 year
Nitrogen Dioxide (NO ₂)	150	0.08	24 hours	--	--	--
Photochemical Oxidants	140	0.07	1 hour	--	--	--
As Ozone	60	0.03	8 hours	--	--	--
Carbon Monoxide (CO)	35 mg/Ncm 10 mg/Ncm	30 9	1 hour 8 hours	-- --	-- --	-- --
Lead (d)	1.5	--	3 mo. (d)	1.0	--	1 year

- (a) Maximum limits represented by (98%) values not to be exceeded more than once a year.
- (b) Arithmetic Mean
- (c) Annual Geometric Mean
- (d) Evaluation of this guideline is carried out for 24- hours averaging time and averaged over three moving calendar months.
- (e) SO₂ and Suspended Particulates are sampled once every 6-days when using the manual method
- (f) with mass median diameter less than 25-50 µm.
- (g) with mass median less than 10 µm.

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

TABLE 9.5.6-3 DENR STANDARDS FOR NOISE IN GENERAL AREAS (DBA)

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

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

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

TABLE 9.5.6-4 WATER QUALITY CRITERIA FOR CONVENTIONAL AND OTHER POLLUTANTS CONTRIBUTING TO AESTHETIC AND OXYGEN DEMAND FOR FRESH WATERS

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

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

N/A: No standards

9.5.6.2 Monitoring Frequency and Monitoring Report

RAP Implementation Stage

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

Construction Stage

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

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

Operation and Maintenance Stage

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

Table 9.5.6-5 shows the draft monitoring form to be submitted to JICA. This monitoring form shows the monitoring items, measurement points, frequency, survey method, survey period, standard etc.

TABLE 9.5.6-5 MONITORING FORM

1. Responses/Actions to Comments and Guidance from Government Authorities and the Public						
Monitoring Item			Monitoring Results During Report Period			
Number of Responses/Actions to Comments and Guidance from Government Authorities (DENR, LGUs)			<ul style="list-style-type: none"> - Quarterly during construction - Twice a year during operation for two years 			
2. Mitigation Measures						
- Air Quality (Emission Gas/Ambient Air Quality)						
Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Country's Standards	Referred International Standards	Remarks (Measurement Point, Frequency, Method, etc.)
SO ₂	µg/Ncm	25.3	31	340	-	Same points as baseline survey Quarterly during construction Twice a year during operation for two (2) years Air sampler & high volume sampler
NO ₂	µg/Ncm	7.9	11	260	200 (IFC)	
CO	mg/Ncm	*	*			
Dust (TSP)	Mg/Ncm	90	147	300	-	
<i>*Note: Data will be provided during construction phase of the project.</i>						
- Water Quality (Effluent/Wastewater/Ambient Water Quality)						
Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Country's Standards	Referred International Standards	Remarks (Measurement Point, Frequency, Method, etc.)
pH	-	7.5	8.0	6.5 – 8.5		Upstream and downstream portions of affected water bodies Twice a year during construction Grab sampling
TSS (Suspended Solid)	Mg/L	8.2	10.2	15 – 50		
BOD	Mg/L	1.5	2.2	20		
DO	Mg/L	7.1	7.7	min. 5.0		
Temperature	°C	25	28	-		
Total Coliform	MPN/100mL	67,000	160,000	5,000		
Lead	Mg/L	8.2	10.2	30		

- **Waste**

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

- **Noise/Vibration**

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

3. Natural Environmental

- **Ecosystem**

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

4. Social Environment

- **For the IMA**

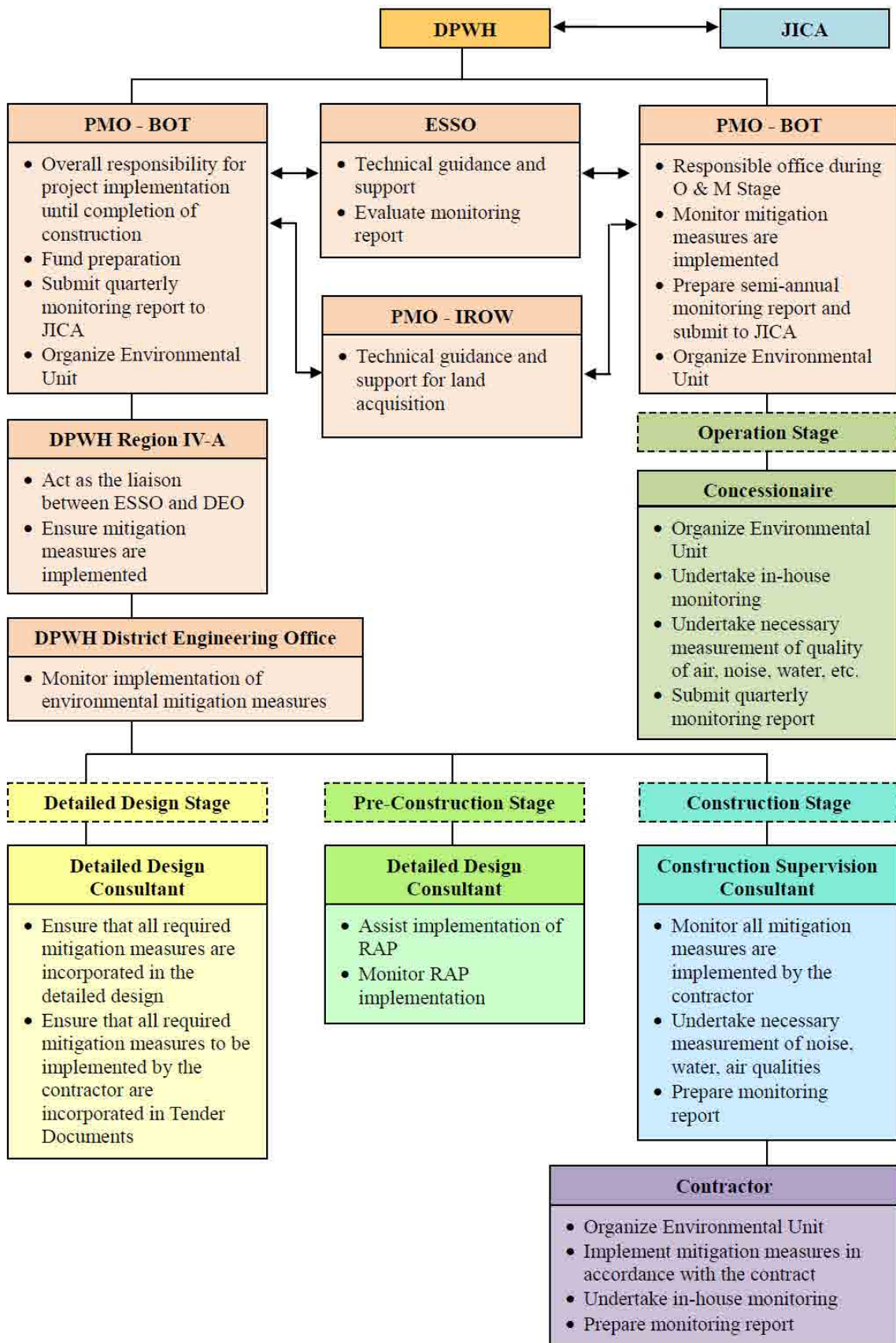
Monitoring Item	Monitoring Results During Report Period
<ol style="list-style-type: none"> 1. Budget and Timeframe <ul style="list-style-type: none"> - Schedule for the mobilization of appointed land acquisition and resettlement staff - Schedule for the capacity building and training activities - Achievement of resettlement implementation activities against the agreed implementation plan - Disbursement of funds in accordance to RAP - Schedule of social preparation phase - Schedule for the occupation of acquired land for project implementation 2. Delivery of Compensation <ul style="list-style-type: none"> - AF entitlements as provided in the entitlement matrix, such as payments on structure and lands. - Number of PAF to donate to the Government - Number of PAFs with land title under C.A. 141, Sec. 112. - Land holdings with quit claims & easements. - PAFs preference of payment compensation on land and expropriation. - Number of PAF receiving relocation & actual occupations. - Implementation of income and livelihood restoration activities. 3. Public Participation <ul style="list-style-type: none"> - Schedules of Consultations & community activities. 	<ul style="list-style-type: none"> - Monthly during RAP Implementation - Quarterly during construction - Twice a year during operation for two (2) years

<ul style="list-style-type: none"> - PAFs awareness on their entitlements. - Issues in grievance mechanism and resolution of conflicts. <p>4. Benefits</p> <ul style="list-style-type: none"> - Changes incurred in the patterns of occupation, production and resources compared to pre-project situation. - Changes in income and expenditures patterns compared to pre-project situation. - Changes in key social and cultural parameters relating to living standards. - Changes encountered by the vulnerable groups. 	
<p>- For the EMA</p>	
Monitoring Item	Monitoring Results During Report Period
<p>1. Restoration of Living Standards</p> <ul style="list-style-type: none"> - Compensation Payments on house free of depreciation, fees or transfer cost - Restoration on Community Perceptions. - Achievement of PAFs on the replacement of key social cultural elements. <p>2. Restoration of Livelihoods</p> <ul style="list-style-type: none"> - Sufficiency of payment compensation to replace lost assets. - Assistance to re-establish the affected enterprises. - Effectiveness and sustainability of the provided income earning opportunities for the vulnerable groups. - Restoration of pre-project income levels and living standards through the jobs provided by the project. <p>3. Levels of PAP Satisfaction</p> <ul style="list-style-type: none"> - Awareness of Affected Families on the resettlement procedures and their entitlements, including its realization. - Assessment of PAFs on the restoration of their living standards and livelihood. - PAFs awareness on the grievance mechanism, including the procedures in the resolution of conflicts and their satisfactions. <p>4. Effectiveness of Resettlement Planning</p> <ul style="list-style-type: none"> - Proper identification of PAFs affected assets. - Sufficiency of budget and adequacy of timelines to properly meet objectives. - Generosity of entitlement packages. - Identification and assistance to the vulnerable groups. - Actions of resettlement implementers on the unforeseen problems. <p>5. Social and Environmental Impact</p> <ul style="list-style-type: none"> - Unintended environmental impacts. - Unintended impacts on employment or incomes. 	<ul style="list-style-type: none"> - Monthly during RAP implementation - Quarterly during construction - Twice a year during operation for two (2) years

9.5.7 Institutional Arrangement and Budget

9.5.7.1 Institutional Arrangement

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



Source: JICA Study Team (2012)

FIGURE 9.5.7-1 ENVIRONMENTAL MANAGEMENT AND MONITORING IMPLEMENTATION ORGANIZATION

9.5.7.2 Budget

DPWH Administrative Cost

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

Consultancy Cost

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

Detailed Engineering and Pre-construction Stage:

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

Construction Supervision Stage:

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

Contractor's Cost

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

Concessionaire's Cost

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

9.5.8 System for Environmental Management

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

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

9.6 RELOCATION ACTION PLAN

9.6.1 Relocation Policy

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

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

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

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

9.6.2 Summary of Relocation and Assets

9.6.2.1 Household Interview Survey

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

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

Type-B: Households who are doing the farming and their farm lands are affected by the

project. Estimated number of farm lots is about 77, of which 31 households (about 40%) were interviewed.

Interviewee selection criteria were established as follows;

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

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

Interview results were as follows;

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

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

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

9.6.2.2 Summary of Project Affected Persons (PAPs)

Summary of Survey Result

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

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

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

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

Source: JICA Study Team (2012)

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

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

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

Source: JICA Study Team (2012)

TABLE 9.6.2-3 SUMMARY OF LAND ACQUISITION AND RESETTLEMENT IMPACTS

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

Annual Crops	Ha. ^e	18.94	0	18.94
Commercial stalls (Small-scale)	No. ^f	524	0	524
Auxiliary Structures ^g	No.	2	0	2
Public Infrastructure ^h	No.	34	0	34
Perennial Crops (fruit bearing trees ⁱ and non-fruit bearing ^j)	No.	6	0	6

Note:

- ^a - Estimates only, based on Cadastral Map of respective City Assessor's Offices (no parcellary survey yet)
- ^b - There are 62 parcels but only 52 have crops; 10 parcels are raw lands
- ^c - Residential structures
- ^d - There are cases where there are more than one (1) household per dwelling structure. In the project-affected areas, there are 36 structures with 50 households
- ^e - pineapple, cassava, corn, palay
- ^f - banana hill
- ^g - fish ponds, carabao shed, pig pen, deep wells, fence/gate, farm structures/equipment, area development
- ^h - waiting sheds, electrical posts
- ⁱ - mango, avocado, santol, jack fruit, banana, coconut, etc.
- ^j - narra, mahogany ipil-ipil, Benjamin tree, palm tree, etc.

Source: JICA Study Team (2012)

TABLE 9.6.2-4 SUMMARY OF RROW ACQUISITION IMPACTS ON LAND, STRUCTURES, AND TREES

Affected City/ Municipality	Area (In Ha)	Land ^a (Php)	No. of Structures	Structures ^b (Php)	No. of Trees	Trees ^b (Php)
Silang, Cavite	64.71	420,615,000	56	16,928,130	5,906	12,279,205
Biñan, Laguna	40.45	2,425,000,000	164	14,917,675	2,195	1,656,940
Sta. Rosa, Laguna	13.68	684,000,000	0	0	1,292	874,855
Total	118.84	3,529,615,000	220	31,845,805	9,393	14,811,000

Notes:

Structures include *residential* (those with families living in it); *commercial* such as small scale business (i.e. *carinderia*); *auxiliary* such as fence, goat pen, pig pen, and *public utilities* (electric posts).

^a - Based on BIR Zonal Values for Cavite/Silang, Revenue District (RDO 54A 0 DO#39007, November 05, 2007);

^b - Based on Municipal Assessors of Silang, Cavite Schedule of Market Values (1980); City Assessor of Biñan; Schedule of Market Values (1980) and City Assessor's of Sta. Rosa Schedule of Market Values (1980)

Source: JICA Study Team (2012)

Survey Results

Table 9.6.2-5 shows number of residential houses, households and people affected and relocated.

TABLE 9.6.2-5 NUMBER OF WHOSE RESIDENTIAL HOUSES ARE AFFECTED AND TO BE RELOCATED

Municipality/ City	Barangay	No. of Structures	No. of Residential Households Affected	No. of Residential Households to be Relocated	Land Tenure (*)			Residential Structure (*)		
					Owner	Rental	Total	Owner	Rental	Total
Silang, Cavite	Sabutan	15	19	19	12	2	14	11	3	14

	Kaong	2	3	3	1	1	2	2	0	2
	Tibig	12	16	16	9	2	11	9	2	11
Biñan, Laguna	Timbao	7	12	12	5	0	5	5	0	5
Total		36	50	50	27	5	32	27	5	32

Source: JICA Study Team (2012)

*) : Interview survey result, No. of sample 32 structure owners/respondents (89%)

TABLE 9.6.2-6 MATERIALS OF DWELLING STRUCTURES

Municipality/ City	Salvage	Light	Mixed	Strong	Total
Silang, Cavite	1	10	4	14	29
Biñan, Laguna	0	0	1	6	7
Total	1	10	5	20	36

Materials:

Salvaged (plastic, tin, cardboard, etc.)

Light (nipa, cogon, bamboo, wood)

Mixed (light and strong)

Strong (hollow blocks, G.I. Sheets, wood)

Source: JICA Study Team (2012)

Overall RAP requirements are shown in **Table 9.6.2-7**.

TABLE 9.6.2-7 OVER-ALL RAP REQUIREMENTS

	Compensation Structure	LARRIPP, 2007	This Project
Compensation	For Structure	<ul style="list-style-type: none"> Cash including cost of restoring the remaining structure Determined by Appraisal Committee No deduction for salvaged building materials (Replacement Cost) 	<ul style="list-style-type: none"> No. of residential houses affected: 36 (50 HH, 197 persons)
	For Other Improvement	<ul style="list-style-type: none"> Cash Replacement cost for the affected portion of public structure to the Government or non-Government agencies or to the community Cost for reconnecting the facility such as water, power and telephone 	<ul style="list-style-type: none"> Commercial Structure: 2 Auxiliary Structure: 34 Public Infrastructure: 6
	For Crops, Trees and Perennials	<ul style="list-style-type: none"> Cash Commercial value as determined by DENR or Appraisal Committee PAFs given sufficient time to harvest crops Compensation for damaged crops (palay, corn) at market value Fruit-bearing trees based on assessment of Provincial/Municipal Assessors 	<ul style="list-style-type: none"> Fruit bearing/crops: 524+3730 = 4254 None Fruit Bearing Trees: 5253
	For Land	<ul style="list-style-type: none"> Replacement Cost Initial Offer: Zonal Valuation Second Offer: Market Value Land Swapping if feasible (Land 	<ul style="list-style-type: none"> Residential house land: 36 lots (36 owners, all severe) Farm Land: Approximately 77 lots (Severe 62, Marginal 15)

Compensation Structure	LARRIPP, 2007	This Project
	for Land) (Cash compensation when affected holding has a higher value than relocation plot.)	<ul style="list-style-type: none"> Survey Result...70.1% are land owners, 5.2% are tenants and 24.7% are free occupation with permit.
Other Types of Assistance or Entitlement	Disturbance Compensation <ul style="list-style-type: none"> Lessees: 5 times the average of gross harvest for the past three years, but not less than Php15,000. Tenant: Value of gross harvest of 1 year and not less than Php15,000 per ha. (E.O. 1035) 	<ul style="list-style-type: none"> About 70.1% of farm lands are owned. No Lessee 5.2% are classified as tenant farmers 24.7% are free occupation with permit.
	Income Loss <ul style="list-style-type: none"> Loss of business/income, entitled to an income rehabilitation assistance not to exceed Php15,000 or based on tax record. 	<ul style="list-style-type: none"> Two (2) small-scale owners are affected.
	Inconvenience Allowance <ul style="list-style-type: none"> Php10,000 to PAF when severely affected structures which require relocation and new construction. 	<ul style="list-style-type: none"> Thirty six (36) residential houses (50 households)
	Rehabilitation Assistance <ul style="list-style-type: none"> Skills training and other development activities equivalent to Php15,000 per family 	<ul style="list-style-type: none"> Max. fifty (50) households who lose income. Some farmers who become land less.
	Rental Subsidy <ul style="list-style-type: none"> Without sufficient additional land to allow reconstruction of their lost house. Equivalent to prevailing average monthly rental. Period between delivery of house compensation and the delivery of land compensation 	<ul style="list-style-type: none"> When availability of relocation sites is delayed, this should be considered (maximum of 50 households)
	Transportation Allowance and Assistance	<ul style="list-style-type: none"> 50 households

Note: Severe –More than 20% of Total Land/Properties affected
Marginal – Less than 20% and still viable for continued use.
Source: JICA Study Team (2012)

9.6.3 Household Survey Result

Socioeconomic survey of PAPs was conducted from February 27, 2012 to March 14, 2012.

9.6.3.1 Bio Data of PAPs

Majority of the respondents have a nuclear (54%) structure of household, 19% are living alone, 22% are family with extension and 5% sharing in one structure (see **Table 9.6.3-1**).

TABLE 9.6.3-1 HOUSEHOLDS STRUCTURE OF PAPS INTERVIEWED

Municipality/Barangay		Single	Nuclear	Extended	Joint	Total	
Type A - Residential/Household Structure							
Silang, Cavite	Sabutan	Count	2	8	3	1	14
		% within Barangay	14%	57%	21%	7%	100%
	Kaong	Count	0	1	1	0	2
		% within Barangay	0%	50%	50%	0%	100%
	Tibig	Count	1	8	2	0	11
		% within Barangay	9%	73%	0%	0%	82%
Biñan, Laguna	Timbao	Count	0	3	0	2	5
		% within Barangay	0%	60%	0%	0%	60%
Total of Type A Respondents		Count	3	20	6	3	32
		% within Barangay	9%	63%	19%	9%	100%
Type B - Farm Lands							
Silang, Cavite	Sabutan	Count	2	0	4	0	6
		% within Barangay	33%	0%	67%	0%	100%
	Kaong	Count	0	1	1	0	2
		% within Barangay	0%	50%	50%	0%	100%
	Tibig	Count	2	5	0	0	7
		% within Barangay	29%	71%	0%	0%	100%
	Carmen	Count	5	8	3	0	16
		% within Barangay	31%	50%	19%	0%	100%
Total Type B Respondents		Count	9	14	8	0	31
		% within Barangay	29%	45%	26%	0%	100%
Total Type A & B		Count	12	34	14	3	63
		% within Barangay	19%	54%	22%	5%	100%

Note:

Single – Single (individual) occupant

Nuclear – Family consisting of parents and siblings

Extended – Nuclear family plus immediate family members like parents, siblings

Joint – Nuclear plus one or more extended families

Source : JICA Study Team (2012)

9.6.3.2 Communication/Language

The most common dialect is Tagalog. This dialect is used by 95% of the respondents, followed by ‘Ilocano’, ‘Bicolano’, and ‘Ilongo’ (see **Table 9.6.3-2**).

TABLE 9.6.3-2 ETHNO LINGUISTIC AFFILIATION OF THE RESPONDENTS

City/Municipality/Barangay		Tagalog	Ilocano	Bicolano	Ilonggo	Total	
Type A - Residential/Household Structure							
Silang, Cavite	Sabutan	Count	13	1	0	0	14
		% within Barangay	93%	7%	0%	0%	100%
	Kaong	Count	2	0	0	0	2
		% within Barangay	100%	0%	0%	0%	100%
	Tibig	Count	11	0	0	0	11
		% within Barangay	100%	0%	0%	0%	100%
Biñan, Laguna	Timbao	Count	5	0	0	0	5
		% within Barangay	100%	0%	0%	0%	100%
Total of Type A		Count	31	1	0	0	32
		% within Barangay	97%	3%	0%	0%	100%
Type B - Farm Lands							
Silang, Cavite	Sabutan	Count	5	0	1	0	6
		% within Barangay	83%	0%	17%	0%	100%
	Kaong	Count	2	0	0	0	2
		% within Barangay	100%	0%	0%	0%	100%
	Tibig	Count	7	0	0	0	7
		% within Barangay	100%	0%	0%	0%	100%
	Carmen	Count	15	0	0	1	16
		% within Barangay	94%	0%	0%	6%	100%
Total Type B Respondents		Count	29	0	1	1	31
		% within Barangay	94%	0%	3%	3%	100%
Total of Type A and B		Count	60	1	1	1	63
		% within Barangay	95%	2%	2%	2%	100%

Source : JICA Study Team (2012)

9.6.3.3 Educational Attainment

The level of educational attainment of the male project affected respondents in the host city/municipality is presented in **Table 9.6.3-3**. Majority of the male were able to finish secondary schooling. As seen from this table, 52% of the respondents were able to finish the secondary education, 30% primary education and 11% successfully finished college. The 4% has taken up vocational and post graduate level while the remaining 3% was not able to have education.

TABLE 9.6.3-3 EDUCATIONAL ATTAINMENT OF MALE RESPONDENTS

City/Municipality/Barangay		A	B	C	D	E	F	Total	
Type A - Residential/Household Structure									
Silang, Cavite	Sabutan	Count	4	8	2	0	0	0	14
		% within Barangay	29%	57%	14%	0%	0%	0%	100%
	Kaong	Count	1	1	0	0	0	0	2
		% within Barangay	50%	50%	0%	0%	0%	0%	100%
	Tibig	Count	3	7	1	0	0	0	11
		% within Barangay	27%	64%	9%	0%	0%	0%	100%
Biñan, Laguna	Timbao	Count	1	3	1	0	0	0	5
		% within Barangay	20%	60%	20%	0%	0%	0%	100%
Total of Type A - Respondents		Count	9	19	4	0	0	0	32
		% within Barangay	28%	59%	13%	0%	0%	0%	100%
Type B - Farm Lands									
Silang, Cavite	Sabutan	Count	1	1	1	1	1	1	6
		% within Barangay	17%	17%	17%	17%	17%	17%	100%
	Kaong	Count	1	1	0	0	0	0	2
		% within Barangay	50%	50%	0%	0%	0%	0%	100%
	Tibig	Count	2	2	2	0	0	1	7
		% within Barangay	29%	29%	29%	0%	0%	14%	100%
	Carmen	Count	6	10	0	0	0	0	16
		% within Barangay	38%	63%	0%	0%	0%	0%	100%
Total of Type B Respondents		Count	10	14	3	1	1	2	31
		% within Barangay	32%	45%	10%	3%	3%	6%	100%
Total of Type A and B		Count	19	33	7	1	1	2	63
		% within Barangay	30%	52%	11%	2%	2%	3%	100%

Note:

A – Primary; B – Secondary; C – Tertiary; D – Vocational; E – Post-Graduate; F - None

Source: JICA Study Team (2012)

Table 9.6.3-4 shows the educational attainment of women, which has majority (41%) of them are able to finish secondary or high school education, seconded by 24% primary education. Female respondents who were able to finish college has a greater percentage (17%) compared to the male respondents.

TABLE 9.6.3-4 EDUCATIONAL ATTAINMENT OF FEMALE RESPONDENTS

City/Municipality/Barangay		Primary	Secondary	Tertiary	Vocational	Post Graduate	None	Total	
Type A - Residential/Household Structure									
Silang, Cavite	Sabutan	Count	2	8	1	1	0	2	14
		% within Barangay	18%	45%	9%	9%	0%	18%	100%
	Kaong	Count	0	2	0	0	0	0	2
		% within Barangay	0%	100%	0%	0%	0%	0%	100%
	Tibig	Count	2	5	1	1	0	2	11
		% within Barangay	18%	45%	9%	9%	0%	18%	100%
Biñan, Laguna	Timbao	Count	1	3	1	0	0	0	5
		% within Barangay	18%	45%	9%	9%	0%	18%	100%
Total of Type A Respondents		Count	5	18	3	2	0	4	32
		% within Barangay	16%	56%	9%	6%	0%	13%	100%
Type B – Farm Lands									
Silang, Cavite	Sabutan	Count	2	1	2	0	1	0	6
		% within Barangay	33%	17%	33%	0%	17%	0%	100%
	Kaong	Count	0	2	0	0	0	0	2
		% within Barangay	0%	100%	0%	0%	0%	0%	100%
	Tibig	Count	2	1	3	0	0	1	7
		% within Barangay	29%	14%	43%	0%	0%	14%	100%
	Carmen	Count	6	4	3	0	3	0	16
		% within Barangay	38%	25%	19%	0%	19%	0%	100%
Total of Type B Respondents		Count	10	8	8	0	4	1	31
		% within Barangay	32%	26%	26%	0%	13%	3%	100%
Total of Type A and B		Count	15	26	11	2	4	5	63
		% within Barangay	24%	41%	17%	3%	6%	8%	100%

Note:

A – Primary; B – Secondary; C – Tertiary; D – Vocational; E – Post-Graduate; F - None

Source: JICA Study Team (2012)

Table 9.6.3-5 shows that children who were able to finish college education have a high percentage of 32% and 50% are still studying. 18% of the children are out of school youth.

TABLE 9.6.3-5 EDUCATION OF CHILDREN

City/Municipality/Barangay		Finished College	Schooling	Out of School	Total	
Type A - Residential/Household Structure						
Silang, Cavite	Sabutan	Count	4	15	7	26
		% within Barangay	15%	58%	27%	100%
	Kaong	Count	1	2	0	3
		% within Barangay	33%	67%	0%	100%
	Tibig	Count	2	5	2	9
		% within Barangay	22%	56%	22%	100%
Biñan, Laguna	Timbao	Count	1	3	0	4
		% within Barangay	25%	75%	0%	100%
Total of Type A Respondents		Count	8	25	9	42
		% within Barangay	19%	60%	21%	100%
Type B – Farm Lands						
Silang, Cavite	Sabutan	Count	6	5	1	12
		% within Barangay	50%	42%	8%	100%
	Kaong	Count	1	2	0	3
		% within Barangay	33%	67%	0%	100%
	Tibig	Count	3	6	2	11
		% within Barangay	27%	55%	18%	100%
	Carmen	Count	17	17	8	42
		% within Barangay	40%	40%	19%	100%
Total of Type B Respondents		Count	27	30	11	68
		% within Barangay	40%	44%	16%	100%
Total of Type A and B		Count	35	55	20	110
		% within Barangay	32%	50%	18%	100%

Source: JICA Study Team (2012)

9.6.3.4 Main Occupation of PAPs

Of 32 respondents whose houses are affected, main occupation of the 6 households (19.0%) is farming, 11 households (34%) is employment and 15 households (16%) is others (drivers, factory workers, etc.).

Of 31 respondents whose farm lands are affected, main occupation of 21 households (68%) is farming, 4 households (13%) is employment and 6 households (19%) is others.

9.6.3.5 Family Economy

Table 9.6.3-6 shows the monthly family income bracket of the PAPs interviewed, 24% of them are earning between 6,001 to 15,000 and 22% have income bracket of 10,001 to 15,000. While 22% of them are earning 10,000 or less that most of them falls from the annual poverty

threshold for family of 6 persons in the provinces of Cavite and Laguna that is Php8,938 and Php8,265 respectively based on National Statistical Yearbook 2010 under Region IV-A.

TABLE 9.6.3-6 MONTHLY FAMILY INCOME

City/Municipality/Barangay		3,000 or less	3,001 to 6,000	6,001 to 10,000	10,001 to 15,000	15,001 to 20,000	20,001 to 30,000	30,001 to 40,000	40,001 to 50,000	50,001 to 60,000	60,001 or more	Total		
Type A - Residential/Household Structure														
Silang, Cavite	Sabutan	Count	1	1	3	6	0	1	1	0	0	1	14	
		% within Barangay	7%	7%	21%	43%	0%	7%	7%	0%	0%	7%	100%	
	Kaong	Count	0	0	0	1	0	0	0	0	0	0	1	2
		% within Barangay	0%	0%	0%	50%	0%	0%	0%	0%	0%	0%	50%	100%
	Tibig	Count	1	1	1	3	3	1	1	0	0	0	0	11
		% within Barangay	9%	9%	9%	27%	27%	9%	9%	0%	0%	0%	0%	100%
Biñan, Laguna	Timbao	Count	0	0	2	0	1	0	0	1	0	1	5	
		% within Barangay	0%	0%	40%	0%	20%	0%	0%	0%	20%	0%	20%	100%
Total of Type A		Count	2	2	6	10	4	2	2	1	0	3	32	
		% within Barangay	6%	6%	19%	31%	13%	6%	6%	3%	0%	9%	100%	
Type B – Farm Lands														
Silang, Cavite	Sabutan	Count	0	0	1	2	0	1	0	0	1	1	6	
		% within Barangay	0%	0%	17%	33%	0%	17%	0%	0%	17%	17%	100%	
	Kaong	Count	0	0	1	0	0	0	0	1	0	0	2	
		% within Barangay	0%	0%	50%	0%	0%	0%	0%	50%	0%	0%	100%	
	Tibig	Count	0	0	2	0	0	1	2	2	0	0	7	
		% within Barangay	0%	0%	29%	0%	0%	14%	29%	29%	0%	0%	100%	
	Carmen	Count	1	0	5	2	2	5	0	1	0	0	16	
		% within Barangay	6%	0%	31%	13%	13%	31%	0%	6%	0%	0%	100%	
Total of Type B		Count	1	0	9	4	2	7	2	4	1	1	31	
		% within Barangay	3%	0%	29%	13%	6%	23%	6%	13%	3%	3%	100%	
Total of Type A and B		Count	3	2	15	14	6	9	4	5	1	4	63	
		% within Barangay	5%	3%	24%	22%	10%	14%	6%	8%	2%	6%	100%	

Source: JICA Study Team (2012)

Table 9.6.3-7 shows the household expenditures. The bulk of the household expenditures comprises of food (51%) followed by education (25%). The PAPs considered that if farming will be lost from their livelihood, food security problem will arise from their displacement. They believe that having a farmland sustain their meal from planting backyard vegetables for daily consumption.

TABLE 9.6.3-7 AVERAGE ANNUAL HOUSEHOLD EXPENDITURES OF THE PAPS INTERVIEWED (1 OF 2)

Municipality/Barangay			Food	Utilities	Education	Rent	Health	Transportation	Total
Type A – Residential/Household Structure									
Silang, Cavite	Sabutan	Average	68,092	12,678	17,371	1,714	1,653	5,867	7,669
		% within Barangay	64%	12%	16%	2%	2%	5%	100%
	Kaong	Average	60,000	2,250	12,000	300	2,500	50,000	127,050
		% within Barangay	47%	2%	9%	0%	2%	39%	100%
	Tibig	Average	72,245	7,690	14,463	2,181	2,181	9,796	108,560
		% within Barangay	67%	7%	13%	2%	2%	9%	100%
Biñan, Laguna	Timbao	Average	174,720	22,800	6,700	0	0	5,840	210,060
		% within Barangay	83%	11%	3%	0%	0%	3%	100%
Total of Type A		Average	375,057	45,418	50,534	4,195	6,334	71,503	453,339
		% within Barangay	69%	10%	12%	1%	1%	8%	100%

Source: JICA Study Team (2012)

TABLE 9.6.3-7 HOUSEHOLD EXPENDITURES OF THE PAPS INTERVIEWED 2/2

Municipality/Barangay		Food	Utilities	Education	Rent	Health	Transportation	Total		
Type B – Farm Lands										
Silang, Cavite	Sabutan	Count	32,578	32,408	5,688	0	2,835	3,857	10,808	
		% within Barangay	22%	21%	53%	0%	2%	3%	100%	
	Kaong	Count	61,200	4,500	11,250	300	2,700	5,625	52,725	
		% within Barangay	58%	4%	21%	1%	5%	11%	100%	
	Tibig	Count	49,745	23,650	3,861	0	38	19.81	10,591	
		% within Barangay	43%	20%	36%	0%	0%	0%	100%	
	Carmen	Count	68,321	15,820	1,395	111	918	409.3	8,093	
		% within Barangay	53%	12%	17%	1%	11%	5%	100%	
	Total of Type B		Count	211,844	76,378	22,194	411	6,453	9,911	82,217
			% within Barangay	39%	17%	35%	1%	5%	3%	100%
Total of Type A and B		Count	586,901	121,796	2,444,240	4,606	342,441	81,414	535,556	
		% within Barangay	51%	14%	25%	1%	4%	5%	100%	

Source: JICA Study Team (2012)

9.6.3.6 Income Sources

The main source of income of PAPs who lose structures is via employment while the PAPs who lose land are by farming. Employment here refers to jobs in government and private offices including skilled workers. Aside from the primary occupation of the PAPs there are others sources of income of their household members but majority (52%) of them has no secondary source of income.

9.6.3.7 Land Ownership

(1) Residential Lands

The respondents' landownership shows in **Table 9.6.3-8** that out of 32 Type A respondents 27 owned the land as well, while the remaining are renting the land where their structures are built.

(2) Farm Lands

With regards to Type B respondents, 12 owned the land, three (3) are tenants and 16 are occupying the farmland with permit from the owner. The said 16 respondents are within Brgy. Carmen. Based on coordination meeting with the SAMACA NGO in Carmen, almost all of the tenants were paid by the developers and signed a waiver in exchange for their farmland. According to said NGO, since the land is not yet used by the developer, the tenants who received payments have been given a permit to continue their farming activity. See **Table 9.6.3-9** for the tenure status of Type B respondents.

TABLE 9.6.3-8 LAND TENURE STATUS OF IMPACTED STRUCTURES

City/Municipality/Barangay		Owner	Renter	Total	
<i>Type A - Residential/Household Structure</i>					
Silang, Cavite	Sabutan	Count	12	2	14
		% within Barangay	86%	14%	100%
	Kaong	Count	1	1	2
		% within Barangay	50%	50%	100%
	Tibig	Count	9	2	11
		% within Barangay	82%	18%	100%
Biñan, Laguna	Timbao	Count	5	0	5
		% within Barangay	100%	0%	100%
Total of Type A Respondents		Count	27	5	32
		% within Barangay	84%	16%	100%

Source: JICA Study Team (2012)

TABLE 9.6.3-9 LAND TENURE STATUS ON LAND FARMING

City/Municipality/Barangay		Owner	Tenant	Free occupation with Permit	Total		
<i>Type B – Farm Lands</i>							
Silang, Cavite	Sabutan	Count	6	0	0	6	
		% within Barangay	100%	0%	0%	100%	
	Kaong	Count	1	1	0	2	
		% within Barangay	50%	50%	0%	100%	
	Tibig	Count	5	2	0	7	
		% within Barangay	58%	42%	0%	100%	
	Carmen	Count	0	0	16	16	
		% within Barangay	0%	0%	100%	100%	
	Total of Type B Respondents		Count	12	3	16	31
			% within Barangay	39%	10%	51%	100%

Source: JICA Study Team (2012)

9.6.3.8 Structure Ownership

Table 9.6.3-10 shows that out of 32 households interviewed, 27 of them own the structure and only five (5) are renting.

TABLE 9.6.3-10 RESIDENTIAL STRUCTURE OWNERSHIP

City/Municipality/Barangay		Owner	Renter	Total	
Silang, Cavite	Sabutan	Count	11	3	14
		% within Barangay	79%	21%	100%
	Kaong	Count	2	0	2
		% within Barangay	100%	0%	100%
	Tibig	Count	9	2	11
		% within Barangay	82%	18%	100%
Biñan, Laguna	Timbao	Count	5	0	5
		% within Barangay	100%	0%	100%
Total of Type A Respondents		Count	27	5	32
		% within Barangay	84%	16%	100%

Source: JICA Study Team (2012)

9.6.3.9 Social Acceptability

There are a total of 199 respondents who were asked on their social acceptability on the proposed Cavite –Laguna Expressway Project (Laguna Section). These consist of:

- a) 32 Type A respondents (residential structure owners);
- b) 31 Type B respondents (PAPs at farm lands);
- c) 135 Type C respondents or the indirectly affected respondents from residential, business, youth, transportation, senior, NGO/POs sectors.

Majority (69%) of Type A (Residential household to be affected by project) have objection to the Project.

About 40% of Type B (Form land to be affected by project) also object to the Project.

Majority (87%) of Type C (Indirectly affected) are in favor of the Project.

Their common reasons are:

- Most concerns are their livelihood after lands/houses are taken by the project.
- Although the Government says compensation will be done by replacement cost basis, most of them still worry that compensation cost would be lower than the replacement cost.
- Some compensation such as disturbance compensation is very low.
- Although the Government says “land for land” compensation is one of the ways to compensate, however, most of them think that it is practically very difficult and the Government will not pursue this type of compensation.

In order to address above issues/concerns of PAPs, the Government should employ Independent Assessor (IA) to fairly decide compensation cost. IA should also talk with PAPs frequently to remove PAP’s concerns. DPWH should also make all kinds of efforts to realize “land for land” compensation. DPWH in close coordination with LGU’s and Barangay Captains should also implement in Livelihood Restoration Program.

As seen in **Table 9.6.3-11** the highest percentage of respondents who refuses the project are those have impact on land and structures (Type A).

TABLE 9.6.3-11 SOCIAL ACCEPTABILITY OF THE RESPONDENTS 1 OF 2

City/Municipality/Barangay/Respondents		Yes	No	Total	
Type A – Residential/Household Structure					
Silang, Cavite	Sabutan	Count	3	11	14
		% within Barangay	21%	79%	100%
	Kaong	Count	1	1	2
		% within Barangay	50%	50%	100%
	Tibig	Count	1	10	11
		% within Barangay	9%	91%	100%
Binan, Laguna	Timbao	Count	5	0	5
		% within Barangay	100%	0%	100%
Total Type A		Count	10	22	32

	% within Barangay	31%	69%	100%	
Type B – Farm Lands					
Silang, Cavite	Sabutan	Count	5	1	6
		% within Barangay	83%	17%	100%
	Kaong	Count	1	1	2
		% within Barangay	50%	50%	100%
	Tibig	Count	4	3	7
		% within Barangay	57%	43%	100%
	Carmen	Count	8	8	16
		% within Barangay	50%	50%	100%
Total Type B		Count	18	13	31
		% within Barangay	58%	42%	100%

Source: JICA Study Team (2012)

TABLE 9.6.3-11 SOCIAL ACCEPTABILITY OF THE RESPONDENTS 2 OF 2

City/Municipality/Barangay/Respondents		Yes	No	Total		
Type C – Indirectly Affected						
Type of Respondent	Residential Sector	Count	31	4	35	
		% within Type of Respondent	89%	11%	100%	
	Business Sector	Count	27	2	29	
		% within Type of Respondent	93%	7%	100%	
	Youth Sector	Count	12	7	19	
		% within Type of Respondent	63%	37%	100%	
	Transportation Sector	Count	20	1	21	
		% within Type of Respondent	95%	5%	100%	
	Aged Sector	Count	18	3	21	
		% within Type of Respondent	86%	14%	100%	
	NGO/PO/ Homeowners Association/ Agricultural Cooperative	Count	10	0	10	
		% within Type of Respondent	100%	0%	100%	
	Total Type C		Count	118	17	135
			% within Type of Respondent	87%	13%	100%
Total of Type A, B, and C		Count	146	52	198	
		% within Barangay	74%	26%	100%	

Source: JICA Study Team (2012)

9.6.3.10 Relocation of Informal Settlers

There are no identified informal settlers to be affected by the CALAX Project.

9.6.3.11 Farmlands and Livelihood to be Affected

As mentioned in this report, the western section of this project is mostly agricultural land which is located in the municipality of Silang. The loss of livelihood to be mostly affected is farming. **Table 9.6.3-12** shows the five year trend of annual gross harvest per crop being planted by the PAPs that was provided by the Department of Agriculture of Silang, Cavite that have knowledge on the status of farming activities and production for the past five years. Table shows that the vast tracks of crops being planted is pineapple.

TABLE 9.6.3-12 YEAR TREND OF ANNUAL GROSS HARVEST

City/ Municipality	Crops	2006			2007			2008			2009			2010		
		Area Planted (Has.)	Area Harvested (Has.)	Production (MT/Ha.)	Area Planted (Has.)	Area Harvested (Has.)	Production (MT/Ha.)	Area Planted (Has.)	Area Harvested (Has.)	Production (MT/Ha.)	Area Planted (Has.)	Area Harvested (Has.)	Production (MT/Ha.)	Area Planted (Has.)	Area Harvested (Has.)	Production (MT/Ha.)
SILANG	Corn	134.25	179.25	1,165.50	99.00	111.00	555.00	328.82	272.02	1,218.16	403.57	448.13	1,768.18	398.61	323.35	1,344.92
	Vegetables	73.79	60.48	728.44	93.30	93.83	1,355.94	99.55	99.46	1,427.16	104.06	104.06	1,409.37	102.92	98.39	1,327.53
	Sugarland	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.0
	Cassava	149.57	123.57	1,777.73	179.00	179.00	2,685.00	171.75	166.75	2,504.00	184.45	184.45	2,765.25	47.45	47.45	818.75
	Pineapple	912.00	799.50	20,136.25	933.00	933.00	23,325.00	943.25	943.25	23,418.50	951.25	951.25	23,662.50	813.27	810.27	20,264.25
	Coffee	1,815.50	1,657.50	1,657.25	1,559.50	1,559.50	1,247.50	1,468.00	1,468.00	1,174.40	1,526.50	1,526.50	1,221.20	1,455.00	1,452.50	1,162.00
	Banana	339.5	339.5	2,808.5	415.75	415.75	3,417.5	339.5	339.5	2,808.5	842.25	842.25	2,834	340.775	340.775	2,882.30
	Coconut	1,325	1,325	3,975	1,365	1,365	4,095	1,325	1,325	3,975	1,270	1,270	3,810	1,093	1,093	3,279

Note: N.R. – No Record

Source: 5 Years Agricultural Profile 2006-2010 Office of the Provincial Agriculturist Province of Cavite

The types of crops being planted by the PAPs are presented in **Table 9.6.3-13**. The land area, production and yield per crop is also shown in every barangays to be traversed by the proposed project.

TABLE 9.6.3-13 CROPS PRODUCTION OF PAPs

City/ Municipality	Barangay	Crops	Land Area (ha.)	Production (T)	Yield (T/ha.)
Silang, Cavite	Sabutan	Corn	12.7	56.00	4.41
		Banana	17.66	250.00	14.20
		Papaya	0.50	3.00	6.00
		Pineapple	8.90	98.00	11.00
		Coffee	5.00	6.00	1.20
		Coconut	5.00	10.00	2.00
		Leafy Vegetables	0.48	0.70	1.50
	Kaong	Banana	17.56	260.00	15.00
		Pineapple	16.86	185.00	11.00
		Coffee	10.40	8.00	0.80
		Coconut	4.50	10.00	2.20
		Cassava	2.50	0.65	0.30
	Tibig	Banana	14.60	220.00	15.10
		Pineapple	19.80	210.00	11.00
		Coffee	16.60	12.00	1.00
		Coconut	8.50	16.00	2.00
		Cassava	2.50	0.70	0.30
	Carmen	Pineapple	12.50	165.00	13.20
		Cassava	15.50	4.90	0.30
		Corn	21.80	125.00	6.00
Camote		6.00	10.00	2.00	
Banana		8.00	105.00	13.00	
Total	Corn			181(10%)	
	Banana			835(49%)	
	Papaya			3(0%)	
	Pineapple			658(37%)	
	Coffee			26(1%)	
	Coconut			36(2%)	
	Leafy Vegetables			0.7(0%)	
	Cassava			6(0%)	
	Camote			10(1%)	

Source: JICA Study Team (2012)

When asked if there are other farmlands available for the PAPs who will lose their livelihood from farming, the response gives that 87% of them has no other land to cultivate. In this regard the loss of land of the tenants was coordinated with the Provincial Governor and Agrarian Reform Office of Cavite in order to inquire on the available farmlands/CARP lands that can be provided for the displaced tenants in exchange for their loss due to the project. According to them, there is no available CARPable land that can be provided to them. It is also noticeable in the land use map of Cavite that their farmlands are almost being converted to developed lands that results into urbanization of the province which is very near to the urbanized city of Biñan and Sta. Rosa.

Relocation of Farmland Owners

When asked about the compensation preference of PAPs (Type B), the result reveals that they prefer to replace their affected farmland to equally productive farmland in order to continue their farming activities (58%). The remaining 42% preferred to receive cash compensation because they believe that there is no available land in Cavite for farming and only in faraway places and mountainous area, which are uncultivated and unproductive. Please refer to **Table 9.6.3-14**.

TABLE 9.6.3-14 ENTITLEMENT PREFERENCE OF PAPs LOSING FARM LAND/PROPERTY DUE TO THE PROJECT (TYPE B – FARM LANDS)

Municipality/Barangay			Land for land, pond for pond	Cash Compensation	Total
Silang, Cavite	Sabutan	Count	4	2	6
		% within Barangay	67%	33%	100%
	Kaong	Count	2	0	2
		% within Barangay	100%	0%	100%
	Tibig	Count	5	2	7
		% within Barangay	71%	29%	100%
	Carmen	Count	7	9	16
		% within Barangay	44%	56%	100%
Total		Count	18	13	31
		% within Barangay	58%	42%	100%

Source: JICA Study Team (2012)

In terms of additional assistance or acceptable livelihood replacement to lost farmland, the 58% of the PAPs are very firm in their reply that is to provide them another equally productive farmland while the remaining 42% preferred provision of business capital or funds to augment the loss of income from farming. Please refer to **Table 9.6.3-15**.

TABLE 9.6.3-15 ACCEPTABLE LIVELIHOOD IN REPLACEMENT TO LOST FARMLAND (TYPE B – FARM LANDS)

Municipality/Barangay			Provision of another equally productive farmland	Business capital	Total
Silang, Cavite	Sabutan	Count	4	2	6
		% within Barangay	67%	33%	100%
	Kaong	Count	2	0	2
		% within Barangay	100%	0%	100%
	Tibig	Count	5	2	7
		% within Barangay	71%	29%	100%
	Carmen	Count	7	9	16

		% within Barangay	44%	56%	100%
Total	Count		18	18	13
	% within Barangay		58%	58%	42%

Source: JICA Study Team (2012)

9.6.3.12 Availability of Social Services

Power and Water Supply

All the barangays' **power supply** is provided by MERALCO. In terms of **water supply**, majority of the respondents get their water from artesian well for domestic use such as washing of clothes and dishes (**10%**), and from barangay water district (**46%**), while drinking water is being purchased like mineral and distilled water (**48%**). Please refer to **Table 9.6.3-16** and **Table 9.6.3-17**.

TABLE 9.6.3-16 SOURCE OF WATER FOR WASHING CLOTHES AND DISHES

City/Municipality/Barangay		Dug well	Artesian well	Pump well	Piped	Purchase	Total	
Type A - Residential/Household Structure								
Silang, Cavite	Sabutan	Count	10	1	0	2	14	
		% within Barangay	71%	7%	0%	14%	7%	100%
	Kaong	Count	0	0	0	1	1	2
		% within Barangay	0%	0%	0%	50%	50%	100%
	Tibig	Count	1	0	0	8	2	11
		% within Barangay	9%	0%	0%	73%	18%	100%
Biñan, Laguna	Timbao	Count	0	0	0	3	2	5
		% within Barangay	0%	0%	0%	60%	40%	100%
Total of Type A Respondents		Count	11	1	0	14	6	32
		% within Barangay	34%	3%	0%	44%	19%	100%
Type B – Farm Lands								
Silang, Cavite	Sabutan	Count	1	1	1	2	1	6
		% within Barangay	17%	17%	17%	33%	17%	100%
	Kaong	Count	0	0	0	1	1	2
		% within Barangay	0%	0%	0%	50%	50%	100%
	Tibig	Count	2	0	0	4	1	7
		% within Barangay	29%	0%	0%	57%	14%	100%
	Carmen	Count	4	4	0	8	0	16
		% within Barangay	25%	25%	0%	50%	0%	100%

Total of Type B Respondents	Count	7	5	1	15	3	31
	% within Barangay	23%	16%	3%	48%	10%	100%
Total of Type A and B Respondents	Count	18	6	1	29	9	63
	% within Barangay	29%	10%	2%	46%	14%	100%

Source: JICA Study Team (2012)

TABLE 9.6.3-17 SOURCE OF WATER SUPPLY FOR DRINKING

City/Municipality/Barangay		Dug well	Artesian	Piped	Purchase	Total	
Type A - Residential/Household Structure							
Silang, Cavite	Sabutan	Count	3	3	3	5	14
		% within Barangay	21%	21%	21%	36%	100%
	Kaong	Count	0	0	0	2	2
		% within Barangay	0%	0%	0%	100%	100%
	Tibig	Count	2	3	3	3	11
		% within Barangay	18%	27%	27%	27%	100%
Biñan, Laguna	Timbao	Count	0	0	2	3	5
		% within Barangay	0%	0%	40%	60%	100%
Total of Type A Respondents		Count	5	6	8	13	32
		% within Barangay	27%	9%	18%	45%	100%
Type B – Farm Lands							
Silang, Cavite	Sabutan	Count	0	1	2	3	6
		% within Barangay	0%	17%	33%	50%	100%
	Kaong	Count	0	0	0	2	2
		% within Barangay	0%	0%	0%	100%	100%
	Tibig	Count	2	0	0	5	7
		% within Barangay	29%	0%	0%	71%	100%
	Carmen	Count	2	0	7	7	16
		% within Barangay	13%	0%	44%	44%	100%
Total of Type B Respondents		Count	4	1	9	17	31
		% within Barangay	13%	3%	29%	55%	100%
Total of Type A and B Respondents		Count	9	7	17	30	63
		% within Barangay	14%	11%	27%	48%	100%

Source: JICA Study Team (2012)

Health

Health personnel visit all the barangays, but for more modern health facilities the nearest

hospitals are located in *poblacions*. There are **five (5)** hospitals in the Municipality of Silang, **one (1)** of which is a private hospital located in Brgy. Sabutan. There are **three (3)** hospitals in Biñan and also **three (3)** major hospitals in Sta. Rosa.

Education

With regards to educational facilities, elementary schools are available in every barangay. In terms of secondary education, the barangays with educational facilities offering secondary education Sabutan National High School, Kaong National High School, Munting Ilog National High School. There are seven (7) tertiary schools in the Municipality of Silang. Of them there are two (2) public schools namely Cavite State University and Philippine National Police Academy located in Silang Proper. In the city of Biñan and Sta. Rosa primary educational facilities are also available in every barangay, while secondary education facilities are located in the poblacions of each city. There are eight (8) tertiary educational facilities in Biñan. Polytechnic University of the Philippines is the available tertiary educational facility in Sta. Rosa that is managed by the government.

Life in the Province

The collection of garbage in barangays is very limited; only 11% and mostly those who are near the *poblacions* area such as Brgy. Sabutan are serviced. The Project-affected barangays generally bury 14% or burn 71% of their waste in their backyard.

The common means of public utility transportation in the project is tricycle. Barangay along the provincial roads are accessible by jeepneys.

9.6.4 Compensation and Rehabilitation Plan

9.6.4.1 Assets Inventory

Number of residential houses affected is shown in **Table 9.6.2-1**. Approximate number of farm land lot affected is shown in **Table 9.6.2-2**. Other improvement affected is shown in **Table 9.6.2-3**.

9.6.4.2 Eligibility

Legal owners of residential, commercial and institutional land who have full title, tax declaration or other acceptable proof of ownership shall be eligible for compensation. On the other hand, owners of structures, whether these are based on legitimate or informal occupation of lands including, shanty dwellers, who have no land title or tax declaration or other acceptable proof of ownerships, shall be compensated based on replacement cost, as defined in the IRR of R.A. 8974. LARRIPP clearly agreed to WP OP4.12 stating in its CHAPTER 2 section E.2 (pp8):

Quote:

The absence of a formal legal title to land by some affected groups should not be a bar to compensation, especially if the title can be perfected; particular attention should be paid to households headed by women and other vulnerable groups, such as indigenous peoples and ethnic minorities, and appropriate assistance provided to help them improve their status.

In case of severe impacts on agricultural land use, rehabilitation measures shall be given to PAFs

If possible, income restoration entitlements may also be given to informal settlers affected by non-severe loss of agricultural land.

Unquote.

- (1) The majority of the respondents who owns their land constitutes of 96.6% but do not have other land to construct to relocate their house or other farm land to cultivate
- (2) A majority or 92.2% of the PAPs own the structures they are occupying. Only a few are either sharing (6.2%) or occupying the structures (1.6%) with permission from owners.
- (3) Mostly situated in private lands which they inherited from relatives who were former tenants of vast haciendas of landed families in Nueva Ecija.
- (4) These residential properties through the years were transferred down to several generations up to the present occupants and real ownership status nobody really knows. Most responses gathered from the structure occupants were that they inherited the land where their houses are now situated. (No title)

With the foregoing premises, for most of the structure occupants, ownership of the lots where their houses were built is considered free occupation on private land with permit.

TABLE 9.6.4-1 ENTITLEMENT MATRIX

Type of Loss	Application	Entitled Person	Compensation/Entitlements	Actions For Each Compensation/Entitlement	Organization Responsible For Each Action
<p>LAND (classified as Agricultural, Residential, Commercial or Institutional).</p>	<p>More than 20% of the total landholding lost or where less than 20% lost but the remaining land holding become economically unviable.</p>	<p>Project affected Family (PAF) with Torrens Certificate of Title (TCT) or tax declaration (Tax declaration can be legalized to full title).</p>	<p>PAF will be entitled to:</p> <ul style="list-style-type: none"> • Cash compensation for loss of land at 100% replacement cost at the informed request of PAFs. This entitlement covers the residential land if the remaining farm land holding becomes economically unviable and (it's the only asset/property the PAF has, thus) the Project Affected Family (PAF) is obliged to relocate their house to other place for new jobs (refer to STRUCTURE (B) below), or • Land for land, if feasible, will be provided in terms of a new parcel of land of equivalent productivity, at a location acceptable to PAFs. • Cash compensation for damaged crops at market value at the time of taking. • Cash compensation for disturbance allowance equivalent to 5 times of average gross harvest which shall be assessed and determined by the Independent Assessor. • Rehabilitation assistance in the form of skills training equivalent to at least P15,000.00, per family, if the present means of livelihood is no longer viable and the Affected Family (AF) will have to engage in a new income activity. 	<ol style="list-style-type: none"> (1) Public consultation meeting (2) Parcellary survey to identify land owners, area to be acquired, preparation of subdivision map, etc. (3) Assessment of land value, procurement of independent land/asset appraiser, damaged crops, disturbance compensation, etc. (4) Validation of assessment (5) Preparation of RAP Report (6) Approval of RAP (7) Disclosure of Compensation Package 	<ol style="list-style-type: none"> (1) PMO, RO/DEO with D/D Consultant (2) PMO,RO/DEO with D/D Consultant (3) Independent land/ Asset Appraiser (4) PMO, RO/DEO, MRIC/CRIC (5) PMO, D/D Consultant (6) DPWH Secretary (7) PMO, RO/DEO (8) RO/DEO (9) PMO, RO/DEO (10) RO/DEO
		<p>AF without TCT</p>	<ul style="list-style-type: none"> • Cash compensation for damaged crops at market value at the time of taking. • Tenant farmers are entitled to financial assistance equivalent to the value of the gross harvest for one year on the principal and secondary crops of the area acquired, based on the average annual gross harvest for the last three preceding crop years and determined by the Independent Assessor, provided, that in no case shall the financial assistance be less than P15,000.00 per hectare (E.O. 1035) 	<ol style="list-style-type: none"> (8) Land purchase contract with land owners (9) Payment to land owners (10) Transfer of Title 	

Type of Loss	Application	Entitled Person	Compensation/Entitlements	Actions For Each Compensation/Entitlement	Organization Responsible For Each Action
	Less than 20% of the total landholding lost or where less than 20% lost or where the remaining landholding still viable for use.	AF with TCT or tax declaration (Tax declarations that are legalizable to full title).	PAF will be entitled to: <ul style="list-style-type: none"> • Cash compensation for loss of land at 100% replacement cost at the informed request of PAFs. • Cash compensation for damaged crops at market value at the time of taking. • Cash compensation for disturbance allowance equivalent to 5 times of average gross harvest, which shall be determined by the Independent Assessor. 		
		AF without TCT	<ul style="list-style-type: none"> • Cash compensation for damaged crops at market value at the time of taking. • Tenant farmers are entitled to financial assistance equivalent to the value of the gross harvest for one year on the principal and secondary crops of the area acquired, based on the average annual gross harvest for the last three preceding crop years and determined by the Independent Assessor provided, that in no case shall the financial assistance be less than P15,000.00 per hectare (E.O. 1035) 		
STRUCTURES (A) (classified as Residential, Commercial & Industrial)	More than 20% of the total landholding loss or where less than 20% loss but the remaining structure no longer functions as intended or no longer viable for continued use.	AF with TCT or tax declaration (Tax declaration can be legalized to full title).	AF will be entitled to: <ul style="list-style-type: none"> • Cash compensation for entire structure at 100% replacement cost. 	(1) Public Consultation Meeting (2) Parcellary Survey to identify asset owners, assets to be acquired, (3) Valuation (4) Validation of assets (5) Preparation of RAP (6) Approval of RAP (7) Disclosure of Compensation Package (8) Pledge of undertakings (9) Payment (10) Relocation	(1) PMO, RO/DEO with D/D Consultant (2) PMO,RO/DEO with D/D Consultant (3) Independent land/ Asset Appraiser (4) PMO, RO/DEO, MRIC/CRIC/ESSO (5) PMO, D/D Consultant/ESSO (6) DPWH Secretary (7) PMO, RO/DEO/ESSO (8) RO/DEO/PMO/ESSO
		AF without TCT.	AF will be entitled to: <ul style="list-style-type: none"> • Cash compensation for entire structure at 100% of replacement cost. 		
		AF who are Renter	<ul style="list-style-type: none"> • Three (3) months rental subsidy shall be provided equivalent to the amount that will equal to the rent of the same type of house rented. 		
	Less than 20% of the total landholding lost or where the remaining structure is still functional and is viable for continued use.	PAF with TCT or tax declaration (Tax declaration can be legalized to full title).	<ul style="list-style-type: none"> • Compensation for affected portion of the structure to be computed based on replacement cost 		
PAF without TCT		<ul style="list-style-type: none"> • Compensation for affected portion of the structure to be computed based on replacement cost. 			

Type of Loss	Application	Entitled Person	Compensation/Entitlements	Actions For Each Compensation/Entitlement	Organization Responsible For Each Action
STRUCTURES (B)	(B) Farm land becomes economically unviable due to the Project and the Project Affected Family (PAF) is obliged to relocate their house to other place.	PAF with Torrens Certificate of Title (TCT) or tax declaration	PAF will be entitled to: (a) Cash compensation for entire structure at 100% Replacement Cost (RC), (b) Moving allowance, (c) Income rehabilitation, if source of income is severely affected	(11) Demolition	(9) PMO, RO/DEO (10) PMO, RO/DEO (11) RO/DEO
		PAF without TCT	PAF will be entitled to: (a) Cash compensation for entire structure to be computed at replacement cost, (b) Moving allowance, (c) Income rehabilitation, if source of income is severely affected		
		PAF who are Renter whose source of income are severely affected	PAF will be entitled to: (a) Rental subsidy (refer to renter, structure (A)) (b) Moving allowance, (c) Income rehabilitation if source of income is severely affected		
Improvements	Severely or marginally affected	PAF with or without TCT, tax declaration	Cash compensation for affected improvements at replacement cost.	Same as "Structure"	Same as "Structure"
Trees and perennials	Severely or marginally affected	PAF with or without TCT, tax declaration	Cash compensation for affected trees and perennials at current market value as prescribed by the concerned LGUs and/or DENR. For fruit-bearing perennial trees, basis shall be commercial value or based on respective City Agriculturist Office valuation, whichever is higher; For timber species planted/cultivated by PAFs, pricing shall be based on DENR valuation schedule	Same as "Structure"	Same as "Structure"
Income loss	Severely or marginally affected	PAF that own Small shops with or without TCT, or tax declaration (small shops are for example Sari-sari store, carinderia, fruit-stand, etc.)	Cash compensation equivalent to one month minimum wage as prescribed by the Regional Wage Board; or Cash compensation equivalent to income loss from demolition and of their shop and for the entire duration of shop closure, until they are able to re-establish shop; Rehabilitation assistance in the form of skills	(1) Public consultation meeting (2) Socio-economic survey to identify income loss families (3) Evaluation of income loss (4) Validation	(1) RO/DEOwith D/D Consultant (2) RO/DEOwith D/D Consultant (3) RO/DEOwith Independent Asset Assessor (4) RO/DEO, MRIC,

Type of Loss	Application	Entitled Person	Compensation/Entitlements	Actions For Each Compensation/Entitlement	Organization Responsible For Each Action
			training equivalent to the amount of at least P15,000.00 per family, if their current means of livelihood is no longer viable in the relocation site, and the PAF will have to engage in a new income generating activity.	(5) Payment	CRIC (5) RO/DEO (Regional Office/District Engineering Office)
		PAPs that own large scale commercial establishments with or without TCT, or tax declaration	NOT APPLICABLE		
Unemployed Women/wives	Severely or marginally affected	Women/wives who lose a job	Vocational training equivalent to the amount of P 15,000.00 per family	Same as "Income Loss"	Same as "Income Loss"
Additional allowance	Vulnerable persons as head of households	Person with disability, senior citizens	Additional allowance to be determined by FULL-BLOWN RAP preparer.	Same as "Income Loss"	Same as "Income Loss"
Priority Employment of PAPs during construction	All PAPs	All PAPs	All PAPs are given priority to be employed by the Contractor during construction for unskilled laborers	(1) This condition specified in Special Provision of Construction Contract. (2) During construction, Contractor announces required number and period of employment. (3) Contractor employs PAPs.	(1) Detailed Design Consultant and PMO-BOT (2) Contractor (3) Contractor

Source: JICA Study Team (2012)

Land for Land Compensation

About 60% of land owners whose farm lands are taken by the project wish “land for land” compensation. They wish to do farming continuously at the substitution lands to maintain their livelihood.

This type of compensation is practically very difficult, because the Government has to acquire another farm lands which are equivalent to the present land in terms of land productivity and location.

Although it is a very hard task of DPWH, however, DPWH should do utmost efforts from this early stage to realize this type of compensation with close coordination with concerned LGU’s and barangay captains.

DPWH should search idle lands, big farm land owners who are willing to sell their land to DPWH for the purpose of “land for land” compensation, the farm land owners whose farm lands are marginally affected by the project but willing to sell entire lot area for the purpose of this type of compensation and other feasible measures.

Two (2) land areas owned by Cathay Land, Inc. (CLI) are diagonally divided into two areas by the project. CLI mentioned that their two land areas are no longer suitable for their urban development, and at present, CLI has no plan how to develop the area. DPWH can negotiate with CLI and purchase full their land areas and the land area other than road ROW can be provided to farm land owners who wish “land for land” compensation.

DPWH should seek all possible ways to realize this type of compensation and action should be started from now until construction starts.

9.6.4.3 Valuation and Compensation for Losses

Valuation for compensating loss of land shall be in accordance with Section 5 of R.A. 8974; for dwellings and other structures, on replacement cost as defined in Section 10 of its Implementing Rules and Regulations (IRR), as well as the LARRIPP of the DPWH. Small-scale commercial establishments like sari-sari stores, which will incur temporary decrease in income due to limited access/frontage, shall also be provided income rehabilitation assistance. Inconvenience allowance shall be given to PAPs with severely affected structures, which require relocation and new construction.

For informal settlers, affected families shall be provided free transportation (including those

who opt to go back to their province) upon their transfer to the relocation sites. Rehabilitation assistance such as skills training and other development activities per family will be provided in coordination with other government agencies, if the present means of livelihood is no longer viable and the PAPs will have to engage in a new income activity. Rental Subsidy will be given to PAPs without sufficient additional land to allow the reconstruction of their lost house.

(1) Principle of Replacement Cost

All compensation for land and non-land assets owned by households/shop owners who meet the cut-off-date will be based on the principle of replacement cost.

Replacement cost is the amount calculated before displacement which is needed to replace an affected asset without depreciation and without deduction for taxes and/or costs of transaction.

- Replacement Cost is defined as follows;

- *For Agricultural Land*

It is the pre-project or pre-displacement, whichever is higher, market value of land of equal productive potential or use located in the vicinity of the affected land, plus the cost of preparing the land to levels similar to those of the affected land, plus the cost of any registration and transfer taxes.

- *For Land in Urban Areas*

It is the pre-displacement market value of land of equal size and use, with similar or improved public infrastructure facilities and services and located in the vicinity of the affected land, plus the cost of any registration and transfer taxes.

- *For Houses and Other Structures*

It is the market cost of the materials to build a replacement structure with an area and quality similar to or better than those of the affected structure, or to repair a partially affected structure, plus the cost of transporting building materials to the construction site, plus the cost of any labor and contractors' fees, plus the cost of any registration and transfer taxes. In determining the replacement cost, depreciation of the asset and the value of salvage materials are not taken into account, nor is the value of benefits to be derived from the project deducted from the valuation of an affected asset.

Where domestic law does not meet the standard of compensation at full replacement cost, compensation under domestic law is supplemented by additional measures so as to meet the replacement cost standard.

- Such additional assistance is distinct from resettlement measures to be provided under other clauses in OP 4.12, para. 6.

- Existing regulations, methods and market price survey results of DPWH, DENR, DA, and LGUs will be used where ever available for compensation calculations for building, crops and trees.
- Independent asset assessor is employed to valuate lands, structures, trees and other compensations.
- Houses and other related structures based on actual current market prices of affected materials, labor and mark-up costs. Unit cost for the materials is updated every year, using standard price in each region. Labor cost is added as 25 % of the material cost. In addition to the total estimated direct cost, 20 % mark-up is included in the grand total of replacement cost, covering transfer cost and taxes.
- Annual crops equivalent to current market value of crops at the time of compensation;
- For perennial crops, cash compensation at replacement cost that should be in line with local government regulations, if available, is equivalent to current market value given the type and age at the time of compensation.

For timber trees, cash compensation at replacement cost that should be in line with local government regulations, if available, will be equivalent to current market value for each type, age and relevant productive value at the time of compensation based on the diameter at breast height of each tree.

9.6.4.4 Livelihood Restoration Program

Livelihood Restoration Program (LRP) will be prepared during the detailed design stage as a part of Final RAP and implemented by DPWH in close coordination with concerned LGUs. LRP will focus on skills training equivalent to the amount of Php 15,000 per family by this project. Budget may not be enough, thus regular LRP being done by respective LGUs should be also utilized. LGUs should give priority to PAPs of the project for LRP.

Although the project will provide job opportunities to PAPs during construction phase, this is temporary in nature, thus long-term solution is important. Nonetheless, PAPs should be give priority to job opportunities during construction.

DPWH should guide the Contractor to announce to PAPs the following:

- What types of jobs are available for how many days and for how many people?
- What kinds of skills are required?
- What are the levels of wages?
- What are the conditions of employment?
-

The Contractor should coordinate with respective Bagangay captain for them to recommend appropriate PAPs to be employed.

Stakeholders meetings will be held to identify what kinds of skills training are needed, and based on the results of their needs, LRP will be prepared.

In addition to the skills training to be conducted by the project, existing programs being implemented by LGUs, Technical Education and Skills Development Authority (TESDA),

NGOs and POs will be arranged by DPWH for PAPs to be participated in such program. DPWH needs to closely coordinate with those agencies and organizations.

Possible areas for skills training will be as follows;

- Tellers at toll booths needed by Expressway Operator
- Road maintenance workers needed by Expressway Worker
- Expressway patrol persons needed by Expressway Operator
- Workers at factories in Economic Zones along the Expressway
- Dress making
- Sewing skills
- Typing / encoding works
- Secretariat works

9.6.5 Grievance Redressing Mechanism

If there will be grievances arising from any aspect of the Project, these will be handled through negotiations following the succeeding procedures.

In accordance with the LAPRAP Tracking Manual of DPWH, a Grievance Handling Committee (HGC) shall be formed within the City/Municipal Resettlement Implementing Committee (CRIC/MRIC-GHC) to facilitate the resolution of the PAPs' grievances. The CRIC's/MRIC's Chairperson shall head this Committee. Each representative from concerned Barangay government shall be his Co-Chairperson(s). The GHC shall consist of the following:

- Legal Officer from the Legal Service (DPWH Central)
- IROW Engineer
- IROW Agent
- Land Management Section Chief/Representative (DENR Regional/Provincial Office)
- City/Municipal Assessor
- Community Environment and Natural Resources Officer (CENRO)
- RP Preparer (from PJHL-PMO or their Consultant)
- Representatives of PAPs
- Representatives of NGOs

This procedure is initiated once the letters from PAFs, expressing their grievances are received by the CRIC-GHC. The deadline for submitting letters of grievances shall be until end of construction after the date of public disclosure of compensation package to affected families; with a maximum extension of another 15 days, if request was made by more than ten percent (10%) of the PAFs.

A Grievance Action Form (GAF), as prescribed in the said LAPRAP Tracking Manual shall be used during the detailed design stage to cover the various aspects of property acquisition based on validation of the RP. The GAF shall, at the very least, contain the following:

- Basic information on PAPs (Name, Address, Contact Number)

- Date of last disclosure meeting;
- Category of grievance filed (Legal, Technical/Engineering, Social, and Financial)
- Type of action taken (Resolved at the CRIC level, or referred to higher authorities).

Respective Barangay Captains, as Co-Chairperson of the GHC shall be the first recipient of the GAF. All GAFs shall be consolidated by the CRIC/MRIC Chairperson and presented to the CRIC/MRIC for deliberation and appropriate action, on a weekly basis. Unresolved grievances at the CRIC/MRIC level shall be elevated to the respective District Engineering Offices for resolution of complaints. Recommendations of the District Engineer shall be elevated to the Regional ESSO for approval and final action. If there are still unresolved grievances, a case shall be filed in the proper courts.

PAPs shall be exempted from all administrative and legal fees incurred in pursuant to the grievance redress procedures.

9.6.6 Institutional Arrangement

The implementation of the RAP will be pursued by various government offices in cooperation with the PAFs and expressway concessionaire. In this section, the various players involved in the RAP implementation are named and their respective roles defined. While the expressway project is pursued under the Japan ODA Loan arrangements, the primary responsibility for the implementation of the project still lies with government specifically the Department of Public Works and Highways. This section is based on DAO D.O. 5, Series of 2003 and the DPWH LARRIP 3rd Edition.

9.6.6.1 Department of Public Works and Highways

DPWH is the Executing Agency (EA) who is responsible to the Philippine Government and the donor agency for the planning and implementation of the expressway project. DPWH will initiate through its relevant departments and PMOs the preparation of all documents necessary for the approval and implementation of the expressway project which includes the updating of feasibility studies, securing of clearances/permits, acquisition of ROW, and monitoring of project implementation. The expressway project will be overseen by the Office of the Assistant Secretary for Planning who shall report directly to the DPWH Secretary on matters related to the project.

9.6.6.2 Project Management Office – Build-Operate-Transfer

PMO-BOT has the overall operational responsibility for implementing the project from the detailed design up to construction. In coordination with other relevant government agencies and the detailed design consultant, the PMO-BOT shall manage and supervise the project, including resettlement planning and land acquisition. It shall ensure that funds for the timely

implementation of the RAP is available and that expenses are properly accounted for. PMO-BOT will be assisted by ESSO and IROW-PMO who provides technical guidance and support in the preparation and implementation of the RAP.

9.6.6.3 Environmental and Social Services Office (ESSO)

ESSO shall provide technical guidance and support in the implementation of the RAP and will be responsible for the following resettlement activities:

- Oversee the preparation and planning of the RAP;
- Submit RAP budgetary requirements for approval and allocation of needed financial resources by the DPWH central office;
- In accordance to the Department's resettlement policies, guide the project consultants, and Regional Offices in their tasks, such as parcellary survey of project area, verification of PAFs, final inventory of affected assets, and information dissemination;
- Amend or update the RAP in the event problems arise during the internal and/or external monitoring of its implementation;
- Follow-up with the DPWH Accounting Office for the processing of compensation claims of PAFs;
- In collaboration with the IROW-PMO, monitor the actual payment of compensation to PAFs; and
- In collaboration with IROW-PMO, prepare periodic supervision and monitoring reports on RAP implementation for submission to the PMO-BOT and the donor institution.

9.6.6.4 Infrastructure Right-of-Way (IROW)- PMO

IROW-PMO will provide guidance to PMO-BOT and consultants on the preparation of RAP;

- It will spearhead the negotiations with the PAFs and secure agreements on the final valuation of the affected assets which will be used in the payment of compensation;
- It will finalize the compensation plan for the PAFs, based on the result of the negotiation process; and submit the same to the DPWH financial service for approval and payment;
- In collaboration with ESSO, monitor the progress of RAP implementation, including compensation disbursements and prepare monitoring reports for submission to the PMO-BOT and donor institution.

9.6.6.5 District Engineering Office (DEO) of DPWH

The concerned DEO will serve as the major player in the implementation of the RAP with the following functions:

- Oversee the staking-out, verification and validation of the PAF's affected assets;
- Conduct inventories of properties that will be affected in coordination with the Detailed Design Consultant;
- Prepare parcellary maps of the project area in coordination with the Detailed Design Consultant;
- Approve disbursement vouchers/payments on PAFs compensation and other benefits;
- Submit disbursement reports on payments to PAFs to the Regional/Central Office accounting office and PMO-BOT;
- Submit monthly progress reports to ESSO, Regional Office and PMO-BOT; and
- Serve as an active member of the Resettlement Implementation Committee (RIC) of the City/Municipality.

9.6.6.6 Regional Office (Region IV-A) of DPWH

The Regional Office shall act as the Liaison between ESSO, IROW-PMO and the District Engineering Offices and shall ensure that the RAP is implemented as planned. Its specific activities are:

- Oversee the activities of DEOs;
- Monitor the RAP implementation and fund disbursement;
- Submit monthly progress reports to ESSO;
- Monitor payments to PAFs;
- Address grievances filed at its office by the PAFs for speedy resolution.

9.6.6.7 Resettlement Implementation Committee (RIC)

The RIC shall be composed of representatives from the Regional Office and District Engineering Office, the City/Municipality LGU, affected barangays, and PAFs/PAPs. No NCIP nor ICC/IP representatives are included in the RIC as Region IV-A is not a recognized ancestral land. The establishment of the RIC shall be made through the signing of a Memorandum of Understanding (MOU) between DPWH, the concerned LGU. The function of the RIC includes:

- Assist the project consultants and DPWH staff engaged in RAP preparation activities in (a) validating the list of PAFs; b) validating the assets of the PAFs that will be affected by the project; (c) assist DPWH in arranging for a suitable relocation facility for the displaced PAFs, and (d) participate in monitoring the RAP implementation;
- Assist the DPWH staff engaged in the RAP preparation in the public information campaign, public participation and consultation meetings;
- Receive complaints and grievances from PAFs and other stakeholders and refer the matter to the appropriate authorities;

- Maintain a record of all public meetings, complaints and actions taken to address complaints and grievances; and
- In coordination with concerned government authorities, assist in the enforcement of laws/ordinances regarding encroachment into the project site or ROW.

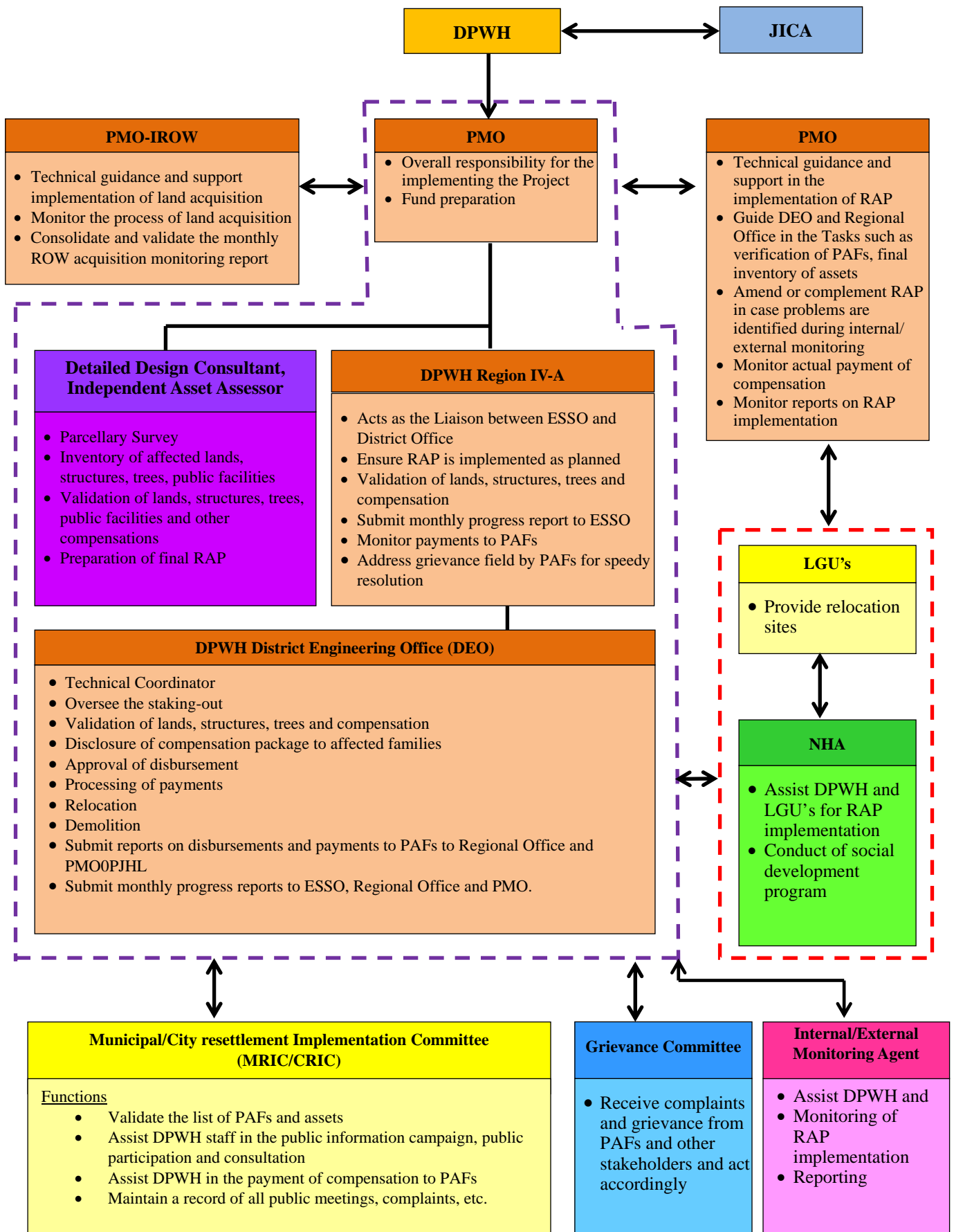
9.6.6.8 National Housing Authority (NHA)

Although relocation of informal settlers is among the tasks of the National Housing Authority (NHA), there are just too many government projects that require relocation, particularly in urban areas where there is very little land that can be utilized as relocation site. It is quite important to coordinate with NHA at the early stage of the Project. For this particular project, NHA's functions are as follows;

- Coordinate with DPWH and LGUs for relocation of PAFs;
- Build houses at relocation sites, if necessary;
- Undertake the Social Development Program (SDP).

9.6.6.9 Organization Chart of RAP Implementation

Organization chart of RAP Implementation is shown in **Figure 9.6.6-1**.



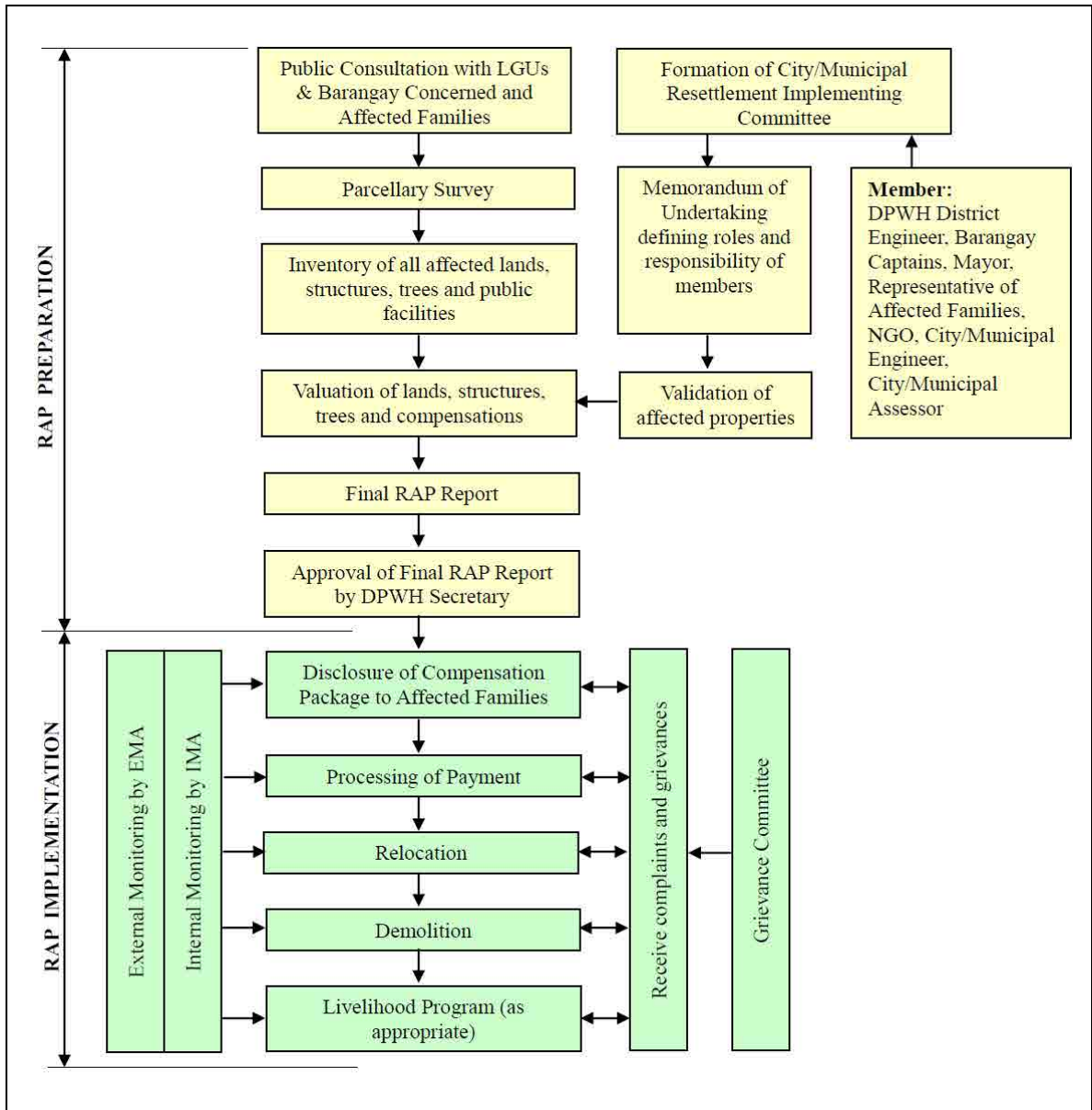
Source: JICA Study Team (2012)

FIGURE 9.6.6-1 RAP IMPLEMENTATION ORGANIZATION

9.6.7 RAP Implementation Process

RAP implementation process is shown in **Source: JICA Study Team (2012)**

Figure 9.6.7-1.



Source: JICA Study Team (2012)

FIGURE 9.6.7-1 RAP IMPLEMENTATION PROCESS

9.6.8 Implementation schedule

9.6.8.1 Cut-Off date (Survey Commencement Date)

Cut-off date for compensation eligibility is the date commencement when social survey was carried out. The concept of the “cut-off date” was also emphasized during each IEC. “Cut-off date”, as defined in the Land Acquisition, Resettlement, Rehabilitation and Indigenous Peoples Policy (LARRIPP, 3rd Edition 2007) of DPWH is “the date of the census of affected families within the Project boundaries”. As cited in World Bank’s O.P. 4.12, cut-off date is the date the census begins. The cut-off date could also be the date the project area was delineated, prior to the census, provided that there has been an effective public dissemination of information on the area delineated, and systematic and continuous dissemination subsequent to the delineation to prevent further population influx.

TABLE 9.6.8-1 DATE OF CENSUS COMMENCEMENT (CUT-OFF DATE)

Province	City/Municipality	Barangay	Starting Date (Cut-Off)
Cavite	Silang	Biga II	February 27, 2012
		Sabutan	February 28, 2012
		Kaong	February 29, 2012
		Tibig	February 29, 2012
		Munting Ilog	February 29, 2012
		Carmen	March 01, 2012
		Hukay	March 01, 2012
		Inchican	March 04, 2012
Laguna	Biñan	March 02, 2012	
	Sta. Rosa	March 02, 2012	

Source: JICA Study Team (2012)

Note: Census was conducted with tagging survey at the same time.

9.6.8.2 Tagging

Process of tagging of affected structures, which was carried out by the RAP Team was well explained during consultation meetings to make sure that the PAPs are well informed of the purpose of the sticker tags and photographs. It was also pointed out during said meetings that the preparation of the parcellary plans (prepared by the DPWH - District Office) should be completed first before the final location and extent (size) of land take can be determined. Tagging of affected structures and improvements commenced in February 27, 2012 using the project design and alignment provided by the JICA Study Team.

9.6.8.3 RAP Implementation Schedule

RAP implementation schedule is shown in **Table 9.6.8-2**.

TABLE 9.6.8-2 RAP IMPLEMENTATION SCHEDULE

	2012				2013				2014				2015				2016				2017			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
								DD Stage												→ Construction				
First Disclosure of the Project (Public Consultation Meeting)																								
Cut-off date announced																								
Preparation of Initial RAP																								
Coordination with the LGUs (Friezing Development, Zoning Ordinance)																								
Coordination with NHA (relocation of PAFs)																								
Public Consultation Meeting																								
Conduct of Parcellary Survey																								
Inventory of Affected Land, Structure, Trees, etc.																								
Valuation of Land, Structure, etc., and Compensation by Replacement Cost																								
Preparation of farm lands for land to land compensation																								
Preparation of Draft Final RAP																								
Submit Draft Final RAP to JICA																								
Approval of Final RAP																								
Formation of CRIC/MRIC																								
Validation of Affected Properties																								
Disclosure of Compensation Package to Affected Families																								
Processing of Payment																								
Relocation																								
Demolition																								
Implementation of Livelihood Restoration Program																								
Internal Monitoring																								
External Monitoring																								
Formation of Grievance Committee																								
Receive and Act on Complaints/Grievance																								
Commencement of Construction - End of Construction																								

9-208

Source: JICA Study Team (2012)

9.6.9 Financial Arrangement

All necessary cost shall be arranged, budgeted and released by PMO-BOT of DPWH.

9.6.10 Estimated Cost

Acquisition cost of land and structure/improvement/trees, compensation cost, resettlement site development cost, RAP implementation cost, etc. are estimated as shown in **Table 9.6.10-1**.

TABLE 9.6.10-1 ESTIMATED RAP IMPLEMENTATION COST

(Confidential)

Estimated cost of land, structures and trees by city/municipality is shown in **Table 9.6.10-2**.

TABLE 9.6.10-2 COST OF LAND, STRUCTURE AND TREES BY CITY/MUNICIPALITY

(Confidential)

9.6.11 Monitoring and Evaluation

9.6.11.1 Monitoring Agents

(1) Internal Monitoring

An Internal Monitoring Agent (IMA) will be commissioned by the PMO-BOT to undertake independent internal monitoring and evaluation.

The tasks of the IMA are to:

- a) Regularly supervise and monitor the implementation of the RAP in coordination with the concerned CRIC/MRIC. The findings will be documented in the quarterly report to be submitted to the PMO and ESSO, and PMO-BOT in turn will submit the report to JICA.
- b) Verify that the re-inventory baseline information of all PAFs has been carried out and that the valuation of assets lost or damaged, the provision of compensation and other entitlements, and relocation, if any, has been carried out in accordance with the LARRIP and the respective RAP Reports.
- c) Ensure that the RAP is implemented as designed and planned.
- d) Verify that funds for implementing the RAP are provided by the PMO-BOT in a timely manner and in amounts sufficient for the purpose.

- e) Record all grievances and their resolution and ensure that complaints are dealt with promptly.

All activities in RAP implementation will require for quality and quantity results which are time bounded. The PMO-BOT will be responsible for the internal monitoring of the actual implementation jointly with ESSO of DPWH against the planned activities, time frame, budget and entitlement that will be done on an on-going basis throughout the subproject construction and in the livelihood period of the affected households.

(2) External Monitoring

An External Monitoring Agent (EMA) will be commissioned by the PMO-BOT to undertake independent external monitoring and evaluation. The EMA for the Project will be either a qualified individual or a consultancy firm with qualified and experienced staff. The Terms of Reference of the engagement of the EMA shall be prepared by the DPWH and shall be acceptable to the JICA prior to the engagement.

The tasks of the EMA shall be the following:

- a) Verify results of internal monitoring;
- b) Verify and assess the results of the information campaign for PAFs rights and entitlements;
- c) Verify that the compensation process has been carried out with the procedures communicated with the PAFs during the consultations;
- d) Assess whether resettlement objectives have been met; specifically, whether livelihoods and living standards have been restored or enhanced;
- e) Assess efficiency, effectiveness, impact and sustainability of resettlement and RAP implementation drawing lessons as a guide to future resettlement and indigenous peoples' policy making and planning;
- f) Ascertain whether the resettlement were appropriate to meet the objectives, and whether the objectives were suited to PAF conditions;
- g) Suggest modification in the implementation procedures of the RAP, if necessary, to achieve the principles and objectives of the Resettlement Policy;
- h) Review on how compensation rates were evaluated; and
- i) Review of the handling of compliance and grievances cases.

External monitoring and evaluation will be of two kinds: 1) random observation visits and 2) consultation with PAFs, both at their current residence area and at their relocation site.

9.6.11.2 Stages and Frequency of Monitoring

The stages and monitoring frequency of the contract packages by the IMA and EMA as

follows.

(1) Inception Report

This is the first activity that both IMA and EMA shall undertake to determine whether or not the RAP was carried out as planned and according to this Policy.

The IMA / EMA will submit an Inception Report and Compliance Report one month after receipt of Notice to Proceed for the engagement. The engagement of the IMA/EMA shall be scheduled to meet the Policy's requirement of concluding RAP implementation activities at least one (1) month prior to the start of civil works.

(2) IMA Monthly Monitoring

The IMA will be required to conduct a monthly monitoring of RAP implementation activities.

(3) IMA Final Evaluation

Final evaluation of the implementation of the LARRIP will be conducted three months after the completion of payments of compensation to PAFs.

(4) IMA Post-Resettlement Semi-Annual Monitoring and Evaluation

This activity will be undertaken every 6 months until the construction works end, to determine whether the social and economic conditions of the PAFs after the implementation of the project have improved.

When the PAF are found that their living standard worsens, or whose present means of livelihood became not-viable, DPWH, in coordination with other appropriate institutions, will provide assistances, such as skills and livelihood trainings.

(5) EMA Semi-Annual Monitoring

This activity will be undertaken every 6 months until the construction works end to follow-up whether the social and economic conditions of the PAFs after the implementation of the project have improved.

When the PAF are found that their living standard worsens, or whose present means of livelihood became not-viable, DPWH, in coordination with other appropriate institutions, will provide assistances, such as skills and livelihood trainings.

(6) IMA/EMA Final Evaluation and Proposal Report

Final Evaluation and Proposal Report will be submitted one month after the completion of the construction work.

9.6.11.3 Schedule of Implementation of RAP and Monitoring

PMO-BOT through Project Consultant in coordination with the ESSO shall establish a schedule for the implementation of RAP and the required monitoring taking into account the project's implementing schedule. It is expected that one month prior to the start of the civil works, all RAP activities have been determined by the IMA and EMA as having been concluded.

TABLE 9.6.11-1 RAP MONITORING SCHEDULE

	Internal Monitoring Agent	External Monitoring Agent
RAP Implementation Period (June 2014 to May 2015: 12 months)	<ul style="list-style-type: none">• Inception Report (1)• Monthly Monitoring and Reporting (20)• Final evaluation (1)	<ul style="list-style-type: none">• Inception Report (1)• Semi-Annual Report
Construction Period (May 2015 – June 2017 26 months)	<ul style="list-style-type: none">• Semi-Annual Monitoring and Reporting (9)• Final Evaluation Report (1)	<ul style="list-style-type: none">• Semi-Annual Report (9)• Final Report (1)

Source: JICA Study Team (2012)

9.6.11.4 Reporting

The IMA and the EMA are accountable to the PMO-PJHL and also report to the ESSO. The PMO-BOT submits copy of their reports to JICA.

9.6.11.5 Monitoring Indicator

Monitoring indicators are shown in **Table 9.6.11-2**.

TABLE 9.6.11-2 MONITORING INDICATORS

Monitoring Indicators	Basis for Indicators / Check List
1. For the IMA	
1. Budget and timeframe	<ul style="list-style-type: none"> • Have all land acquisition and resettlement staff been appointed and mobilized for the field and office work on schedule? • Have capacity building and training activities been completed on schedule? • Are settlement implementation activities being achieved against the agreed implementation plan? • Are funds for resettlement being allocated to resettlement agencies on time? • Have funds been disbursed according to the RAP? • Has the social preparation phase taken place as scheduled? • Have all lands been acquired and occupied in time for project implementation?
2. Delivery of Compensation and Entitlements	<ul style="list-style-type: none"> • Have all PAFs received entitlements according to numbers and categories of loss set out in the entitlement matrix? • Have PAFs received payments for affected structures on time? • How many PAFs opted to donate their land to the government? • How many PAFs did not receive payment because their title is covered by the provisions of Sec. 112 of CA 141? • How many landholdings were subjected to quit claim? Easement? • How many PAFs accepted the first offer at zonal valuation? • How many PAFs rejected the first offer and accepted the second offer? • How many PAFs resorted to expropriation? • How many PAFs have received housing as per relocation options in the RPAP? • Have relocation sites been selected and developed as per agreed standards? • Are the PAFs occupying the new houses? • Is restoration proceeding for social infrastructure and services? • Are income and livelihood restoration activities being implemented as set out in income restoration plan? For example utilizing replacement land, commencement of production, numbers of PAFs trained and provided with jobs, micro-credit disbursed, number of income generating activities assisted? • Have affected businesses received entitlements including transfer and payments for net losses resulting from lost business and stoppage of production?

Monitoring Indicators	Basis for Indicators / Check List
3. Public Participation and Consultation	<ul style="list-style-type: none"> • Have consultations taken place as scheduled including meetings, groups, and community activities? Have appropriate resettlement leaflets been prepared and distributed? • How many PAFs know their entitlements? How many know if they have been received? • Have any PAFs used the grievance redress procedures? What were the outcomes? • Have conflicts been resolved? • Was the social preparation phase implemented?
4. Benefit monitoring	<ul style="list-style-type: none"> • What changes have occurred in patterns of occupation, production and resources use compared to the pre-project situation? • What changes have occurred in income and expenditure patterns compared to pre-project situation? What have been the changes in cost of living compared to pre-project situation? Have PAFs' incomes kept pace with these changes? • What changes have taken place in key social and cultural parameters relating to living standards? • What changes have occurred for vulnerable groups?
2. For the EMA	
1. Basic information on PAP households	<ul style="list-style-type: none"> • Location • Composition and structures, ages, education and skills levels • Gender of household head • Ethnic group • Access of health, education, utilities and other social services • Housing type • Land use and other resource ownership patterns • Occupation and employment patterns • Income sources and levels • Agricultural production data (for rural households) • Participation in neighborhood or community groups • Access to cultural sites and events • Value of all assets forming entitlements and resettlements and resettlement entitlements
2. Restoration of living standards	<ul style="list-style-type: none"> • Were house compensation payments made free of depreciation, fees or transfer costs to the PAF? • Have perceptions of “community” been restored? • Have PAFs achieved replacement of key social cultural elements?

Monitoring Indicators	Basis for Indicators / Check List
3. Restoration of Livelihoods	<ul style="list-style-type: none"> • Were compensation payments made free of deduction for depreciation, fees or transfer costs to the PAF? • Were compensation payments sufficient to replace lost assets? • Was sufficient replacement land available of suitable standard? • Have enterprises affected received sufficient assistance to re-establish themselves? • Have vulnerable groups been provided income-earning opportunities? Are these effective and sustainable? • Do jobs provided restore pre-project income levels and living standards?
4. Levels of PAP Satisfaction	<ul style="list-style-type: none"> • How much do PAFs know about resettlement procedures and entitlements? Do PAFs know their entitlements? • Do they know if these have been met? • How do PAFs assess the extent to which their own living standards and livelihood been restored? • How much do PAFs know about grievance procedures and conflict resolution procedures? How satisfied are those who have used said mechanisms?
5. Effectiveness of Resettlement Planning	<ul style="list-style-type: none"> • Were the PAFs and their assets correctly enumerated? • Was any land speculators assisted? • Was the time frame and budget sufficient to meet objectives? • Were entitlements too generous? • Were vulnerable groups identified and assisted? • How did resettlement implementers deal with unforeseen problems?
6. Other Impacts	<ul style="list-style-type: none"> • Were there unintended environmental impacts? • Were there unintended impacts on employment or incomes?

Source: JICA Study Team (2012)

9.7 STAKEHOLDERS MEETING/ CONSULTATION MEETING

Total of fourteen (14) stakeholders meetings/consultation meetings were conducted between 15th and 29th of February 2012 in the Provinces of Cavite and Laguna.

9.7.1 Procedure of the Meeting

Total of fourteen (14) consultation meetings were held for EIS and RAP formations. There are three levels of meeting according to types of interest groups.

- **LGU level:** Two (2) Provincial level and three (3) City/Municipal level meetings
- **Barangay level:** Eight (8) Barangay level meetings with Project Affected Persons (PAPs)
- **Others:** One (1) Coordination meeting with SAMACA Farmer's Organization in Barangay Carmen.

The Study Team consulted with the concerned Mayors of the affected areas and set the date of the stakeholder meeting. Official letters were sent to the concerned Mayors prior to at least one week before and Mayors informed about the Stakeholders meeting to concerned barangay captains requesting them to inform the concerned people within their jurisdiction.

Venue was selected based on the advice of Mayor in consideration of the following;

- Venue where easily accessible by the concerned people.
- Venue where the power point presentation for a better understanding of the presentation is possible.
- Venue where concerned people know and familiar with it.

The consultation meetings were undertaken to:

- Inform about the Project/CALAX including alternatives of project designs;
- Inform of and confirm the revised Scoping Matrix and concerns with the stakeholders;
- Inform and generate awareness and understanding of the concerned public about the project;
- Provide the stakeholders and avenue to ventilate salient issues and concerns regarding the project;
- Give an opportunity to the stakeholders to have an open discussion with the Preparers, Proponent, and LGUs about the project;
- Inform the stakeholders of their rights and privileges; and
- Enable the stakeholders to effectively participate and make informed and guided decisions.

Complete and proper documentations of the proceedings were strictly observed. All participants of each activity were noted and proceedings were recorded on a digital voice recorder. Photographs were likewise taken during the consultations.

Results of the Stakeholder meetings were summarized in the minutes of the meeting which were sent to concerned Mayors requesting them to distribute minutes to concerned Barangay Captains who are requested to post the minutes at the Barangay Hall.


**TABLE 9.7.1-1 MEETINGS CONDUCTED FOR THE PROPOSED CALAX PROJECT
(LAGUNA SECTION)**

Date/Time	Target Municipality	Main Participants
February 15, 2012	Cavite government	City Officials
February 15, 2012	Silang municipality and its barangays	PAPs, municipality officials, Barangay Officials, People's Organization, Farmer's Association, NGO, Homeowner's Association, Transport Group
February 17, 2012	Biñan city government and its barangays	City Officials, Barangay Officials, Farmer's Association, Senior citizen's association,, Homeowner's Association, Transport Group, women's group
February 17, 2012	Santa Rosa city government and its barangays	City Officials, Barangay Officials, Farmer's Association, Senior citizen's association,, Homeowner's Association, Transport Group, women's group
February 20, 2012	Barangays Sabutan and Biga in Silang	Barangay Officials, Farmer's Association, Senior citizen's association,, Land owners, Homeowner's Association, Women's group
February 20, 2012	Barangay Kaong in Silang	Barangay Officials, Farmer's Association, Senior citizen's association,, Land owners, Homeowner's Association, Women's group
February 21, 2012	Barangay Tibig in Silang	Senior Citizens Association Health Organization, Transport Group and Women's Organization; Human Rights Organization, Structure and Landowners (PAPs)
February 22, 2012	Barangay Carmen in Silang	SAMACA (NGO); SAMACA means "SamahanngMagsasakang Carmen" (Farmer's Organization in Brgy. Carmen)
February 23, 2012	Barangay Biñan, Malamig, Timbao and Loma of Biñan, Laguna	Barangay Officials of Barangay Biñan, Malamig, Timbao and Loma; Senior Citizens Association, Womens Organization, Farmers Organization, Youth Organization and Project Affected Persons (PAPs)
February 23, 2012	Barangays Pulong Sta. Cruz and Malitlit	Barangay Officials of Barangays Pulong Sta. Cruz and Malitlit; Senior Citizens Association Health Organization and Women's Organization
February 24, 2012	Barangays Munting Ilog, Carmen and Hukay in Silang	Barangay Officials of Barangays Munting Ilog, Carmen and Hukay, Senior Citizens Association, Women's Organization, Youth Organization, Farmers Organization, Transport Group and Project Affected Persons (PAPs)
February 24, 2012	Barangays Inchican in Silang	Barangay Officials of Barangays Inchican; Senior Citizens Association, Women's Organization, Health Organization, Farmer's Organization, Homeowners and Project Affected Persons (PAPs)
February 29, 2012	Provincial official of Laguna province	LGUs, CBOs
	Barangays Don Jose and Sto. Domingo in Sta. Rosa, Laguna	Barangay Officials of Barangays Sto. Domingo and Don Jose, Senior Citizens Association, Women's Organization, Youth Organization, Farmers Organization and Transport Group

Source: JICA Study Team (2012)

9.7.2 Program

An outline of consultation meeting is shown below.



PROGRAMME

Information, Education & Communication (IEC) Meeting
LGU Level
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
PROPOSED CAVITE-LAGUNA (CALAX) PROJECT (Laguna Section)
Venue: 3rd Floor, SB Session Hall, Municipality of Silang, Province of Cavite
1330-1530HH, February 15, 2012

I.	Registration 1330-1345HH	SB Session Hall
II.	Participant's Bio-Profile	
III.	Welcome Remarks	Hon. Clarito Poblete <i>Municipal Mayor</i>
IV.	Introduction of Participants	Ms. Crisley Ian V. Diot <i>ECOSYSCORP, Inc.</i>
V.	Objectives of the Meeting	Ms. Olive Baguio <i>ESSO-DPWH</i>
VI.	Presentation of Project Alternative Alignments	Mr. Ryuichi Ueno <i>CTI</i>
VII.	Sub-Grouping of Participants	
VIII.	Presentation of IICA Scoping Matrix	Ms. Annabelle N. Herrera <i>ECOSYSCORP, Inc.</i>
IX.	Open Forum on JICA Scoping Matrix	Ms. Felicia G. Rubianes <i>ECOSYSCORP, Inc.</i>
X.	RAP Entitlement Matrix	Ms. Annabelle N. Herrera <i>ECOSYSCORP, Inc.</i>
XI.	Open Forum on Entitlement Matrix	Ms. Felicia G. Rubianes <i>ECOSYSCORP, Inc.</i>
XII.	<i>Recap of the Open Forum</i>	<i>Mr. Ronaldo T. Manipal</i> <i>ECOSYSCORP, Inc.</i>
XIII.	Closing Remarks	Hon. Herminigildo M. Linaja <i>Vice-Mayor</i>

Ms. Felicia G. Rubianes
Facilitator

Snacks will be served during the open forum

Source: JICA Study Team (2012)

A PROGRAM OF STAKEHOLDER MEETING

9.7.3 Attendants

COORDINATION MEETINGS

Date	Office	Findings	Venue
January 07, 2012	National Irrigation Authority (NIA)	No irrigation facilities to be affected by the proposed CALAX Project (Laguna Section)	Engr. Hilarion C. Cedenio Division Manager NIA Office, Pila, Laguna
January 16, 2012	Provincial Assessor's Office	Gathered data on landowners to be affected and obtained Schedule of Market Values for land and structures	Mr. Raymundo D. Salazar TreceMartires City, Cavite
January 16, 2012	Provincial Agriculture Office	Identified crops and other related data on farming	Engr. Mario Silan Department Head TreceMartires City, Cavite
January 16, 2012	Provincial Agrarian Reform Office	Identified list of registered tenants within the proposed project alignment	Mr. Reynaldo Penalba TreceMartires City, Cavite
January 17, 2012	National Historical Institute	Identified national historical sites and heritage within the project area	Arch. Wilkie B. Delumen, UAP,MM Supervising Restoration Architech ErmitaManila,
February 02, 2012	Environmental Remote Sensing and Geo Information Laboratory Forestry	Collected maps of Mt. Makiling	Mr. Edwin Combalicer Administrator College of Forestry, UP Los Banos, Laguna
January 12, 2012	City Assessor of Santa Rosa, City	Gathered data on landowner's to be affected and the Schedule of Market Values for land and structures	Ms. Nelly Gomez Ground Floor, New Government Center of Santa Rosa, Laguna
January 12, 2012	City Assessor of Biñan City, Laguna		Mr. Danilo Arzola Ground Floor, City Hall of Biñan City, Laguna
February 09, 2012	Municipal Assessor's Office of Silang, Cavite		Mr. Melvin Yambao Ground Floor, Municipal Hall of Silang, Cavite
January 31, 2012	Protected Areas and Wildlife Bureau	Collectes maps of Taal Protected Area	Mr. Diomedado Cocal DENR Diliman, Quezon City
January 12, 2012	Municipal Agriculture Office of Silang, Cavite	Identified crops and other related data on farming	Ms. Adelia Poblete 3 rd Floor, Municipal Hall of Silang, Cavite
January 16, 2012	City Agriculture Office of Biñan City, Laguna		Mr. Antonio Aguilar Ground Floor, City Hall of Biñan City, Laguna
January 16, 2012	City Environment and Natural Resources Office	Identified possible location of dumpsite for unsuitable soils	Mr. Rodelio Lee Ground Floor, City Hall of Biñan City, Laguna

Source: JICA Study Team (2012)

INFORMATION EDUCATION AND COMMUNICATION MEETINGS

	Stakeholders	Venue	Number of Attendees		Date
			Male	Female	
IEC of LGUs	a) LGU Officials of Trece Martires, Cavite Province and DENR and Provincial Agriculturist	2 nd Floor, Ceremonial Hall, Provincial Capitol, City of Trece Martires, Province of Cavite	3	5	February 15, 2012
	b) LGU Officials of Silang, Cavite, DA – Department of Agriculture, MCO – Municipal Cooperative Officer, MENRO – Municipal Environmental Natural Resources Office, Transport Group, Senior Citizens Group, Women’s Sector, Farmer’s Organization, Youth Sector and Business and Landowners Association	2 nd Floor, SB Session Hall, municipal Hall of Silang, Province of Cavite	45	17	February 15, 2012
	c) LGU Officials of Biñan, Senior Citizens Association, Women’s Organization and Youth Organization	3 rd Floor, Function Room, City Hall of Biñan, Province of Laguna	16	1	February 17, 2012
	d) Department Officials of Sta. Rosa, Laguna, Barangay Officials, DA – Department of Agriculture, City Cooperative Officer, Housing Project Office, Transport Group, Senior Citizens Group, Women’s Sector, Farmers Organization, Business and Landowners Association	5 th Floor Session Hall, New Government Center Building, City of Sta. Rosa, Province of Laguna	11	8	February 17, 2012
	e) Provincial Department Officials of Laguna	2 nd Floor, Governor’s Conference Room, Sta. Cruz, Provincial Capitol of Laguna	7	6	February 29, 2012
IEC of PAPs	Purpose <ul style="list-style-type: none"> To explain to the stakeholders the procedures involved in RAP preparation such as tagging, taking of photographs and socio-economic survey. To explain the concept of “cut-off” date. To present the project and the study being undertaken in identifying the alternative alignments. To explain and identify the impacts of the project and concerns of the participants in the form of JICA scoping matrix. To explicate the government laws and JICA standards in the entitlements of the PAPs. To allow the PAPs to express their ideas and apprehension on the proposed project. 	2 nd Floor, Barangay Session Hall, Brgy. Sabutan, Municipality of Silang, Province of Cavite	13	12	February 20, 2012
		Barangay Hall of Kaong, Municipality of Silang, Province of Cavite	6	6	February 20, 2012
		Tibig Chapel, Barangay Tibig, Municipality of Silang, Province of Cavite	17	25	February 21, 2012
		Residence of Dorotea Contreras, Barangay Carmen, Municipality of Silang, Province of Cavite	4	1	February 22, 2012
		Barangay Hall of Carmen, Municipality of Silang, Province of Cavite	29	8	February 24, 2012
		Barangay Malamig Youth Training Center, City of Biñan, Province of Laguna	12	11	February 23, 2012
		2 nd Floor Barangay Session Hall, Barangay Pulong Sta. Cruz, City of Sta. Rosa, Province of Laguna	3	4	February 23, 2012
		Barangay Hall of Inchican, Municipality of Silang, Province of Cavite	2	9	February 24, 2012
		Barangay Session Hall, Baranagay Don Jose, Santa Rosa, Laguna	9	1	March 7, 2012

Source: JICA Study Team (2012)

9.7.4 Discussion

EIS and RAP were discussed in the same meeting.

Aside from IEC Meetings, the Consultant paid visits to the Office of Provincial Assessor of Cavite, City Assessors of Santa Rosa and Biñan and Municipal Assessors of Silang, Cavite to request for assistance in identifying owners of lots to be affected. The project was also presented to the different department and offices of the Local Government Unit such as Provincial Agrarian Reform Office (PARO), Provincial Agriculture Office, City Agriculture Office and Municipal Agricultural Office.

During these meetings, the project in terms of ROW width, type of surfacing, alignments, and target implementation schedule, among others, were presented to the PAPs. To familiarize them with the RAP preparation process, field activities that were undertaken namely: (i) linear mapping and tagging; (ii) taking of PAP's photograph in front of their houses/properties carrying a board showing the tag/control number of the affected structure/property; and (iii) conduct of socioeconomic.

The summary of issues and concerns raised during the said meetings are summarized in **Table 9.7.4-1**.

TABLE 9.7.4-1 SUMMARY OF ISSUES AND CONCERNS RAISED DURING IEC

Agencies/ Organization	Issues and Concerns	Issue Addressed to	Answer
LGUs of Binan PAPs of Tibig	Environmental concerns like vehicular gaseous emissions and noise problems	RAP Team	Mitigation measures will be proposed and implemented.
LGUs of Binan	Asking for more dialogues between JICA and LGUs before the start of the project	RAP Team	There will be more dialogues until the project is completed.
LGUs of Binan PAPs of Malamig	Benefits of the project	RAP Team	Reduction of traffic congestion, easier accessibility, economic development.
PAPs of Carmen, Tibig	Right to refuse the project	DPWH-ESSO	Yes.
PAPs of Carmen	Privatization of road; especially tollway	DPWH-ESSO	Project will be implemented under PPP scheme.
PAPs of Carmen LGUs of Sta. Rosa	Concerns on losing their livelihood; effects on agricultural lands	RAP Team	Rehabilitation Program will be implemented.
PAPs of Carmen	Payment issues between tenant and developer	RAP Team	The Government will compensate according to status of land ownership.
PAPs of Carmen, Inchican, Tibig, NGO	Request for increase in the disturbance compensation	DPWH-ESSO	It is difficult under the current law, however take note the opinion.
PAPs of	Requests for land to land	DPWH-ESSO	Land to land replacement is one of

Agencies/ Organization	Issues and Concerns	Issue Addressed to	Answer
Inchican, NGO	replacements of affected people		the options which the Government studies.
PAPs of Inchican	Possibility of selling their lands before the start of the project	DPWH-ESSO	The Government will talk to the land owner at the time of RAP preparation.
PAPs of Kaong, NGO	Issues on waiver from tenants who sold their lands to the developers	RAP Team	The Government will compensate according to status of land ownership.
PAPs of Kaong, Sabutan, Tibig LGUs of Laguna	Concerned on their land if it will be divided by the project; Accesibility of other land, service roads	RAP Team	Accessibility to divided land will be maintained.
PAPs of Kaong, Malamig	Start of RROW and payment	DPWH-ESSO	In 2014 and 2015
PAPs of Kaong, Sabutan, Tibig LGUs of Silang, Laguna	Issues with the alignment; Request changing the alignment to avoid their houses(Barangay Sabutan)	DPWH-ESSO	The proposed alignment achieves the minimal disturbance to people if the alignment changed, more people will be affected.
PAPs of Kaong	Concerns with the width of the road	DPWH-ESSO	ROW is 60m. proper accessibility will be provided between divided lands.
PAPs of Malamig, Sabutan LGUs of Silang	Compensation to crops, houses, trees, structures	RAP Team	It will be done in accordance with the law.
PAPs of Malamig LGUs of Cavite	Will they benefit from the tollway and toll fees	DPWH-ESSO	Economic development will be expected and more job chances will be created.
PAPs of Malamig	Social Impact concerns; long-term programs	RAP Team	Proper rehabilitation program will be implemented.
PAPs of Pulong Sta. Cruz	Employment during construction stage of the project	DPWH-ESSO	Yes, those who are affected will be prioritized.
PAPs of Pulong Sta. Cruz	Complete facility of the CALAx project like lighting, signboards, emergency hotline	DPWH-ESSO	Yes.
PAPs of Sabutan, Tibig	Concern on the project crossing the river	RAP Team	Bridges will be built with extra care.
PAPs of Sabutan	Feasibility of the project	DPWH-ESSO	Yes.
PAPs Sabutan, Tibig	Requesting for relocation	RAP Team	Relocation site is provided for informal settlers.
LGUs of Cavite	Issues on taxes; decrease in tax income	RAP Team	Replacement cost includes taxes.
LGUs of Cavite, Sta. Rosa	Issues on informal settlers; relocation and payment	RAP Team	Informal settlers will be treated based on the concerned laws.
LGUs of Laguna	Disturbance compensation and computation	RAP Team	Disturbance compensation will be estimated by D/D Consultant.
LGUs of Laguna PAPs of NGO	Payment for CLOA holders	RAP Team	Payment will be made in accordance with relevant laws.
LGUs od Sta. Rosa	May cause traffic	DPWH-ESSO	Proper traffic management will be implemented.

Agencies/ Organization	Issues and Concerns	Issue Addressed to	Answer
PAPs of Tibig	Complaining of favoring the developers	DPWH-ESSO	Project will benefit not only for developers but also people in the project area.
PAPs of Tibig	Issues on lack of proof of ownership of land	RAP Team	It will be a problem.

Source: JICA Study Team (2012)

Meeting with Land Developers

About 2/3 sections of the expressway (or 12 km section out of 18.1 km of expressway) pass through lands owned by land developers. Extensive dialogues were made with the following land developers;

- Greenfield Development Corp. ---- Owned land is affected, though no development is started yet.
- Ayala Land Inc ---- Laguna Blvd (private road) affected.
- Extraordinary Development Corp. ---- Owned land is affected, though no development is started yet.
- Stateland, Inc. ---- Owned land is affected, though no development is started yet. Majority of its land falls under Cavite section.

Their issues were as follows;

- Their development plan is affected and has to be changed.
- Proposed project is a full-access control expressway, thus they are not benefitted, since accessibility is only made at the interchanges.
- Proposed alignment should meet with their development plan as much as possible.
- How to develop Laguna Boulevard. should be fully discussed with Ayala Land Inc.
- Accessibility to land divided by the expressway should be provided.

DPWH sent a letter to all concerned Land Developers on February 29, 2012 requesting their response on the selected alignment. Two land developers, Greenfield Development Corp., and Stateland, Inc. responded to reconsider the alignment. Other developers did not make any response so that it was judged that they accepted the alignment.

Greenfield Development Corp. (GDC) requested to reconsider the alignment not to affect their master plan, then several meetings were held. The alignment was modified to suit the GDC's local road network and 50m road right-of-way will be planned in their master plan.

Stateland, Inc. (SI) requested to reconsider the interchange design, since it will affect SI's plan of access road to connect with Aguinaldo Highway. The interchange design was planned by Cavite Section Consultant (WB Consultant), therefore, DPWH together with the Cavite Section Consultant are discussing with SI regarding the interchange design.

Stakeholders Meeting on DFR

Stakeholders meeting on DFR was held on July 11, 2012 at Silang, Cavite Province inviting stakeholders of the Municipality of Silang, Cavite Province and cities of Sta. Rosa and Biñan of Laguna. **Table 9.7.4-2** shows the summary of issues and concerns raised by the stakeholders.

**TABLE 9.7.4-2 SUMMARY OF ISSUES AND CONCERNS RAISED BY
STAKEHOLDERS**

Agency	Issues and Concerns	Issue Addressed to	Answer
LGU of Sta. Rosa	If noise barriers will be provided along the expressway and where	EIA Team	Yes. At noise sensitive receptor areas.
LGU of Sta. Rosa	If a faultline/s were identified.	EIA Team	Yes. West Valley Fault system.
LGU of Sta. Rosa	Assurance that the recommended mitigation measures will be implemented.	EIA Team	Monitoring Team will be formed.
LGU of Sta. Rosa	What type of funding will be set-up for monitoring and who will handle the fund? Who will shoulder the compensation in case of property damage during the implementation?	EIA Team	An Environmental Guarantee Fund and/or Environmental Management Fund will be set-up by the Proponent to ensure that any incident of property damages during implementation will be addressed.
LGU of Sta. Rosa	There are areas in sta. Rosa City that are prone to flooding. Since the flooding situation in the city was not included in the EIA study, it was suggested that flood Master Plan Study conducted by TCGI be factored in the mitigation measures.	EIA Team	Welcomed the suggestion, however, the alignment does not pass through the flood-prone area.
Land Developer	Surface run-off from proposed CALA Expressway may aggravate the existing flooding situation in Greenfields property at the end section of the CALAX, since all the water will be drained through the tributaries crossing SLEX where the drainage facilities were not improved during the rehabilitation of SLEX. Since the Greenfields property will be divided by the proposed expressway, the management	EIA Team	Since the flooding problem exists and not caused by the proposed expressway, solution must be considered with or without the proposed CALAX. There are two (2) solutions that will have to be considered – solution to the existing flooding problem and for the proposed project not to aggravate the existing problem. <i>(EIA Team Leader)</i>

Agency	Issues and Concerns	Issue Addressed to	Answer
	would like to know the measures to be adopted during the Detailed Engineering Design (DED) stage to address the effect of flooding at the end section of the alignment. <i>(representative from Greenfield)</i>		
LGU of Barangay Sabutan	Status of the resolution forwarded by the Barangay Council of Sabutan, Silang, Cavite, opposing the alignment section crossing the area, where a number of residential structures will be affected.	EIA Team	The letter has been forwarded to DPWH. But the council should also consider that if the alignment will be traversing other area instead of Sabutan, those to be affected will likewise refuse to be affected. It is quite impossible to find an open area where there will be no residents to be affected. It was reiterated that the section crossing the Sabutan area has the least number of structures to be affected.
LGU of Barangay Sabutan	The barangay council of Sabutan is requesting to re-align the section of the alignment to adjacent area to avoid the residential structures.	IEA Team	Expressway alignments follow curvature standards, thus re-alignment sections that will compromise the design of the highway will be quite difficult.
LGU of Barangay Sabutan	Based on the latest alignment map, changes have been made especially at the alignment section crossing the Stateland Property, which was not reflected in the previous alignment maps.	JICA Study Team	There are no changes in the alignment. During the initial presentation, the Stateland Property was not reflected but the alignment will cross the same area.
LGU of Sta. Rosa	Since DPWH was the implementing agency of SLEX and the Proponent of the proposed CALAX is also DPWH, it was suggested that a more effective drainage crossing the SLEX be reconsidered in the design so as not to aggravate the flooding problem that already exists.	EIA Team	Rehabilitation of the SLEX was done by BOT. the flooding study was included in the engineering study conducted by the JICA Study Team, and if the results of the study prove that the proposed CALAX will have significant impact to the existing flooding problem in Sta. Rosa, then it will be included in the design. All environmental aspects discussed in the EIA are based on factual data. Moreover, the expressway is elevated in Sta. Rosa, its impact on flooding will be minimal.
EMB-Region IV-A	Issues regarding the flooding problem in Santa Rosa City be	EMB,	The suggestion was noted; the representatives from the

Agency	Issues and Concerns	Issue Addressed to	Answer
	collected and coordinated with DPWH	EIA Team	DENR-EMB NCR and members of the EIARC are present and are taking down the important issues being raised. The existing flooding problem must be addressed whether the proposed CALAX is implemented or not.
LGU of Sta. Rosa	Suggested that a temporary water impounding area to be provided in the upstream portion of the rivers to prevent flash flood from occurring in the downstream area.	EIA Team ESSO EIA Team	The Master Plan was conducted to solve the flooding problem in Santa Rosa. CALAX project is only dragged into the issue because there is an existing flooding problem. Assured the participants that the flooding problem issue will be taken into consideration in the proposed CALAX. If the Laguna section has flood problem In the entire 18km of the expressway, only four (4) km of the alignment will cross Santa Rosa City with elevated structure. In addition, the map shows that not all the drainage systems will drain towards Santa Rosa. Therefore it is not likely that all the run-off from the upstream portions will be drained toward Santa Rosa or the Laguna Lake.
Barangay Captain of Tibig	If Alternate #3 is the final alignment.	JICA Study Team	It is the recommended alignment.
Barangay Captain of Tibig	During the consultation meeting, residents who will be most likely to be affected based on the maps presented to the barangay officials were invited. However, during the survey (tagging for the RAP), those invited during the meeting were not surveyed. It appears to the official that there was a change in the alignment from the time of the barangay consultation meeting to the time of survey. He is	EIA Team	There was no change in alignment. The exact alignment will only be determined during the conduct of the parcellary survey.

Agency	Issues and Concerns	Issue Addressed to	Answer
	apprehensive that his house might be affected by the time the project is implemented, because it is just approximately 60 meters from the area being surveyed.		
Barangay Captain of Sabutan	The surveyor did put the staking on the Stateland Property.	EIA Team	The staking activities conducted is not to determine the exact alignment. The parcellary survey during the DED will determine the final alignment.
Land Developer	<p>Stateland stated for the record that they were never invited during the meetings conducted for the Laguna section. But they were invited in the meetings for the Cavite side. He also said that according to the Brgy. Captain the initial alignment was in place and that they believed Stateland Property is not affected by it. But as of the latest alignment, Stateland will be affected by the toll plaza (interchange) Stateland Property is not in favour of the toll plaza being constructed in their property, where it will affect their right-of-way.</p> <p>Stateland Property submitted a position paper to the DPWH secretary stating their opposition to the proposal and if there are other possible solutions to the conflict.</p>	Study Team	Most of affected parts of the Stateland Property belong to the Cavite section and not Laguna section, which is why they were not invited in the meetings fro Laguna section.
Land Developer	As to what they know, initially, the Cavite section is up to Aguinaldo Highway. Later on the DPWH/Design Team decided that the interchange be part of the Cavite section, but before it was part of the Laguna section.	Study Team	Originally, the boundary between Laguna section and Cavite section are at Aguinaldo Highway. However, construction of the Cavite section needs an interchange at Aguinaldo Highway. Therefore, DPWH decided that the start of Laguna section be at after the interchange.
LGU of Municipality of Silang	Our major concern is the proposed interchanges, since these will have significant effect on the land use of the areas affected. The east Silang interchange is located in a barangay where the road (rough) at present is not yet linked to the National Road, but it can be	Study Team	The said area is being divided by rivers and the road parallel to the rivers provide access. The present access road will be maintained by an overpass or an underpass, therefore, service road is not planned.

Agency	Issues and Concerns	Issue Addressed to	Answer
	<p>designed as a Provincial Road in the future. Further, the area will be divided by the alignment, especially the farmlands. There will be an issue of accessibility to the other side of the farmland.</p> <p>What the MPDC wanted to know is the possibility of the constructing the service roads as presented in the design. These service roads will provide access to the both sides of the divided properties.</p> <p>If the entire service roads presented in the design will be included in the construction of the project or is it a design to be implemented by the local government in the future. And how wide will the service roads be.</p>		
LGU of Municipality of Silang	The MPDC suggested that the ROW for the service roads be separated from perimeter fence, so that when the time comes that the Municipality of Silang is able to shoulder the construction of the roads, the ROW is already cleared and outside the expressway.	ESSO	All the properties acquired by the DPWH is secured to its limit, which is why the suggestion of the MPDC is not workable. She suggested instead to the MPDC to formally write a letter of request to the DPWH secretary to resolve the issue.

Source: JICA Study Team

9.7.5 Interview Survey

In addition to various levels of stakeholders meetings, interview surveys were undertaken. Number of households interviewed are shown in **Table 9.7.5-1** and **Table 9.7.5-2** and summarized as follows;

No. of Households Interviewed	
Type – A	32
Type – B	31
Type – C	132
Total	195

For Type – C, residential, business, youth, transport, senior citizens and NGOs/POs sectors

were interviewed.

Interview results were presented in the previous sections of this report.

TABLE 9.7.5-1 LIST OF IDENTIFIED PAPS AND NUMBER OF PAPS INTERVIEWED (DIRECTLY IMPACTED)

Municipality/ Barangay	Residential Structure (Type A) (No.)						Farm Lands (Type B) (No.)							
	Identified to be Affected			Interviewed / % Interviewed			Identified to be Affected				Interviewed			
	Owner	Renter	Total	Owner	Renter	Total	Land owner	Tenant	Free Occupation with Permit	Total	Land owner	Tenant	Free Occupation with Permit	Total
Silang, Cavite														
Sabutan	13	2	15	12	2	14	27	0	0	27	6	0	0	6
				92%	100%	93%					22%	0%	0%	22%
Kaong	1	1	2	1	1	2	2	2	0	4	1	1	0	2
				100%	100%	100%					50%	50%	0%	100%
Tibig	10	2	12	9	2	11	25	2	0	27	5	2	0	7
				90%	100%	91%					20%	100%	100%	26%
Carmen	0	0	0	0	0	0	0	0	19	19	0	0	16	16
				0%	0%	0%					0%	0%	84%	84%
Biñan, Laguna Timbao	7	0	7	5	0	5	0	0	0	0	0	0	0	0
				71%	0%	71%					0%	0%	0%	0%
Grand Total:	31	5	36	27	5	32	54	4	19	77	12	3	16	31
				87%	100%	89%					22%	75%	84%	40%

Source: JICA Study Team (2012)

TABLE 9.7.5-2 NUMBER OF INTERVIEWED HOUSEHOLDS OF INDIRECTLY AFFECTED SECTORS (TYPE C)

City/Municipality Barangay	Stakeholder Sectors (Indirectly impacted)						Total
	Residential	Business	Youth	Transport	Senior Citizens	NGOs/POs	
SILANG							
Biga	0	1	0	0	0	0	1
Biga 1	1	0	1	0	0	0	2
Biga First	0	0	0	1	0	0	1
Biluso	0	0	0	2	0	0	2
Cinco	0	1	0	1	0	0	2
Ibaba Tibig	0	0	1	0	0	0	1
Inchican	0	0	0	0	0	1	1
Kaong	1	1	1	5	5	0	13
Poblacion Silang	0	2	3	0	0	0	5
Poblacion	1	1	0	0	0	0	2
Poblacion 1	1	0	0	0	0	0	1
Pulong-Bunga	0	0	0	1	0	0	1
Sabutan	15	9	3	6	7	3	43
Sabutan Highway	0	1	0	0	0	0	1
Tibig	7	5	4	3	5	0	24
Timbao	1	0	0	0	0	0	1
Town Proper	0	0	2	0	0	0	2
Sub-Total 1	27	22	15	19	17	4	104
BIÑAN							
Biñan	0	0	0	1	0	0	1
Loma	1	0	3	1	0	1	6
Malamig	0	5	1	0	1	0	7
Timbao	1	0	0	0	1	1	3
Sub-Total 2	2	5	4	2	2	2	17
STA. ROSA							
Don Jose	2	1	0	0	1	2	
Pulong Sta. Cruz	0	0	0	0	0	1	
Sto. Domingo	4	0	0	0	0	0	
Sub-Total 3	6	1	0	0	1	3	11
TOTAL	35	28	19	21	20	9	132
% Distribution	26.5%	21.2%	14.4%	15.9%	15.2%	6.8%	100.0%

Note: NGO – Non-Government Organization; PO – People’s Organization

Source: JICA Study Team (2012)

9.8 RECOMMENDATION

9.8.1 EIS

- Include obligation of priority employment of PAP and barangay residents below poverty line in the project contract with the selected contractor by DPWH during construction and the selected concessionaire during Operation and Maintenance Stage.
- In case of Reconsignment, a private entity that is in charge of the Project should require subcontracting company submission of their detail implementing structure; chart, schedule, member etc.
- All cost for Environmental Management including monitoring cost and follow up cost should be included the tender price (or it should be include the TOR).
- Contractor should take out a policy in Contractor's All Risk Insurance as remarked ANNEX A on previous EIS.
- DPWH should update LARRIPP and compensation/entitlement amount stipulated in it should be amended.

9.8.2 RAP

- Project specific RAP Implementation Framework must be prepared in D/D Stage before construction stage.
- Ensure a priority employment opportunity of PAPs who lives on farming whose base is the land lost for ROW/the project from the company that operate and maintain CALAX.
- Monitor and ensure fair and just compensation have been done to all PAPs with full consensus before CALAX construction tender is out by quarterly monitoring activities which is mandate for DPWH.
- In stakeholder meeting, many PAP's concerns not enough compensation. DPWH should hire the Independent Assessor in detailed design stage, and the proper compensation /entitlement amount should be determined by them for PAP's less grievance.
- Since many PAP's farmer request to compensate as land for land, DPWH should consider the land for land compensation as much as possible.

CHAPTER 10

PROJECT IMPLEMENTATION PLAN

CHAPTER 10
PROJECT IMPLEMENTATION PLAN

(Confidential)

CHAPTER 11

OPERATION AND EFFECT INDICATORS

CHAPTER 11 OPERATION AND EFFECT INDICATORS

11.1 SELECTED OPERATION AND EFFECT INDICATORS

In order to enable project monitoring and evaluation on the basis of consistent indicators, operation and effect indications are introduced for ODA loan projects.

Operation and effect indicators are basically equivalent to the outcome indicators and performance indicators used by the World Bank. For this study, they are defined as follows:

- 1) **Operation indicators:** quantitative measure of the operational status of project.
- 2) **Effect indicators:** quantitative measure of the effects generated by a project.

In order to set the appropriate indicators, the following criteria should be considered.

- 1) **Validity:** This determines whether the set of indicators would really be able to measure the achievement of the project purpose.
- 2) **Reliability:** The set indicators data must yield the same results, regardless of how many times they are measured and regardless of who makes the measurements.
- 3) **Ease of access:** The indicator data set for the project must be easy to access and must not be too many, considering the cost and time required to gather them.

In view of project objective and expected effects, the following indicators were selected:

Operation and Effect Indicators		Data Collection Method
Operation Indicators	Traffic Volume of CALAX (Laguna Section) (veh./day)	Traffic count survey
	Toll Revenue	Data collection from Operator
Effect Indicators	Traffic Congestion Rate (Volume/Capacity Rate)	Calculation based on Traffic count survey
	Travel Time Saving (veh.-hour/day)	Calculation based on Travel Time Survey
	Travel Time Cost Saving (Peso/Year)	Calculation based on Time Cost and Travel Time Survey

The project will definitely contribute to the reduction of traffic accidents. However, it is difficult to estimate present rate of traffic accidents along Expressway. It is also difficult to estimate how many traffic accidents will be reduced due to this project. Although reduction of traffic accidents is an important indicator, it is not adopted in the study due to the current non-availability of data.

11.2 TRAFFIC VOLUME OF CALAX (LAGUNA SECTION)

Based on the traffic assignment result, future traffic volumes are shown as follows.

**TABLE 11.2-1 (1) ESTIMATED TRAFFIC VOLUME OF CALAX
(AGUINALDO IC ~ SILANG EAST IC)**

Unit: Vehicle/day

	Year 2017	Year 2020	Year 2030
Class-1 (Car)	15,051	20,360	30,174
Class-2 (Bus, Truck)	5,454	6,493	8,829
Class-3 (Trailer)	2,919	3,294	4,432
Total	23,424	30,147	43,425

**TABLE 11.2-1 (2) ESTIMATED TRAFFIC VOLUME OF CALAX
(SILANG EAST IC – STA. ROSA TAGAYTAY IC)**

	Year 2017	Year 2020	Year 2030
Class-1 (Car)	13,999	18,470	25,631
Class-2 (Bus, Truck)	5,755	6,454	8,425
Class-3 (Trailer)	3383	3,625	4,758
Total	23,137	28,549	38,814

**TABLE 11.2-1 (3) ESTIMATED TRAFFIC VOLUME OF CALAX
(STA. ROSA TAGAYTAY IC-LAGUNA BLVD. IC)**

	Year 2017	Year 2020	Year 2030
Class-1 (Car)	15,612	21,156	35,467
Class-2 (Bus, Truck)	6,712	7,526	10,168
Class-3 (Trailer)	3,619	3,885	5,212
Total	25,943	32,567	50,847

**TABLE 11.2-1 (4) ESTIMATED TRAFFIC VOLUME OF CALAX
(LAGUNA BLVD IC-TECHNO PARK IC)**

	Year 2017	Year 2020	Year 2030
Class-1 (Car)	15,228	19,206	37,498
Class-2 (Bus, Truck)	6,379	7,256	10,607
Class-3 (Trailer)	3,328	3,521	4,515
Total	24,935	29,983	52,620

**TABLE 11.2-1 (5) ESTIMATED TRAFFIC VOLUME OF CALAX
(TECHNOPARK IC – MAIN TOLL BARRIER)**

	Year 2017	Year 2020	Year 2030
Class-1 (Car)	14,917	18,705	35,348
Class-2 (Bus, Truck)	6,222	7,105	10,186
Class-3 (Trailer)	3,297	3,518	4,343
Total	24,436	29,328	49,877

11.3 TOLL REVENUE OF CALAX

Based on future traffic demand and assumed toll rate, toll revenue will be estimated.

TABLE 11.3-1 (1) ESTIMATED TOLL REVENUE (YEAR 2017)

	Total Vehicle length of CALAX(Laguna) (Veh-*km)	Assumed Toll Rate (P/km)	Revenue (Thousand Peso)
Class-1 (Car)	253,047	5.0	1,265
Class-2 (Bus, Truck)	102,418	10.0	1,024
Class-3 (Trailer)	56,064	15.0	841
Total	411,529		3,130

TABLE 11.3-1 (2) ESTIMATED TOLL REVENUE (YEAR 2020)

	Total Vehicle length of CALAX(Laguna) (Veh-*km)	Assumed Toll Rate (P/km)	Revenue (Thousand Peso)
Class-1 (Car)	332,298	5.4	1,794
Class-2 (Bus, Truck)	117,067	10.8	1,264
Class-3 (Trailer)	60,624	16.2	982
Total	509,990		4,040

11.4 TRAFFIC CONGESTION RATE (V/C RATE)

If CALAX is constructed, traffic of Aguinaldo Highway, Governor's drive and Sta.Rosa-Tagaytay Road will be reduced or maintained at present traffic level. Based on traffic assignment result, future traffic congested rate are estimated.

**TABLE 11.4-1 ESTIMATED TRAFFIC CONGESTION RATE OF W/O CALAX CASE
(VOLUME / CAPACITY RATE)**

Road Name	Indicator	Present	Without CALAX Case	
		Year 2011	Year 2017	Year 2020
Aguinaldo Highway (Imus)	Volume(PCU/day)	39,923	50,515	56,823
	Capacity(PCU/day)	30,000	30,000	30,000
	Volume / Capacity Rate	1.33	1.68	1.89
Governor's Drive (Carmona)	Volume(PCU/day)	33,643	42,569	47,884
	Capacity(PCU/day)	30,000	30,000	30,000
	Volume / Capacity Rate	1.12	1.42	1.60
Sta.Rosa-Tagaytay Road (Sta. Rosa)	Volume(PCU/day)	20,631	26,104	29,364
	Capacity(PCU/day)	20,000	20,000	20,000
	Volume / Capacity Rate	1.03	1.31	1.47

Note: Volume in year 2011 is based on traffic count survey including Tricycle and Motorbike. Annual growth rate is 4% per year. Capacity is assumed by JICA Study Team based on existing road condition.

**TABLE 11.4-2 ESTIMATED TRAFFIC CONGESTION RATE OF WITH CALAX CASE
(VOLUME / CAPACITY RATE)**

Road Name	Indicator	Present	With CALAX Case	
		Year 2011	Year 2017	Year 2020
Aguinaldo Highway (Imus)	Volume(PCU/day)	39,923	39,500	39,969
	Capacity(PCU/day)	30,000	30,000	30,000
	Volume / Capacity Rate	1.33	1.32	1.33
Governor's Drive (Carmona)	Volume(PCU/day)	33,643	35,270	41,382
	Capacity(PCU/day)	30,000	30,000	30,000
	Volume / Capacity Rate	1.12	1.18	1.38
Sta.Rosa-Tagaytay Road (Sta. Rosa)	Volume(PCU/day)	20,631	20,530	20,738
	Capacity(PCU/day)	20,000	20,000	20,000
	Volume / Capacity Rate	1.03	1.03	1.04

Note: Volume of year 2017 and 2020 is estimated by traffic assignment model. Capacity is assumed by JICA Study Team based on existing road condition.

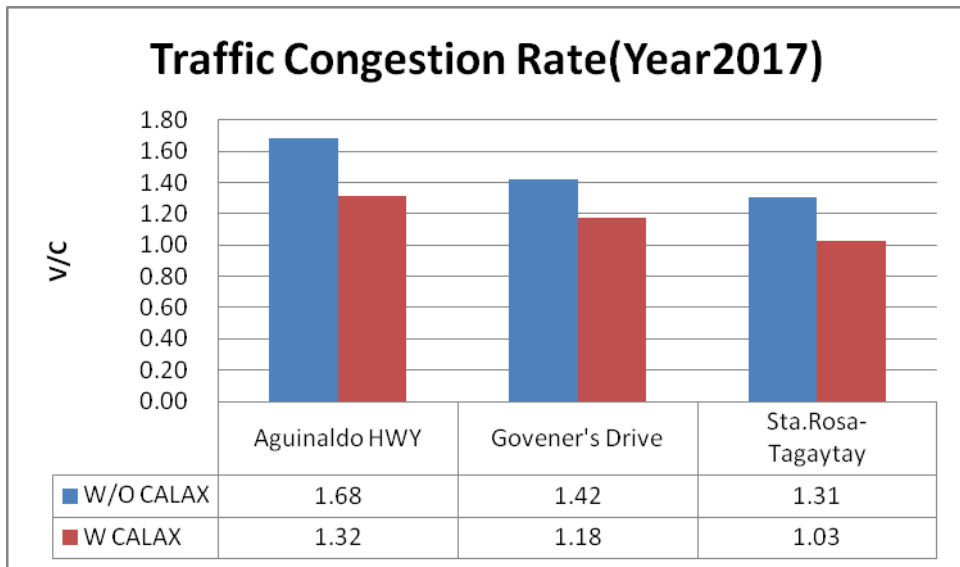


FIGURE 11.4-1 ESTIMATED TRAFFIC CONGESTION RATE (YEAR 2017)

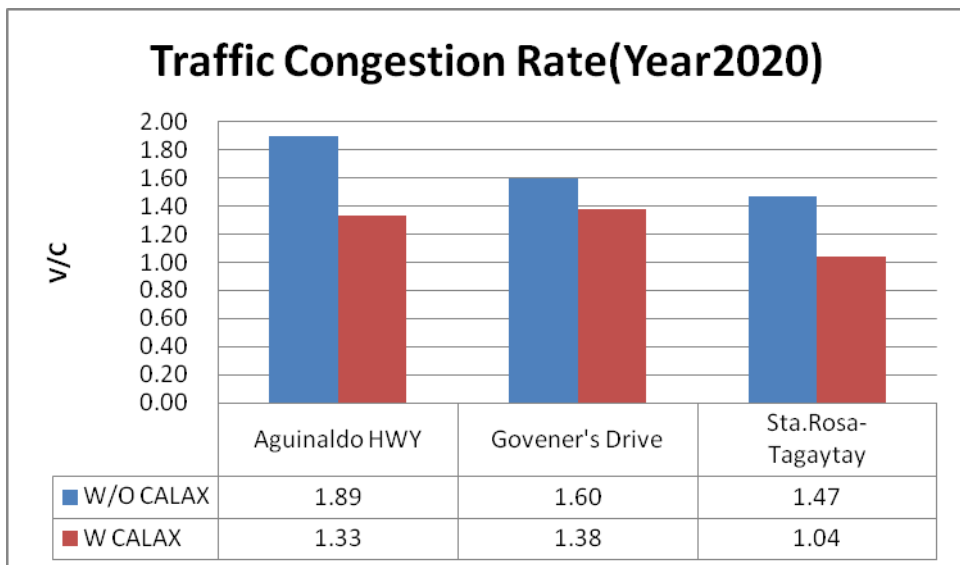


FIGURE 11.4-2 ESTIMATED TRAFFIC CONGESTION RATE (YEAR 2020)

11.5 TRAVEL TIME SAVING

If CALAX were constructed, travel time from Silang, or Tagaytay to Metro Manila will be reduced. Based on the travel speed survey and the following assumptions, travel time is estimated.

- CALAX Average Speed: 90 km/hr.

TABLE 11.5-1 ESTIMATED TRAVEL TIME CASE-1 (SILANG - MANILA)

Route	Section	Length (km)	Speed (km/h)	Travel Time (Hr:Min.)	Remarks
	Section: from Silang to Metro Manila(NAIA) Morning Peak				
Route A	Aguinaldo HWY + Coastal Rd	33.8	31	1:05 (31 min. saving)	2011 Data
Route B	Aguinaldo HWY+ Governor's Drive + SLEX	44.7	38	1:11 (37 min. saving)	2011 Data
Route C	CALAX(Silang - Mamplasan) + SLEX	43.9	78	0:34	CALAX Sec. 90km/h
Section: from Metro Manila(NAIA) to Silang Evening Peak					
Route A	Aguinaldo HWY + Coastal Rd	33.8	26	1:18 (42 min. saving)	2011 Data
Route B	Aguinaldo HWY+ Governor's Drive + SLEX	44.7	38	1:11 (35 min. saving)	2011 Data
Route C	CALAX (Silang - Mamplasan) + SLEX	43.9	73	0:36	CALAX Sec. 90km/h

Note see the each route in Figure 11.5-1

TABLE 11.5-2 ESTIMATED TRAVEL TIME CASE-2 (TAGAYTAY - MANILA)

Route	Section	Length (km)	Speed (km/h)	Travel Time (Hr:Min.)	Remarks
	Section: from Tagaytay to Metro Manila(NAIA) Morning Peak				
Route A	Aguinaldo HWY + Coastal Rd	51.6	37	1:24 (31min. saving)	2011 Data
Route B	Sta. Rosa-Tagaytay Rd+ SLEX	55.8	54	1:02 (9 min. saving)	2011 Data
Route C	Aguinaldo HWY + CALAX (Silang - Mamplasan) + SLEX	61.7	70	0:53	CALAX Sec. 90km/h
Section: from Metro Manila(NAIA) to Tagaytay Evening Peak					
Route A	Aguinaldo HWY + Coastal Rd	51.6	30	1:44 (20min. saving)	2011 Data
Route B	Sta. Rosa-Tagaytay Rd+ SLEX	55.8	36	1:33 (9 min. saving)	2011 Data
Route C	Aguinaldo HWY + CALAX (Silang - Mamplasan) + SLEX	61.7	44	1:24	CALAX Sec. 90km/h

Note see the each route in Figure 11.5-1

TABLE 11.5-3 ESTIMATED TRAVEL TIME CASE-3 (INDUSTRIAL PARK- MANILA)

Route	Section	Length (km)	Speed (km/h)	Travel Time (Hr:Min.)	Remarks
Section: from Industrial Park to Metro Manila(NAIA) Morning Peak					
Route A	Tirona HWY + Coastal Rd	39.4	31	1:18 (39min. saving)	2011 Data
Route B	Governor's Drive+ Aguinaldo + Coastal Rd	31.8	30	1:04 (25min. saving)	2011 Data
Route C	Governor's Drive + SLEX	42.7	46	0:55 (16min. saving)	2011 Data
Route D	CALAX+ SLEX	51.9	79	0:39	CALAX Sec. 90km/h
Section: from Metro Manila(NAIA) to Industrial Park Evening Peak					
Route A	Tirona HWY + Coastal Rd	39.4	29	1:22 (12min. saving)	2011 Data
Route B	Governor's Drive + Aguinaldo + Coastal Rd	31.8	23	1:22 (12min. saving)	2011 Data
Route C	Governor's Drive + SLEX	42.7	31	1:23 (13min. saving)	2011 Data
Route D	CALAX + SLEX	51.9	44	1:10	CALAX Sec. 90km/h

Note see the each route in Figure 11.5-1

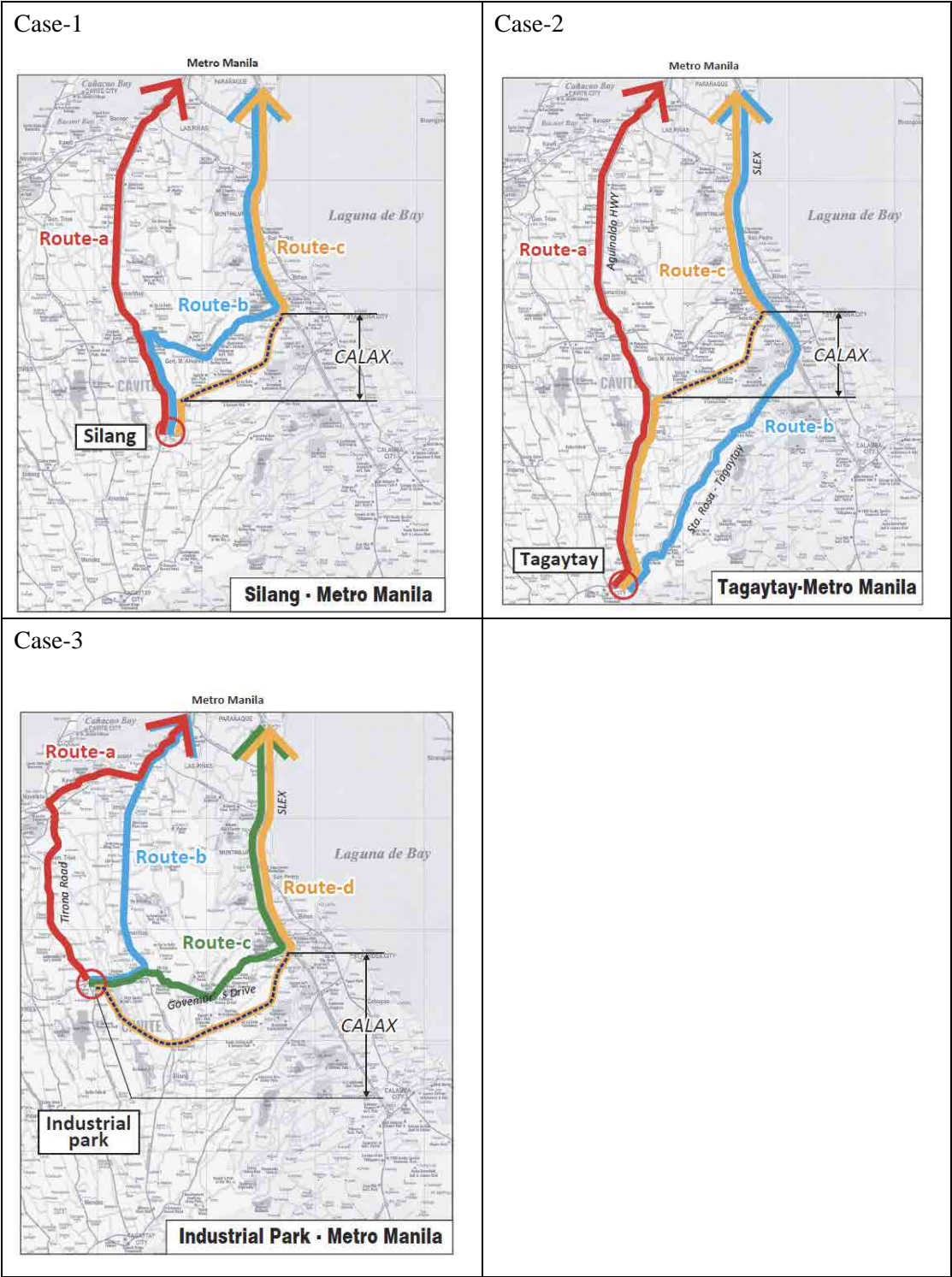


FIGURE 11.5-1 ROUTE MAP OF COMPARISON TRAVEL TIME

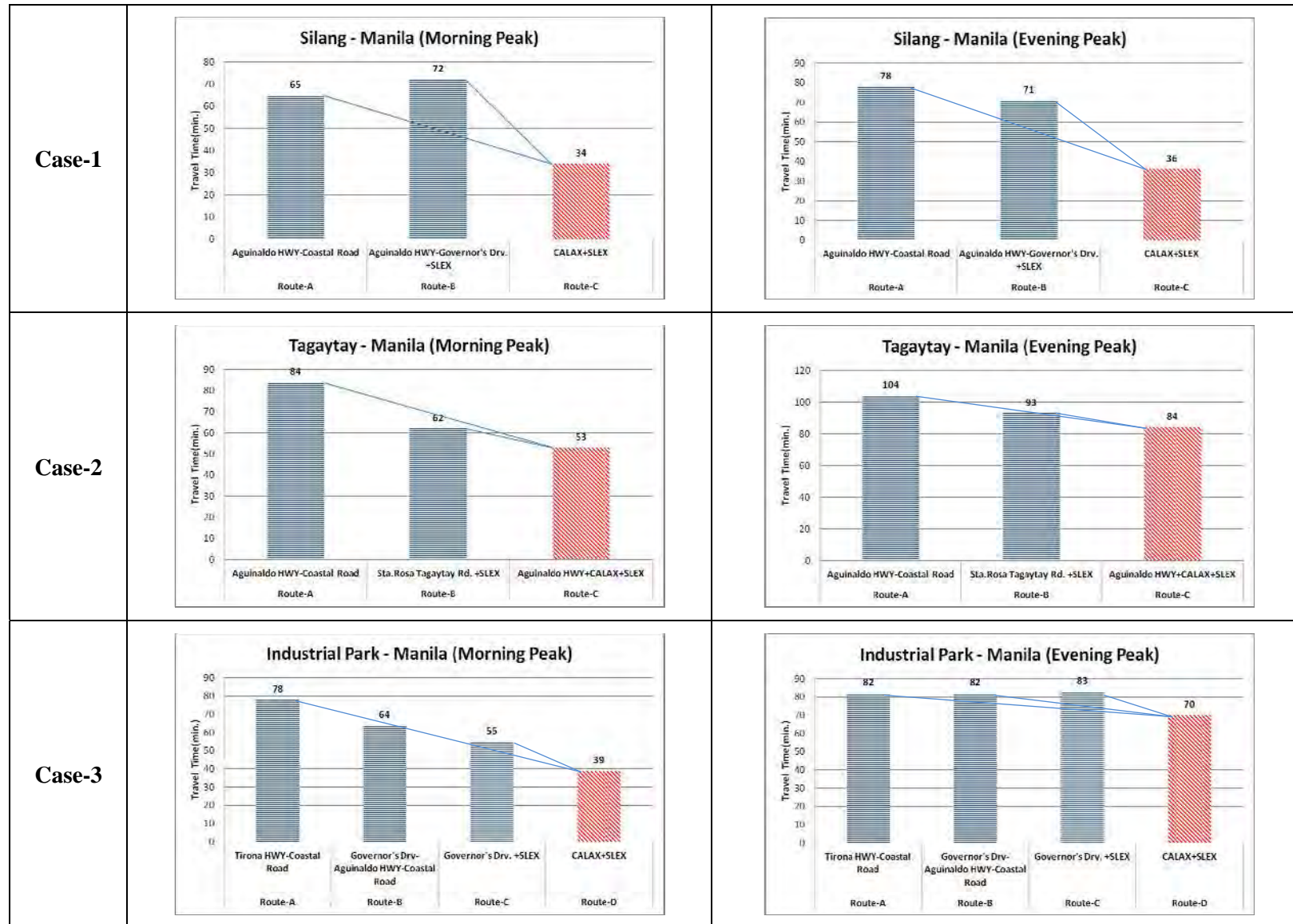


FIGURE 11.5-2 ESTIMATED TRAVEL TIME

Based on the above travel time saving per route and traffic assignment, total travel time savings are estimated as shown in **Table 11.5-4** and **Table 11.5-5**.

TABLE 11.5-4 MAJOR ROUTE TRAVEL TIME SAVING (YEAR 2017)

Route	Travel Time Reduction	Conversion Traffic to CALAX(Y2017)	Travel Time Saving
Via Aguinaldo HWY	31 minutes	15,100 veh/day	7,801 hours/day
Via Governor's Drive	37 minutes	4,500 veh/day	2,775 hours/day
Via Sta. Rosa-Tagaytay	9 minutes	7,000 veh/day	1,050 hours/day
Total			11,626 hours/day

TABLE 11.5-5 MAJOR ROUTE TRAVEL TIME SAVING (YEAR 2020)

Route	Travel Time Reduction	Conversion Traffic to CALAX(Y2020)	Travel Time Saving
Via Aguinaldo HWY	31 minutes	15,300 veh/day	7,905 hours/day
Via Governor's Drive	37 minutes	5,600 veh/day	3,453 hours/day
Via Sta. Rosa-Tagaytay	9 minutes	9,300 veh/day	1,395 hours/day
Total			12,753 hours/day

The travel time savings presented above are only conversion traffic from Aguinaldo Highway, Governor's Drive and Sta. Rosa-Tagaytay Road to CALAX. There is actually other travel time savings from conversion of traffic coming from other roads to CALAX and decongestion of ordinary roads. Since it will be difficult to quantify the whole traffic saving time at post facto evaluation, only major travel time savings are estimated.

11.6 TRAVEL COST SAVING

Travel time saving was converted to cost. Unit rate of time cost by vehicle type are as follow:

TABLE 11.6-1 UNIT TRAVEL TIME COST

Vehicle Type	Unit Travel Time Cost(Peso/min/veh)			Vehicle Share (%)
	Year 2012	Year 2017	Year 2020	
Passenger Car	7.81	9.50	10.69	57%
Jeepney	8.52	10.37	11.66	25%
Bus	31.97	38.90	43.75	6%
Truck	1.44	1.75	1.97	12%
Average <i>Inflation rate: 4% per year</i>		10.55	11.87	

Source: JICA Study Team

Travel time cost saving of 2017 will be 3.82 Billion Peso / year.

$$\begin{aligned} \text{Travel time cost saving} &= 11,626 \text{ (hrs/day)} * 10.55 \text{ (Peso/min/veh)} * 60 \text{ (min)} * 365 \text{ (day)} \\ &= 2.69 \text{ billion (Peso/year)} \end{aligned}$$

As the same calculation, travel time cost saving of 2020 will be 3.32 Billion Peso / year.

11.7 OPERATION AND EFFECT INDICATORS

Summarized Operation and effect indicators are shown in **Table 11.7-1**.

TABLE 11.7-1 OPERATION AND EFFECT INDICATORS

	Indicators	Road Name	Baseline (2011)	Target (2020)	Data Collection Method	
Operation Indicators	Traffic Volume (vehicle /day)	CALAX (Aguinaldo IC ~ East Silang IC)	-	30,147	Traffic count survey	
		CALAX (East Silang – Sta. Rosa Tagaytay IC)		28,549		
		CALAX (Tagaytay IC-Laguna Blvd. IC)		32,567		
		CALAX (Laguna Blvd. IC-Techno Park IC)		29,983		
		CALAX (Techno Park IC-Main Toll Barrier)		29,328		
	Toll Revenue (Thousand Peso/day)	CALAX (Laguna Section)		4,040	Data collection from Operator	
Effect Indicators	Traffic Congestion Rate (V/C Rate)	Aguinaldo Highway (Imus)	1.33	1.33	Calculation based on Traffic count survey	
		Governor’s Drive (Carmona)	1.12	1.38		
		Sta.Rosa-Tagaytay Road(Sta.Rosa)	1.03	1.04		
	Travel Time (hr:min)	Silang – NAIA (Morning Peak)				Travel Time Survey
		Via Aguinaldo + Coastal Rd	1:05	Via CALAX and SLEX 0:34		
		Via Govener’s Dr +SLEX	1:11			
	Travel Time Saving (hours/day)	Aguinaldo Highway, Governor’s Drive and Sta. Rosa-Tagaytay Road to CALAX	-	12,753	Calculation based on Travel Time Survey	
	Travel Time Cost Saving (Peso/year)		-	3.32 billion	Calculation based on Time Cost and Travel Time Survey	