2.2 Natural Condition

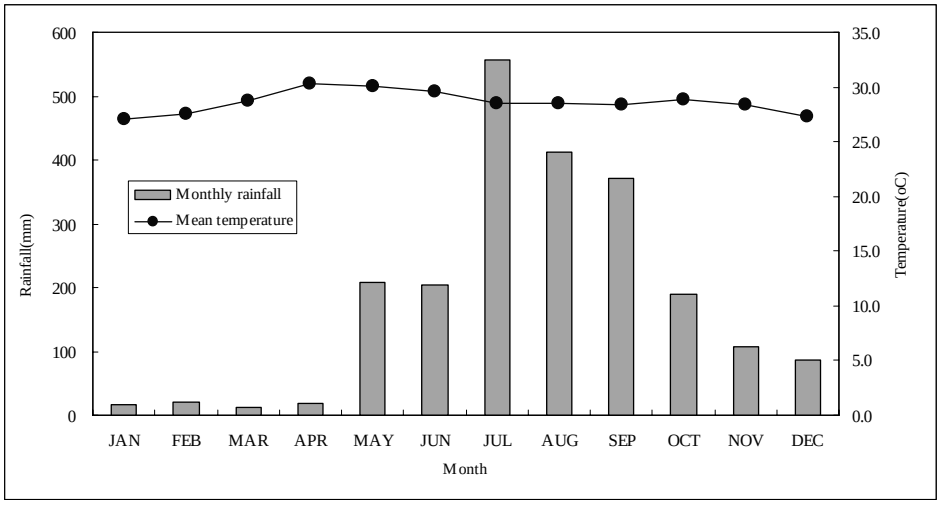
2.2.1 Meteorology

The Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA) classifies climate based on the rainfall distribution in a given area. According to the Coronas Scheme, the study area is classified into Type I, Two pronounced seasons: dry season from November to April, wet season during the rest of the year.

Figure 2.2.1 shows the monthly rainfall and mean temperature at Sangley Point in Cavite while Figure 2.2.2 shows the wind condition in the same area for a ten year period from 1994 to 2003.

The wet season yields 88% of the annual rainfall and the dry season yields the remaining 12%. The mean annual temperature is 28.6^{o}C. The coolest month is January with a mean temperature of 27.1^{o} C while the warmest month is April with a mean temperature of 30.3^{o}C. The average monthly relative humidity varies between 78% in April and 86% in December.

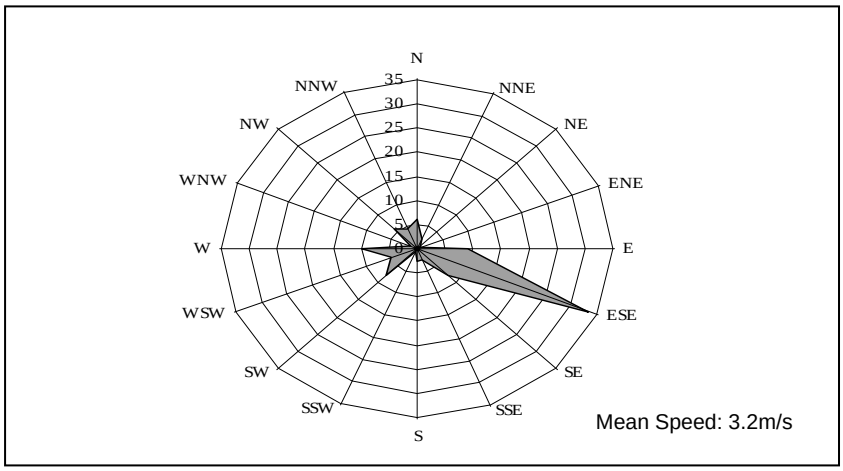
Figure 2.2.1 Monthly Rainfall at Sangley Point in Cavite



Source: PAGASA, 2004

Figure 2.2.2 shows the annual wind rose diagram prepared based on a 10-year average data from 1994 to 2003 at Sangley Point in Cavite. As shown, the ESE wind is the predominant wind with mean speed recorded at 3.2 m/s.

Figure 2.2.2 Wind Rose Diagram at Sangley Point in Cavite, 1994-2003



Source: Wind Rose Analysis. PAG-ASA. 2005

2.2.2 Topography and Hydrology

Topography

A greater part of the land structure in CALA is underlain by volcanic tuff. Figure 2.2.3 shows the topographic map in the study area. The Marikina Fault borders the Laguna Province on the west and gradually curves further to the west as it approaches the Batangas-Cavite boundary at the Tagaytay Ridge. The Lipa Fault is characterized by a prominent fault scarp along the southeastern coast of Laguna de Bay. It extends beyond Lumban on the north and cuts across the northern foothills of Mt. Nagcarlan and Mt. Lagula along the southeastern direction.

CALA is made up of four characteristic landscapes, namely:

- coastal landscapes
- alluvial plains
- piedmont plains and foothills (plateau)
- hills and mountains

(a) Coastal Landscapes

These are basically the transitional areas between land and sea or lake that are formed by the interplay of marine and terrestrial processes. These include the beaches and ridges and active and former tidal flats in Cavite and the freshwater marshes and the lake terraces in Laguna.

In Cavite, the strip of coastal landscapes extends from Bacoor and Cavite City in the north to Ternate in the south. In Laguna, coastal landscapes are common features in the towns bordering Laguna de Bay from San Pedro in the west to Mabitac in the east. Coastal landscapes are nearly level with slopes ranging from 0% to 2%.

(b) Alluvial Lowlands

The alluvial lowlands are those nearly flat to gently sloping alluvial plains formed from lateral erosion or soil deposition of running streams or rivers.

In Cavite, broad and minor alluvial plains form the transition area between the strip of coastal landscapes and the piedmont plains and foothills. These have slopes ranging from 0% to 5% and extend from Bacoor and Imus in the north through General Trias, Tanza and Naic to Maragondon. Approximately 75% are flat, 20% are gently sloping and 5% are levee.

In Laguna, the alluvial lowland is basically an extension of the minor alluvial plain in Taguig and Muntinlupa. It covers the low depressed areas of the towns bordering the western and southern shores of Laguna de Bay (i.e., from San Pedro to Santa Cruz). Slope ranges from 0% to 3%.

(c) Piedmont Plains and Foothills (Plateau)

This landscape extends from the Guadalupe Plateau in Metro Manila and culminates in the foothills of the Tagaytay Ridge. It comprises the undulating tuffaceous plains and the rolling tuffaceous plateau, including steep hills, ridges and elevated inland valley that are below higher hills or mountain foot slopes. Parent soil material is volcanic tuff; clayey and/or loamy in texture; poorly drained and is plastic. Effective soil depth varies from very shallow to moderately deep. Groundwater availability may be through deep wells and could be difficult in higher areas.

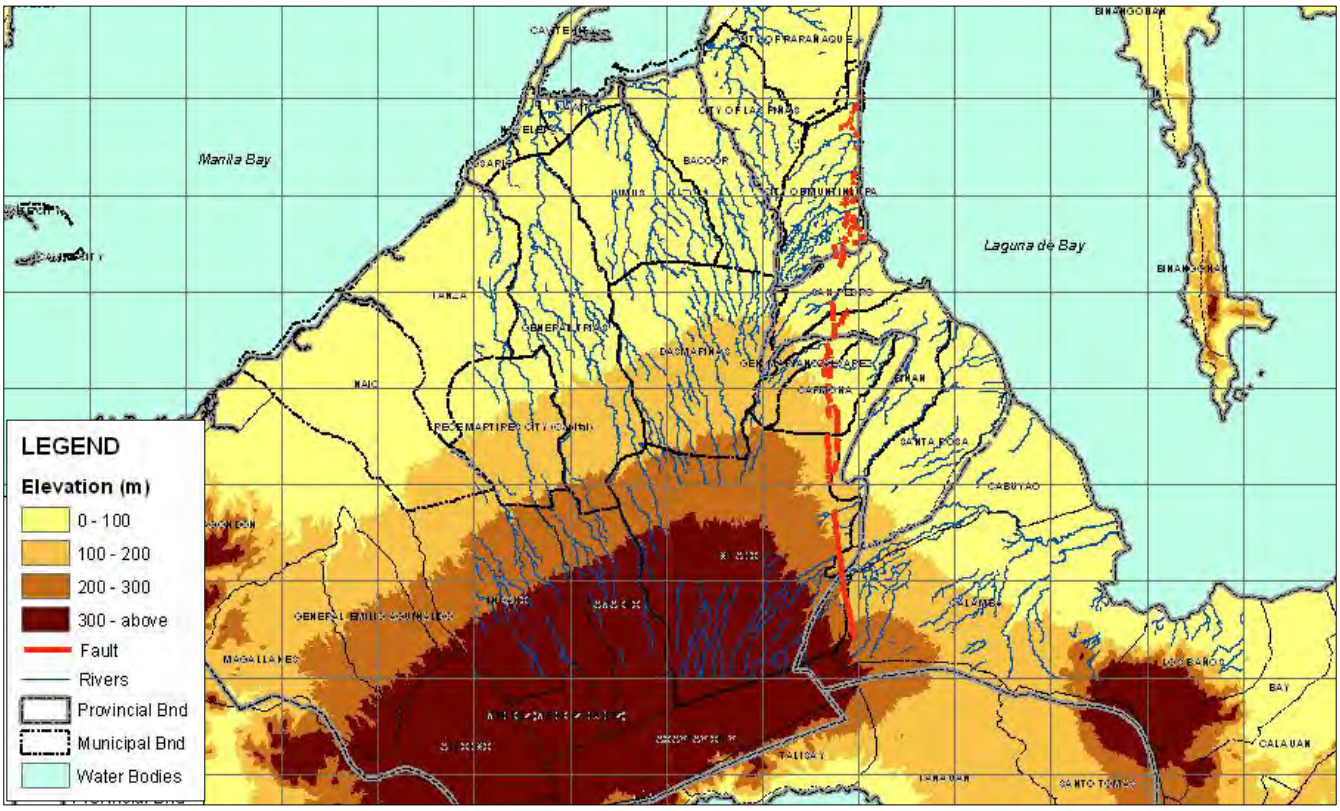
In Cavite, piedmont plains are characterized with elevation relief ranging from a low 20 meters above sea level to a high of nearly 550 meters above sea level. Slope ranges from 2% to 8%, although side slopes from 8% to 15% can be found in Carmona and Silang areas where the fault lines traverse.

In Laguna, the piedmont plains commence at a low elevation in the areas immediately adjoining Metro Manila. These extend up to Calamba, and join the higher elevations in Carmona and Silang, as these narrowly pass between the heights of Mt. Makiling and the Tagaytay ridge to the direction of Sto. Tomas in Batangas and San Pablo City. Slope generally ranges from 3% to 8%, although foothills possess 8% to 18%.

(d) Hills and Mountains

These are the areas at very high elevations with slopes over 18% and include higher hills and mountains. In Cavite, these include the mountains in Maragondon and the Tagaytay Ridge, forming the boundary of Cavite with Batangas Province in the south. In Laguna, these include Mt. Makiling, portions of Mt. Banahaw and the mountains bordering Laguna and Quezon Provinces.

Figure 2.2.3 Topography of the Study Area



Hydrology

River

The river network in the study area is shown in Figure 2.2.4. Laguna has about 40 rivers with a total area of almost 50 hectares serving the irrigation needs of agriculture. The rivers are also the receiving bodies for surface water drainage. Those that meander through most of the towns are also being tapped for fishing (e.g. Pagsanjan River, Calamba River and Biñan River). In the study area, Sucat River, Pasong Diablo River, Bayanan River, Tunsanasan River, San Pedro River, and Biñan River are major rivers. These rivers originate from the uplands and flow down to Laguna de Bay

On the other hand, in Cavite, major rivers flow from the uplands to the Manila Bay and these include Labac River, Canas River, Ilang-Ilang River, and Imus River. Cavite holds many tributaries of these rivers. Based on the reconnaissance survey of the site, many rivers flow at deep ravines.

Table 2.2.1 shows the hydrological situation of rivers in Cavite based on the only available data recorded in the 1970's. As for Laguna, there is no data available.

Figure 2.2.4 River Network in the Study Area

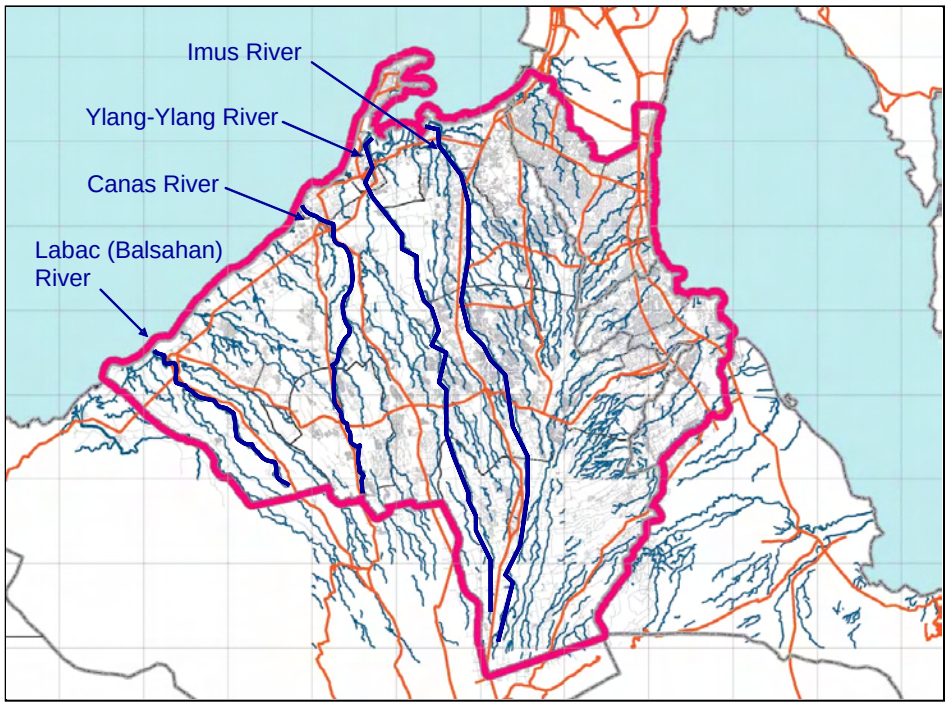


Table 2.2.1 Hydrological Situation of Rivers in Cavite

No	River Name	Drainage Area (km^2)	Annual Discharge in 1972 (m^3/s)		
			Mean	Max	Min
1	Labac (Balsahan) River	96	1.6	11.4	0.07
2	Canas	210	-	-	-
3	Ilang-Ilang	82	0.8	44.4	0.05
4	Imus	105	-	-	-

Note: - : The data is not available

Source: Principal River Basins of the Philippines, National Water Resources Council, 1976 and Philippines Water Data 1972, National Water Resources Council, 1972

Ground water

Ground water is a major water resource in the Philippines. Groundwater is used for drinking by about 50% of the people in the country. In Region IV, the Southern Tagalog region where the study area is located, groundwater contributes about 18% of the total water resource potential of the region (World Bank, 2003).

Table 2.2.2 presents the ground water data (number of wells considered, average well depth, average normal static water, and average specific capacity) for 12 municipalities in the study area. Data for the other 6 municipalities are not available. Average water level of most municipalities is over 10 m below ground level, but the level of Imus, Noveleta and Biñan is less than 10 m.

Table 2.2.2 Groundwater Statistical Data in the Study Area

No	Municipalities	No of Wells Considered	Average well depth (m)	Ave. Normal Static Water Level (m below ground surface)	Average Specific Capacity (liter/s/m)
1	Bacoor	11	171	19	1.3
2	Cavite City	28	241	33	0.9
3	Imus	16	127	7	2.1
4	Kawit	8	172	16	0.3
5	Las Piñas	118	243	26	1.1
6	Muntinlupa	143	239	27	2.5
7	Noveleta	2	65	4	2.9
8	Rosario	9	235	13	0.9
9	Biñan	21	58	2	0.8
10	San Pedro	22	90	32	0.6
11	Carmon	32	117	52	0.3
12	Silang	32	96	42	0.4
13	Tanza	-	-	-	-
14	Naic	-	-	-	-
15	Trece Martires	-	-	-	-
16	General Trias	-	-	-	-
17	Dasmariñas	-	-	-	-
18	GMA	-	-	-	-

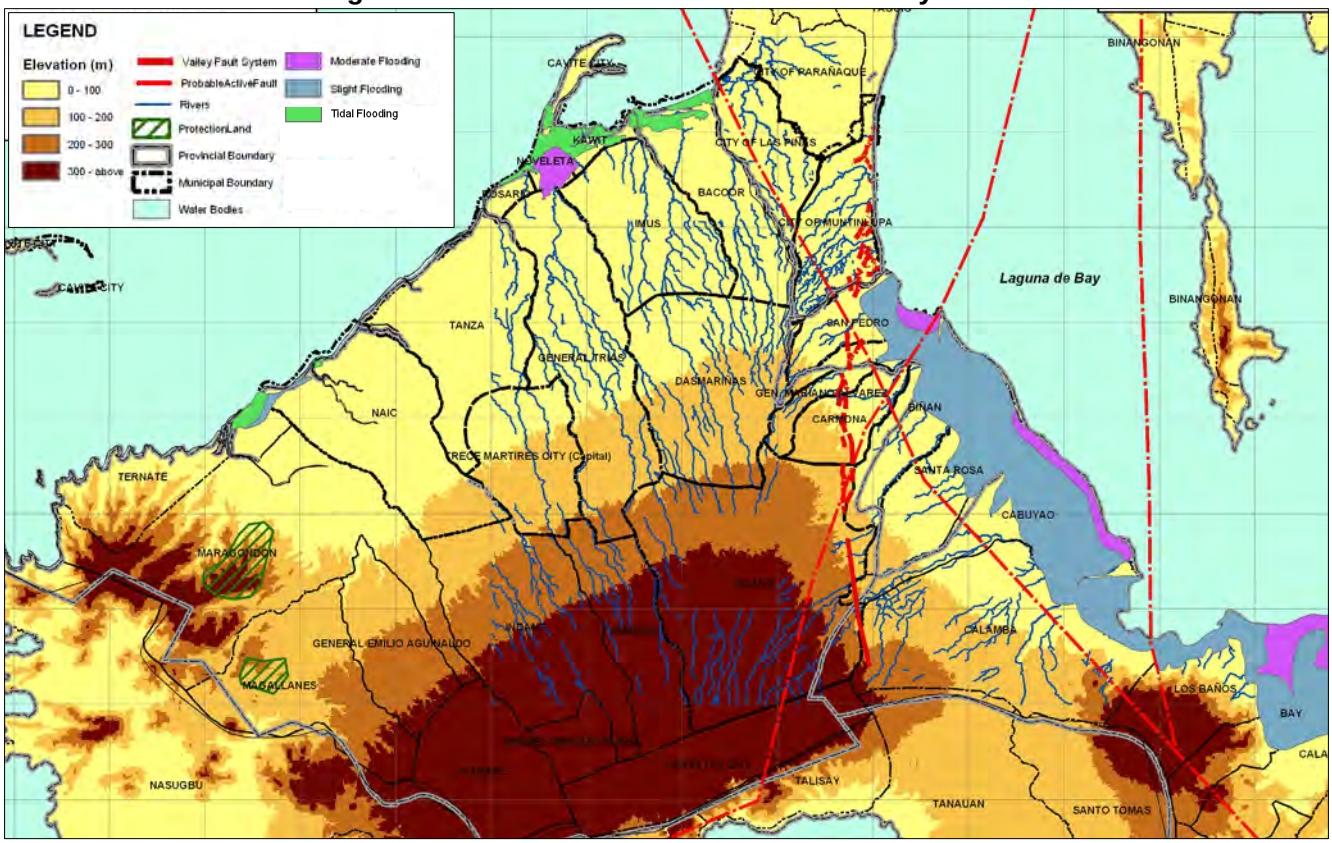
Note: - : the data is not available

Source: Laguna Lake Basins, National water resources council, 1983

Flood

Figure 2.2.5 shows the flood prone areas in the study area. The low portions of Manila Bay shorelands and Laguna Lake shorelands are the major flood prone areas in the study area. Flood problems are, generally caused by excessive runoff in the watershed, limited Manila Bay and Laguna Lake outflows, inadequate drainage facilities, and overbank flow of rivers.

Figure 2.2.5 Flood Prone Areas in the Study Area



Source: Department of Agriculture, Bureau of Soils

2.2.3 Soil and Geology

Soil Characteristics

Table 2.2.3 summarizes the soil characteristics in the study area.

Table 2.2.3 Soil Characteristics in the Study Area

Feature	Coastal Landscapes	Alluvial Plains	Piedmont Plains And Foothills	Hills And Mountains
Effective Soil Depth	Shallow to moderately deep	Shallow to moderately deep	Shallow to deep	Shallow to deep
Composition	Organic	Organic	Non-organic	Non-organic
Soil Plasticity	High	Very high	Low	Low
Soil Drainage	Poor	Moderate	Good	Good

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

(a) Coastal Landscapes

Parent soil material is fluvio-marine/alluvium. Soil is sandy and sometimes clayey and loamy in texture and is highly plastic.

(b) Alluvial Lowlands

In Cavite, parent soil material is largely fine clay that is poorly drained in flat to nearly flat areas and moderately drained in gently sloping areas. Fine loam is

found in the levee areas. As such, the levee areas in the Cavite lowlands are moderately or well drained. In Laguna, soil varies from sandy to silty clay loam to clay and is somewhat poorly drained. The area possesses potentials for high yielding wells.

(c) Piedmont Plains and Foothills (Plateau)

Parent soil material is volcanic tuff; clayey and/or loamy in texture; poorly drained and is plastic. Effective soil depth varies from very shallow to moderately deep.

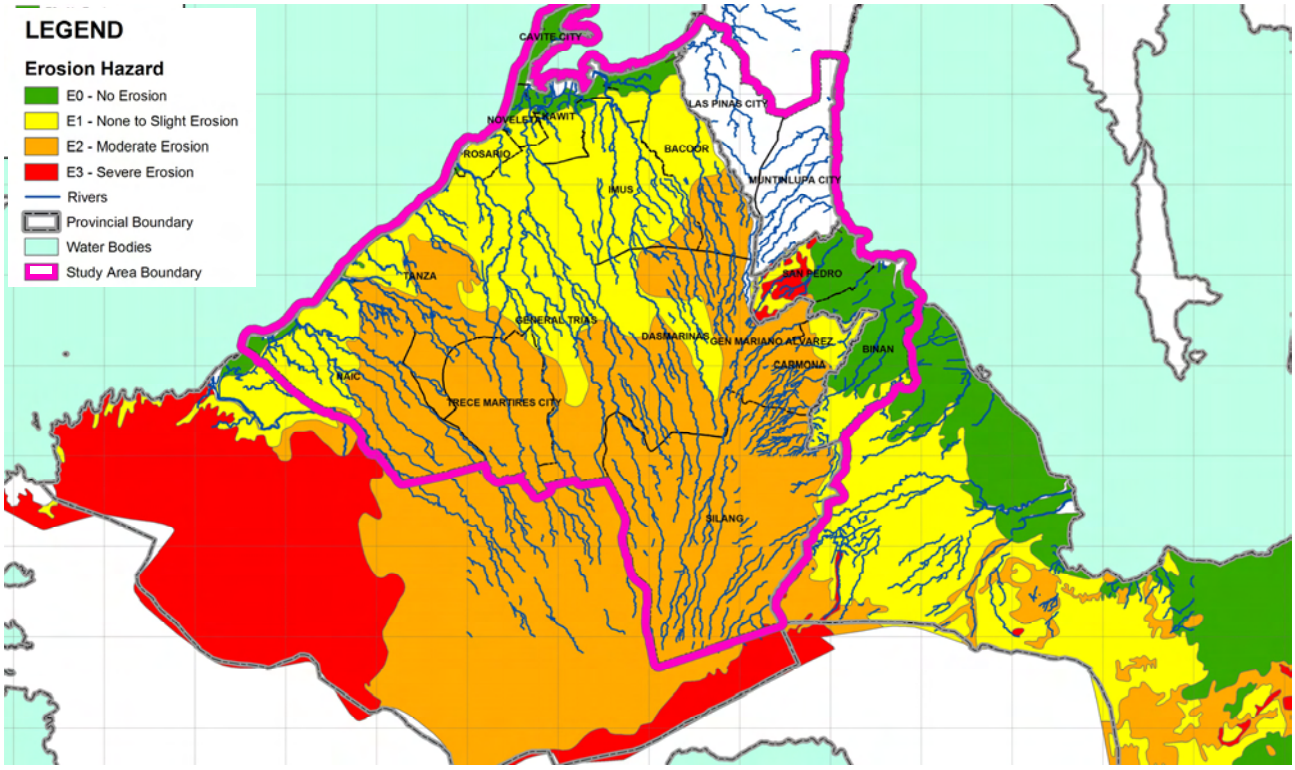
(d) Hills and Mountains

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

Soil Erosion

The study area includes moderately eroded area or severely eroded area as shown in the soil erosion map (Figure 2.2.6). Small parts of San Pedro are especially designated as severely eroded areas.

Figure 2.2.6 Soil Erosion Map



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

Geological Condition

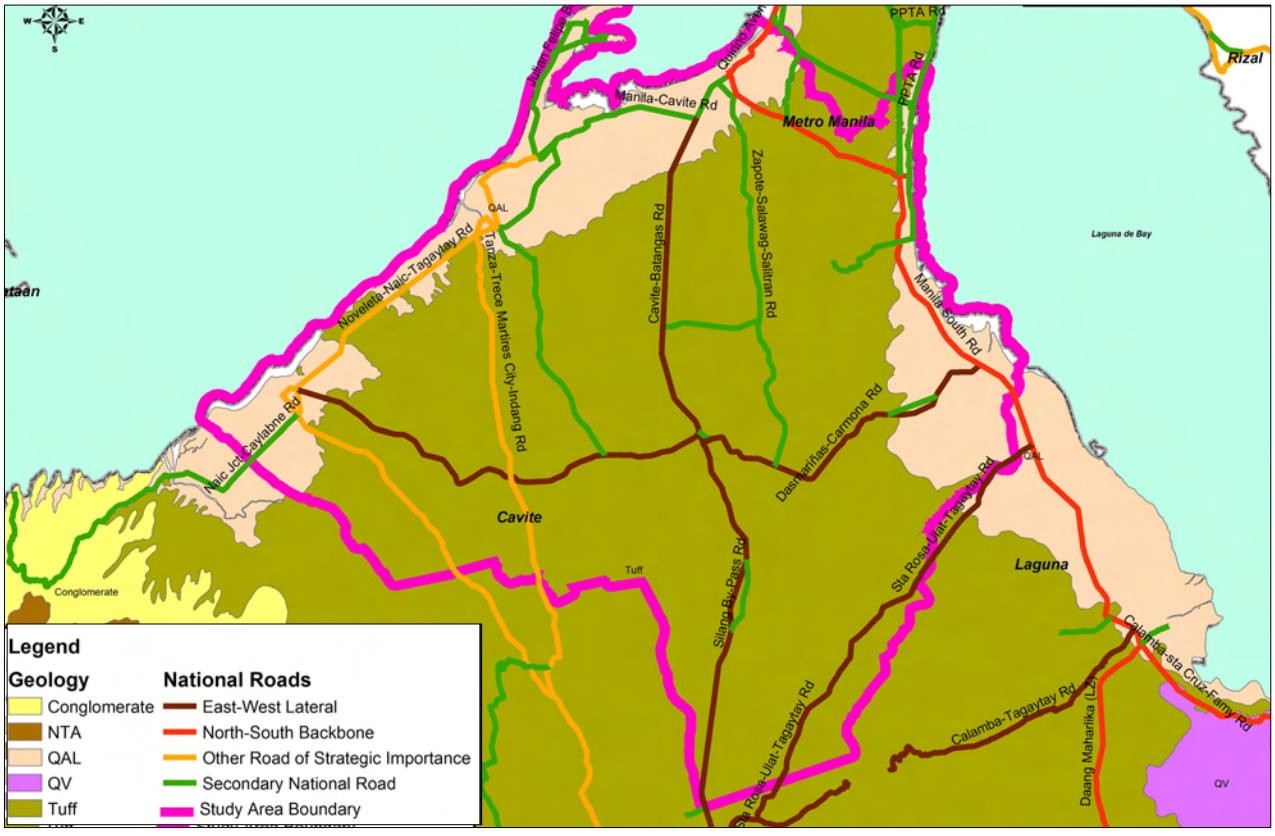
The study area is underlain by rocks of various origins and characteristics consisting primarily of QAL and Tuff as described in Table 2.2.4. These occur in association with other properties.

Table 2.2.4 Geologic Description of the Study Area

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

Note: Data for Metro Manila areas are not available.
Source: Bureau of Soils and Water Management, Department of Agriculture

Figure 2.2.7 Geological Map of the Study Area



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

2.2.4 Flora and Fauna

Flora

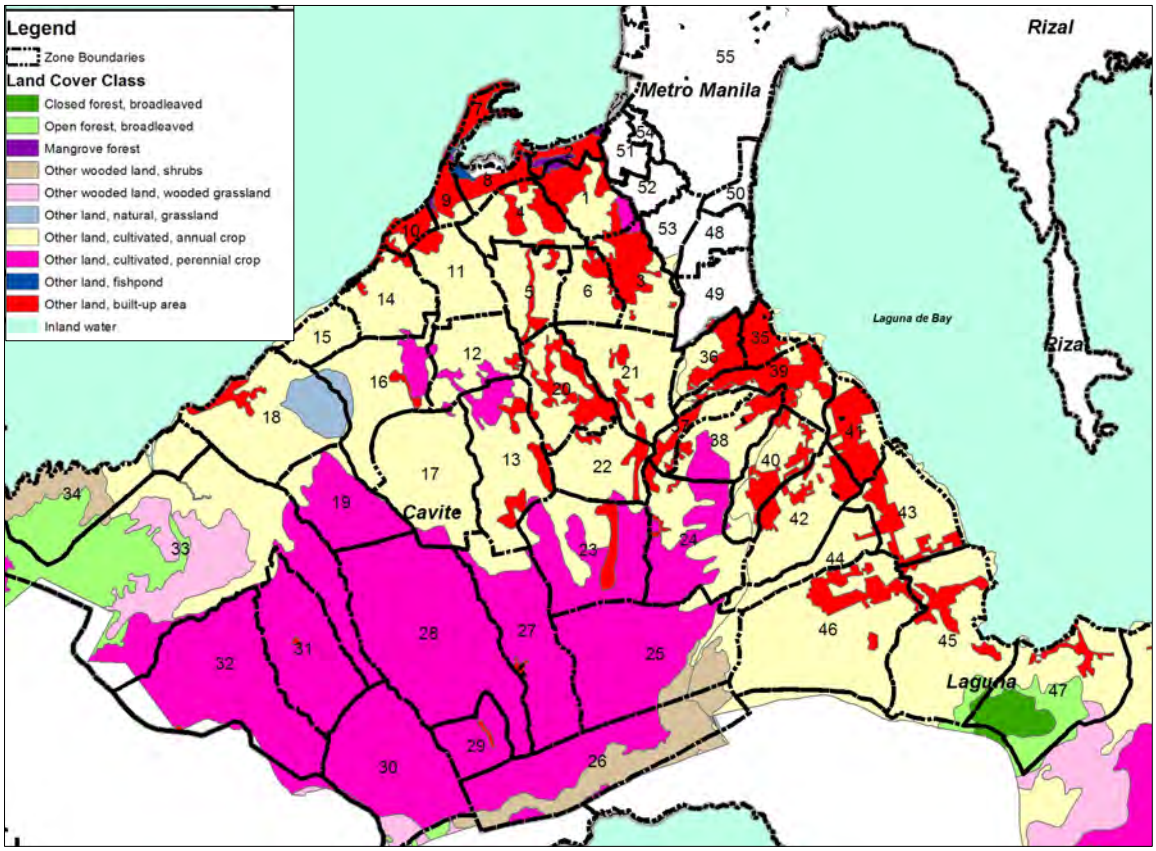
According to Philippine Biodiversity of 1997, the biodiversity classification of the study area is categorized into North/South Luzon. Main forest types of primary

forest in the Philippines are Dipterocarp forest and Mossy forest, but the study area does not include both types of forest.

Figure 2.2.8 shows the land cover map prepared by NAMRIA in 2002 and Table 2.2.5 shows land cover class, area and percentage in the study area. Most of the area is cultivated (agriculture) while the built up area covers 18% of the study area. There is no closed or open forest in the study area, but a small mangrove area exists on the Manila Bay side.

In the Philippines, 213 species of flora are designated as endangered species by the International Union for the Conservation of Nature and Natural Resources (IUCN) and 13 species of flora are imposed with severe restrictions on trade under the Convention on International Trade of Endangered Species of Wild Fauna and Flora (CITES). However, the existence of these species in the study area is unknown.

Figure 2.2.8 Land Cover Map in the Study Area



Note: Data for Metro Manila areas are not available (white color area)
Source: NAMRIA, 2002

Table 2.2.5 Land Cover Class, Area and Percentage in the Study Area

Land Cover Class	Area (ha)	Percentage (%)
Closed forest, broadleaved	-	-
Inland water	-	-
Mangrove forest	292	0.4
Open forest, broadleaved	-	-
Other land, built-up area	13,503	18.2
Other land, cultivated, annual crop	43,513	58.6
Other land, cultivated, perennial crop	14,721	19.8
Other land, fishpond	89	0.1
Other land, natural, grassland	1,294	1.7
Other wooded land, shrubs	843	1.1
Other wooded land, wooded grassland	-	-
Total	74,256	100.0

Note: Data for Metro Manila areas are not available.
Source: NAMRIA, 2002

Fauna

In the Philippines, 125 species of birds, 27 species of mammal and 11 species of reptile are designated as species for conservation as stipulated in a Department Administrative Order, DAO 48. As mandated by law, DENR prepared a national red list of Philippine wild fauna. Table 2.2.7 shows species of wild fauna (Aves, Mammal and Reptilians) in Manila, Laguna and Cavite on national red list of Philippine wild fauna. As shown in Table 2.2.6, there are 11 species of birds, 12 species of mammals and 1 specie of reptile found in Manila, Cavite and Laguna.

However, as Table 2.2.7 shows, most of these species are habitats of forests and wetlands. Because there is virtually no forest and wetland in the study area, the number of species found in the study area would be much less.

In addition, the following number of species are designated as endangered species by IUCN or with imposed severe restrictions on trade under CITES. However, the existence of these species in the study area is yet unknown.

Table 2.2.6 Number of Species Designated as Endangered Species by IUCN or with Imposed Severe Restrictions on Trade under CITES

Class	IUCN	CITE
Mammal	50	8
Birds	71	9
Reptile	6	6
Amphibian	22	—
Fish	49	1
Insect	6	1

Source: IUCN red data list 2003, CITES
(URL: http://www.cites.org/eng/resources/species.html)

Table 2.2.7 List of Wild Fauna (Aves, Mammal and REPTILIA) in Manila, Laguna and Cavite on National Red List of Philippine Wild Fauna

Common Name	Scientific Name	Conservation Status			Known Occurrence and Distribution	Habitat
		IUCN	CITES	CMS		
AVES						
Spot-billed Pelican	*Pelecanus philippensis*	VU			Laguna Bay	Forest, wetland
Black-faced Spoonbill	*Platalea minor*	CR			Manila area	Wetland, Coastline
Merlin	*Falco columbarius*		II		Laguna in 1928	Breeds on open moorland and grassland. Winters on open moorland, estuaries and marshes.
Chinese Crested Tern	*Sterna bernsteini*	CR		II	A bird was collected along Manila bay in 1905	Wetland, Sea, Coastline
Cream-bellied Fruit-Dove	*Ptilinopus merrilli*	NT			Laguna	Forest
Luzon Bleeding-Heart	*Gallicolumba luzonica*	NT	II		unspecified areas near Manila	Secondary growth forest
Whiskered Pitta	*Pitta kochi*	VU	I		Laguna	Forest
Luzon Wren-Babbler/Rabor's Wren-Babbler	*Napothera rabori*	NT			Laguna	Forest
Streaked Reed-Warbler	*Acrocephalus sorghophilus*	VU			Laguna	Wetland
Ashy-breasted Flycatcher	*Muscicapa randi*	VU			Laguna	Forest
Green-faced Parrotfinch	*Erythrura viridifacies*	VU			Laguna	Forest
MAMMALIA						
Southern Luzon Giant Cloud Rat	*Phloeomys cumingi*	VU			Laguna	This species was found in disturbed lowland forest from 150 m to 900 m elevation.
Northern Luzon Giant Cloud Rat	*Phloeomys pallidus*	NT			Laguna	From sea level to high mountains (at least 2,000 m), in primary and secondary forestland heavily disturbed scrub.
Luzuon Short-nosed Rat	*Tryphomys adustus*	VU			Laguna	Mossy forest at about 2500 m in the Central Cordillera and in the lower parts of Mt. Makiling (ca. 100-350 m) .
Crab-eating Mancaque/Long-tailed Macaque	*Macaca fascicularis*	NT	II		Laguna	Agricultural areas near forest, second growth, secondary forest, and primary forest from sea level to at least 1800 m in lowland and montane forest.
Mottle-winged Flying Fox/White-winged Flying Fox	*Pteropus leucopterus*	EN	II		Laguna	Poorly known. Moderately common in primary montane forest on Catanduanes, present in lowland forest.
Golden-crowned Flying Fox	*Acerodon jubatus*	EN	I		Manila	Primary and secondary lowland forest up to 1100 m. Some roosts reported from mangrove and on small islands.

Con't. Table 2.2.7

Common Name	Scientific Name	Conservation Status			Known Occurrence and Distribution	Habitat
		IUCN	CITES	CMS		
Philippine Nectar Bat/Philippine Dawn Bat	*Eonycteris robusta*				Cavite	Until the 1960s, commonly taken in caves adjacent to forest and commonly netted in and adjacent to primary forest from sea level to 1,100 m, often in areas with mixed forest and clearings, but never in primarily agricultural areas.
Luzon Pygmy Fruit Bat	*Otopteropus cartilagonodus*	VU			Laguna	Known only from primary and well-developed secondary forest, in lowland, montane, and mossy forest from 200 m to 1900 m. Abundance is low to moderate, usually most common at middle elevations.
Fischer's Pygmy Fruit Bat	*Haplonycteris fischeri*	VU			Laguna	One of the most common fruit bats in primary forest, especially at middle elevations; it is rare in secondary forest, and absent in entirely agricultural areas. Within forest, it occurs from about 150 m to 2,250 m; abundance usually increases with elevation up to about 1,200 m- 1,500 m, and then declines.
Philippine Forest Roundleaf Bat	*Hipposiderous obscurus*	NT			Laguna	Locally common to uncommon in primary and disturbed forest up to 850 m. Several records of specimens taken in caves, one in a mine shaft, one in a dark cavity in a tree buttress, and one in a hollow tree.
Large Rufuos Horseshoe Bat	*Rhinolophus rufus*	NT			Laguna	Recorded in primary and good secondary forest, either in or near caves.
Small Runfous Horeseshoe Bat	*Rhinolophus subrufus*	DD			Laguna,Manila	Poorly known. Recorded from near sea level to over 1,000 m, with some records from caves.
REPTILIA						
Gray's Monitor Lizard	*Varanus olivaceus*	VU			Laguna,Manila	

Source: 2002 statistics on Philippine Protected Areas and Wildlife Resources, 2002, DENR Protected Areas and Wildlife Bureau
The Field Museum (http://www.fieldmuseum.org/), Birdlife red data book (http://www.rdb.or.id/)

Protected Areas

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

(a) Strict nature reserve;

(b) Natural park;

(c) Natural monument;

(d) Wildlife sanctuary;

(e) Protected landscapes and seascapes;

(f) Resource reserve;

(g) Natural biotic areas; and

(h) 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. However, there is neither the Initial Component of Protected Area nor Proclaimed Protected Area in the study area. In addition, the study area does not include designated wetland under the Ramsar Convention, World Heritage-listed area and Man and the Biosphere Reserve designed by UN Educational, Scientific and Cultural Organization.

2.2.5 Air Quality, Noise Level and Water Quality

Air Quality

Ambient air quality is monitored by DENR. One monitoring station (Trece Martires, Cavite) exists in the study area as shown in Figure 2.2.9, which monitors the total suspended solid (TSP) and Lead level. Figure 2.2.10 and Figure 2.2.11 show the results of the air quality monitoring in 2004.

According to Figure 2.2.10, TSP level for 3 days during the dry season in March fails the National Ambient Air Quality Standards. It is generally observed that the TSP level during the dry season is higher than during the wet season. On the other hand, lead levels recorded for each quarter in 2004 are below the National Ambient Air Quality Standards.

An ambient air quality survey was conducted by the study team on 15-16 February 2005 at the municipality of Carmona along Governor’s Drive as shown in Figure 2.2.9. Table 2.2.8 reveals the survey results on the TSP, which are lower than the National Ambient Air Quality Guideline for Criteria Pollutants for Short Term Period.

Sulfur dioxides, nitrogen dioxides, and carbon monoxides have been undetected or were below detection limit for the equipment.

Figure 2.2.9 Pollution Survey Point

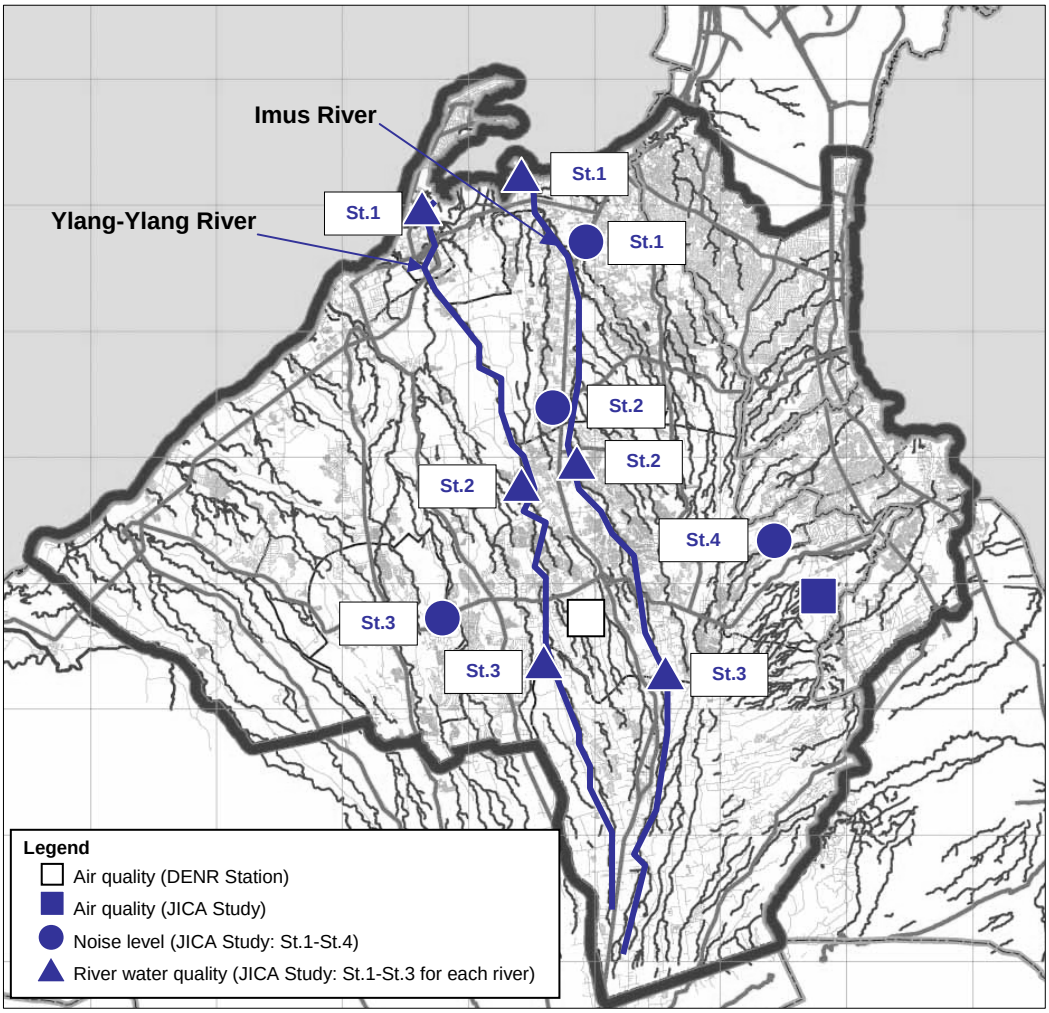
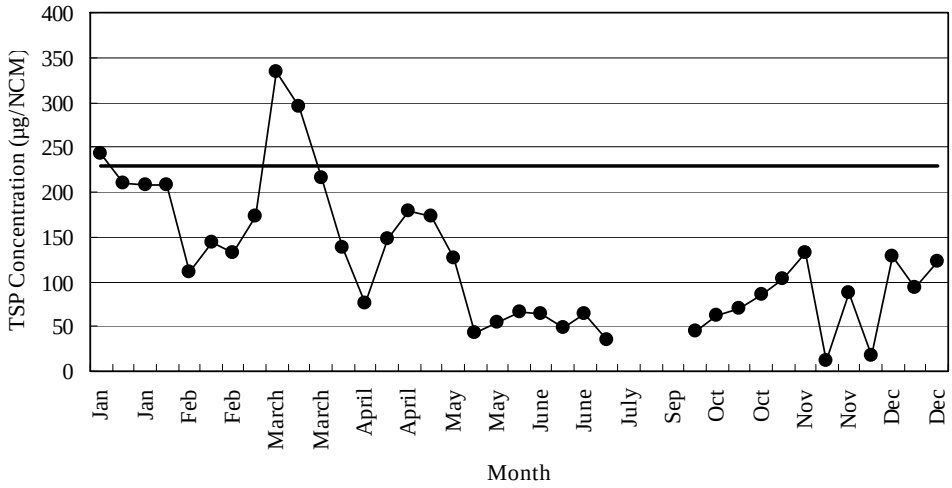
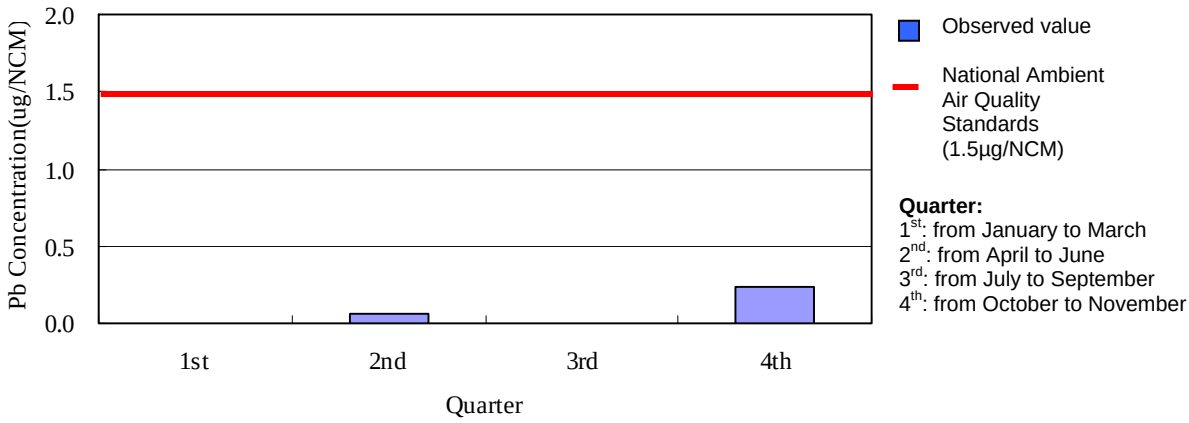


Figure 2.2.10 TSP Level (24hours average) in Cavite (2004)



Note: Data from July to September 2004 is not available.
Source: DENR

Figure 2.2.11 Lead Level (3 months average) in Cavite (2004)



Note: Data from July to September is missing
ND means not detected (Detection limit is 0.05 µg/NCM)
Source: DENR

Table 2.2.8 Results of the Ambient Air Quality Survey (2005)

(Unit:µg/NCM)

Items	Observed Concentration	National Ambient Air Quality Guideline*	WHO Guideline
TSP	84	230	-
SO_2	ND	180	12.5
NO_2	ND	150	40
CO	ND	10 mg/m^3 for 8 hrs averaging time	10 mg/m^3 for 8 hrs averaging time

ND – Not detected
Note: SO_2 Detection Limit = 5 µg/Ncm; NO_2 Detection Limit = 2.5 µg/Ncm;
CO Detection Limit = 0 to 100 ppm with 1 ppm increment.
* - 24 hours averaging time unless otherwise specified as per DAO 2000-81.
Source: JICA Study Team

Noise Level

There is no available data on noise level in the study area because DENR has no regular monitoring point in the study area. Therefore, the study team conducted a noise level measurement survey on February 15 and 16, 2005 at the stations shown in Figure 2.2.9. The periodic average noise levels recorded in decibels (dB) A [Logarithmic equivalent (Leq) form] are as shown in Table 2.2.9 below.

The propagation of noise level in all stations based on measurements failed to meet the DENR allowable standards for the different periods under the DENR Ambient Noise Quality Standards Sec. 78 Chapter IV, Article 1 of NPCC Rules & Regulations, 1978 standard limits for Class B category.

The main reason for this condition was that during the survey, there was a sustained high vehicular traffic movement passing through the sampling points. Also, there was very minimal or an absence of noise abatement structures and/or

vegetation that would dampen the noise levels from such sources along the alignment where the sampling stations are located.

Table 2.2.9 Average Periodic Noise Levels (2005)

Period	Average Periodic Noise Levels in decibels (dB)				DENR Allowable Standard (dB) – Class B Category	WHO Guideline (dB) – Outdoor living area
	St 1	St 2	St 4	St 5		
Morning	73.7	79.6	79.3	74.9	60	-
Daytime	72.0	80.4	77.9	78.6	65	55
Evening	72.2	77.3	73.1	75.2	60	55
Nighttime	71.9	75.2	71.5	57.7	55	-

Note: Station 5 is the same point as ambient air quality survey point.
Morning: 5:00 to 8:00, Day time 9:00 to 17:00, Evening: 18:00 to 21:00, Night time 22:00 to 4:00
Class B is a section or contiguous area which is primarily a commercial area.
Source: JICA Study Team

Water Quality

Ambient water quality of surface water is monitored by DENR in four rivers of the study area (see Figure 2.2.9). Both DO level and BOD level are monitored. Table 2.2.10 shows the results of the monitoring in 2004. The DO level of Ylang-Ylang River and BOD level of both Ylang-Ylang River and Imus River fails the national standards for water quality.

Table 2.2.10 Results of the Water Quality Monitoring (2004)

(Unit: mg/l)

River Name	Class	No of Station	Items	Observed values			Water Quality Criteria*
				Average	Minimum	Maximum	
Labac-Balsahan River	C	3	DO	5.8	3.2	8.0	5
			BOD	4.6	2.0	8.0	7(10)
Ylang-Ylang River	C	5	DO	4.1	ND	7.9	5
			BOD	22.5	1.0	235.0	7(10)
Imus River	C	5	DO	5.7	1.0	9.0	5
			BOD	7.5	3.0	29.0	7(10)
Canas River	C	4	DO	5.9	2.2	8.4	5
			BOD	4.2	1.0	12.0	7(10)**

Note: ND – Not detected
Observed values are average of all stations in each river
* The numerical limits are yearly average values.
**The values without parenthesis are criteria for rainy season while the values with parenthesis are criteria for dry season. 7 is a value for rainy season and (10) is a value for dry season.
Class C is a river for fishery water, recreational /water class II (boating, etc) and Industrial/water supply Class I (for manufacturing process after treatment)
Source: DENR, DAO 90-34

In addition, a water quality survey was conducted by the study team in March 2005. The water samples were taken from three points along the Imus River and three