3.3 Environmental Impact Assessment (EIA)

The Environmental Impact Assessment for the areas affected by the project activities is described in this chapter, section 3.3.1 gives account of EIA for Natural Environment and section 3.3.2 is for Social Environment.

3.3.1 Basic Scheme and Environmental Impact Assessment for Natural Environment

(1) EIA for Natural Environment

1) Environmental Characteristics in the Study area

a) Overview of Cebu Island

Cebu Island is located in approximately Latitude 11°N, Longitude 124°E, in the central part of the Philippines Archipelago. It belongs to typical monsoon region in climate and occasionally typhoons approaches it.

Geomorphological base of the island is upheaved coral reef therefore limestone layer crop out in the whole island. Topography of coast shows variations in which shoal of marsh origin and shallow estuary are representative.

The Soil parent material in Cebu is basically limestone,especially along the coastal areas. And parts of the hilly areas in the region are shale, with calcareous content.

b) Meteorology

Relevant data since 1948 to 2000 was given by the CEBU office of PAGASA (Philippine Atmospheric Geophysical Astronomical Services Administration). Table 3.3.1-1 shows Cebu Climatological data and Fig. 3.3.1-1 shows Monthly Temperature and Rainfall in Cebu City.

Based on the rainfall monthly record, February to May is relatively dry season.

Through the year, monthly average temperature is higher than 30°C, however temperature of January, February are relatively low and on May, June, July, it becomes high respectively from 30°C to 33°C

Humidity is constantly through the year, the mean value indicate 79 %.

As well known, Philippines sea is noticeable for the occurrence of typhoon, which approach Cebu island and the average numbers of typhoon that passed is 29 per a year.

Table 3.3.1-1 Cebu Pagasa Climatological Data

Month	Temperature (°C)	Rainfall (average :mm)	Mean relative humidity (%)	Number** of typhoon
January	26.8	102.1	80	2
Feburuary	27.0	71.5	79	0
March	27.7	53.0	77	2
April	28.8	41.9	76	0
May	29.4	67.6	75	1
June	28.8	185.7	79	3
July	28.2	186.9	80	0
August	28.5	151.7	79	1
September	28.3	185.7	80	1
October	28.1	179.8	81	3
November	27.9	158.8	81	7
December	27.3	118.3	82	9
Annual	28.1*	1,503.00	79*	29

Source : Philippine Atmospheric Geophysical Astronomical Services Administration
**: Typhoon that passed 100 km radius from the station.
*: Average

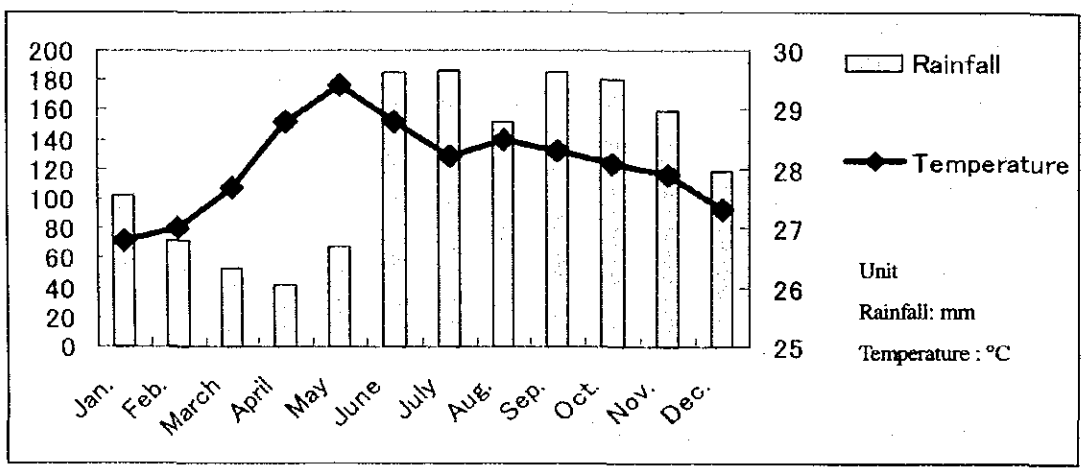

Fig. 3.3.1-1 Monthly Temperature and Rainfall in Cebu City

c) Topography and Geology

As a result of field observation, following topographic form are found out with regard to coastal morphology. Those are strait/channel, gulf, bay, coral reef, shoal and estuary. On the other hand, terrace, lagoon and back marsh are shown as a remarkable morphology in the hinterland area. Table 3.3.1-2 shows the topographic characteristic of the 4 ports.

Table 3.3.1-2 Topographic Characteristics of the Cebu Base Port and New Cebu Port

Port name	Topographic Forms/Type	Remarks
1. Cebu Base Port	Channel	Narrow channel between Mactan island. Original hinterland is marsh surrounded by river Guadalupe and Jose
2. New Cebu Port	Bay/shoal	Small bay in the north of Cansaga Bay. A sand shoal appears.

Cebu Island and its surroundings are basically up heaved coral island. The time of upheaval,

it is assumed, started late Tertiary of geo-age and stops recently. Limestone crops out generally in the whole region of the islands, however, if observed locally in detail, geological type represents variations in accordance with each geomorphology. For example, in case that marsh exists in the hinterland, mud sediments are thick and, in case that there is river similarly thick sediments are found.

As a result of the field observation, geological type is classified as follows:

- Coral Reef: It consists of mainly corals, hard rock and shallow in which live corals are dotted.
- and/Gravel Beach: Relatively long and wide beach usually consists of coral origin sand and gravel.
- Shoal: It is shallow bottom less than 3m deep, geological type of bed is sand and/or gravel.
- Coral Bed: Basically corals distribute, but surface is covered by sand and/or mud
- Mud Flat: Thick muddy sediment overlies the bed, which originated from back marsh and/or river deposit of hinterland.

Table 3.3.1-3 Geomorphological Condition in the Four (4) Ports

Port Name	Geomorphology	Geological Type of Sea Bed	Thickness Soft Soil (m)	Remarks
1. Cebu Base Port	Channel (Originally shoal)	Sand/clay	25	Seabed material is mainly reclaimed and dredged soil along the berth. Siltation and drift are a little.
2. New Cebu Port	Shoal	Sand/clay	25	Sandy shoal of marsh origin. Siltation and drift are a little.

d) Fauna and Flora

There are no rare biological species that can be identified around the study areas. However the vicinity swamp and tidal flat area of New Cebu Port, namely Cansaga bay, threatened water bird species Chinese Egret identified occasionally. And also this area is important for migratory shorebirds.

e) Current Environmental Condition in Candidate New Cebu Port

Table 3.3.1-4 shows the summary of environmental evaluation of candidate new Cebu port

Table 3.3.1-4 Current Environmental Condition Matrix of Candidate New Cebu Port

New Port Candidate Areas	Environmental Description	Evaluation/Mitigation Measures
1. Consolacion Area	Some kinds of mangrove species scatted in the proposed reclaimed areas that are *Sonneratia alba, Avicennia marina, Rhizophora apiculata* (Mangrove species). But all of Sonneratia trees were already cut for fuel wood. And sea grass of family Zosteracaea(Seagrass) and sea urchins habits in the area.	Mangrove planting plan should be formulated on the substitution areas surrounding the port development area. The planting cost will be included in port construction cost.
2. North Mactan Area	Coral reef and mangrove communities occur on the reef edge in Magellan Bay North Mactan. Squatter's houses occur on the coastline north Mactan, so project activities must be attentive to treat the squatters living around proposed area. Seabed off the shore of north Mactan is covered with sea grass and scattered small corals. Be attentive to treat the corals and sea grass	Coral reef and marine ecosystem is the precious resources in resort island Mactan. Port development project is not recommended from the point of environmental view.
3. South Mactan Area	Small Mangrove community occurs coastline and lagoon off the shore. Mangrove species : *Avicennia marina, Sesuvium portulacastrum Rhizophora apiculata* (Mangrove species) Coral reef occurs on the lagoon and on the reef edge. There are swimming beach and diving spots east and south Mactan, pay attention to contamination of replacement from ships. There are fish ponds in the south Mactan, environmental impacts will be expected to the fish ponds while access road are constructed	Lagoon in south Mactan is precious resources in resort island Mactan and fishery resources. Port development project is not recommended from the point of environmental view
4. Cebu South Area	Large reclaimed land filled up on the swamp area by the Cebu South Coastal Road Project, back mangrove species are remaining along the channel. Proposed project activities shall be carried out in the front of existing reclaimed area seaward, corals, and mangroves do not occurs on the area in front of existing reclaimed area. Thick siltation must be expected on the seabed rather than corals from the result of field survey.	No mangroves and coral reefs occurs in front of existing reclamation area. The area has been already covered with the soil from catchments area through the river. The sedimentation with siltation is anticipated in future.
5. Minglanilla Area	Mangroves and coral reef are not seen in the relevant area, thus it is not considerable to raise significant environmental impacts for fauna and flora. Small fishery village exists in Minglanilla area, they are using the coastline for swimming and gathering shellfish Coastal erosion will be expected after reclamation in the vicinity area	Predicted natural environmental impacts may be negligible.

(2) Environmental Consideration Policy in the Philippines

1) Environmental legislations in the Philippines

The 1987 Philippine Constitution lays down the basic framework for policy on the environment. Section 16, Article II states that " *The State shall protect and advance the rhythm and harmony of nature.*" Section 15 of the same Article also mandates the State " *to protect and promote the people's right to health.*"

The basic environmental ordinance consists mainly of two Presidential Decrees (P.D.).

- the P.D. No. 1151 (Established and enacted on June 1977) known as the "Philippine Environmental Policy"
- P.D. No. 1152 (Established and enacted on July 1977) known as the "Philippine Environmental Code".

The latest DENR Administrative Order (DAO) No.37, series of 1996 or DAO 96 - 37, which expressly supersedes DAO 21, series of 1992. DAO 96 - 37 is an attempt to further streamline the EIA system and to strengthen the processes for its implementation.

Table 3.3.1-5 Philippines EIA System Legal and Regulation Framework

Law/Regulation	Year	Feature
Presidential Decree (P.D) 1151	1977	Philippine Environmental Policy : requires sponsors of all government and private projects affecting the quality of the environment to prepare an environmental impact assessment (EIA)
P.D 1586	1978	Establishing an Environmental Impact Statement (EIA) System: centralized the EIA System under the National Environmental Protection Council (NEPC), & authorizes the President and NEPC to proclaim projects and activities subject to the EIS system
Proclamation 2146	1981	Proclaims certain area and types of projects as environmentally critical and within the scope of the EIS system
DENR Administrative Order 96 - 37	1996	Revising DAO 21, Series of 1992, to further strengthen the implementation of the EIA System

2) The Philippine Environmental Impact Statement (EIS) System

The early EIA System of the Philippines was established by the implementation guideline of P.D. No. 1151 (May 1978) and the Environmental Impact Statement (EIS) System was indicated in the Section 4of P-D.No. 1151.

By the P.D. NO. 1586 (June, 1978), the Philippine EIS was officially established and enacted in June, 1982 with its basic policy objectives "to attain and maintain a rational and orderly balance between socio-economic growth and environmental protection".

Also, the government has established a rules and regulations prescribing the function of related agencies and committees as well as the framework of EIA System in July 1983. Furthermore, in 1992, the additional policy objectives of the EIS System was promulgated in D.A.O. No. 21 to promote its proper administration and reinforcement in order to achieve further preservation of the environment These additional policy objectives are:

a) Incorporate environmental considerations in early stages of project development;
Assess the direct and indirect costs and benefits of projects to the local community and the country as a whole;

b) Reduce the unacceptable impacts of projects and describe the most appropriate and cost-effective mitigation measures, including both pollution prevention and control;

c) Encourage early and continuous public involvement to help ensure that projects are socially acceptable;

d) As much as possible, involve a wide spectrum of concerned sectors and the adjacent communities that will be affected by the project development in the exchange of views, information and concerns in order to effect projects that are beneficial to the majority and acceptable to the community; and

e) Provide the basis for assessing the actual impacts of implemented and completed projects, and identify, other significant impacts in order to effect corrective actions and improve future projects of similar type and magnitude.

3) Environmental Administrative Agencies Involved in EIA System

The administration that involves environment is done by DENR and Environmental Management Bureau (EMB), a subordinate agency of DENR. Their duty and responsibility is on the management and examination of EIA, and has an authority to impose penalties for the violation. Presently, the EIA Section is established in EMB. The EIA will be examined in this section and the project proponent can implement its project when the Environmental Compliance Certificate (ECC) is approved and issued. Fig. 3.3.1-2 shows EIA system.

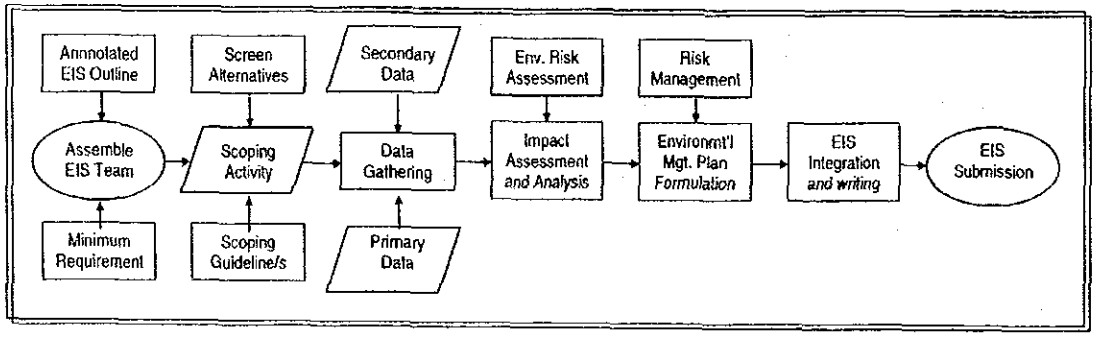

Fig. 3.3.1-2 EIA process

4) Role and Responsibility of CPA and study Team for preparation of EIA

Table 3.3.1-6 shows the roles and responsibilities of Cebu Port Authority and JICA study team.

Table 3.3.1-6 Roles and Responsibilities of each organization

Organization	Roles and Responsibilities
CEBU PORT AUTHORITY: Organization which is the owner of the port development projects	➢ *Provides project description* ➢ Facilitates and assist the consultants in the gathering of secondary data, letter of introduction, permits and other pertinent requirements from the LGU of identified communities ➢ Introduces the project and consultants to the LGU of identified communities through a formal meeting ➢ Preparation of Information, Education and Communication materials about the project, the projected impacts and mitigations, as well as , the benefits ➢ Acts as liaison of the project in relation to the consultants, government line agencies, non-government agencies and people's organizations ➢ Submission IEE/EIA to DENR relevant secession
JICA STUDY TEAM (OCDI/PCI) : Technical expert team for assist the port development project formulation	➢ Provides the technical expertise in the assessment process ➢ Informs the identified LGU and the affected people about the IEE/EIA process using IEC materials. That this is being done by the multidisciplinary team to assure them that the project shall be environmentally sound following strictly the parameters set-forth by DAO 96-37 and JICA ➢ Presents the results of the study (impacts and mitigations) to the affected communities for validation of findings ➢ Coordinates with the EMB Regional Director, PENRO, CENRO and the Review Committee in relation to the progress of the study , up to its final review

5) Type of Document Required and Principal Reviewing Agency

The EIS System covers the following projects and undertaking:

a) Environmentally Critical Projects (ECPs)

Environmental Critical Projects (ECPs) is defined as a project with high potential for significant impact and is listed as such under Presidential Proclamation No. 2146, series of 1981 and Presidential Proclamation No. 803, series of 1996, as well as other projects which may be proclaimed as environmentally critical in accordance with Section 4 of PD 1586.

Environmentally Critical Projects

(i) Heavy Industry

- Non-ferrous metal industries
- Iron and steel mills
- Petroleum and petro-chemical industries, including oil and gas
- Smelting plants

(ii) Resource Extractive Industries

- Major mining and quarrying industries
- Forestry projects
  - Logging
  - Major wood processing projects
  - Introduction of fauna (exotic animal) in public/private forests
  - Forest occupancy
  - Extraction of mangrove production
  - Grazing

(iii) Fishery projects

- Dikes for/and fishpond development projects

(iv) Infrastructure projects

- Major dams
- Major power plants (fossil-fueled, nuclear-fueled, hydroelectric or geothermal)
- Major reclamation projects
- Major roads and bridge

(v) Golf course projects

After checking the Environmentally Critical Projects above mentioned major reclamation projects in the Infrastructure projects is applicable to the port development projects. The *major reclamation projects is defined as a project which involve the filling or reclaiming* of areas (foreshore, marshes, swamps, lakes, rivers, etc.) equal to or exceeding twenty-five (25) hectares.

b) Other ordinances relevant to the environment are:

(i) The DENR Administrative Order (D.A.O.) No. 14 which establishes environmental standards for air pollution, exhaust emission standards, exhaust emission standards for automobiles and air quality management standards,

(ii) The D.A.O. Nos., 34 and 35 which establishes criteria for water quality and effluent,

(iii) The D.A.O. No. 29 "Implementing Rules and Regulations of Republic Act 6969" which establishes various ordinances with several government agencies involved, such as DENR, Ministry of Public Affairs, and Ministry of Health, and

(iv) The "Ordinance for the Conservation of Nature" like P.D. No. 3915 which establishes provision for the parks for public good and game preserve/sanctuaries to protect wild life

(3) Project Area, Location and Activities

1) Development Project Sites and Development Project Description

Development Sites are defined in following 2 areas:

a) The existing Cebu port as Cebu Baseport
b) The proposed new Cebu port as the New Cebu Port

2) Cebu Integrated Port Development Project (CIPDP) covers 2 major ports

Major Ports:

a) The existing Cebu Baseport in Cebu City
b) New Port in Bgy. Tayud, Consolacion town

(4) Project Components

1) Cebu Base Port

Expansion Area including passenger terminal & berth	=	10 ha.
Reclamation	=	none
Equipment	=	to be procured later
Access Road	=	no new access road

2) New Cebu Port in Consolacion town

Expansion Area including berthing and back-up area	=	10 ha
Reclamation	=	60 has.
Equipment	=	10 quay cranes
Access Road	=	20-m wide x 1500 m long access road

Others	=	Water & Electricity Supply; solid waste handling system

Table 3.3.1-7 shows the summary of works to be undertaken.

Table 3.3.1-7 Cebu Integrated Port Development Project Activities

Table 1		
Cebu Integrated Port Development Project Activities		
	Cebu Base Port Project	**New Cebu Port Project**
Phase and Project Works	Description / Coverage of Project Activities	
A. Pre-construction Phase		
1) ROW Acquisition	none	Acquisition of 20m x 1,500m access road right of way
2) Detailed Engineering	Horizontal/Vertical Struct.	Horizontal/Vertical Struct./Marine structures
3) Tendering/Contracting	Civil Works	Civil and Mechanical Works
B. Construction Phase		
1) Preparatory Works	Site clearing and fencing of work area; construction of temporary facilities	Site clearing and fencing of work area; construction of temporary facilities
2) Civil Works - Horizontal Structures	Construction of terminal expansion area	Reclamation of 60 hectares of land ; Construction of retaining structures/revetment works; construction of access road 1,500 m and berthing facilities; construction of parking areas
3) Civil Works - Vertical Structures	Expansion of existing terminal building	Construction of port terminal and related buildings
4) Mechanical Works	none	Procurement and installation of cargo handling machinery and eqpt.
5) Electrical Works	Installation of electrical system for building and lighting system for terminal yard	Installation of building electrical systems and yard lighting works
6) Sanitary Works	Construction of sewage disposal system	Construction of sanitary and plumbing works
7) Miscellaneous	Rehabilitation of existing berthing facilities	Channel dredging
		Watersupply
C. Operation and Maintenance Phase		
	Operation and maintenance of berthing/ship landing facilities; O & M of terminal buildings	Operation and maintenance of berthing/ship landing facilities; O & M of terminal buildings
D. Abandonment Phase		

(5) Current Environmental Condition in Development Sites

Environmental survey was carried out from May to July in 2001 by JICA study team. This section describes the current environmental status in the development sites from the results of the environmental survey.

1) *The Surveyed Items*

The Natural Environmental survey items that we conducted are as follow:

a) Water Quality
b) Seabed Quality
c) Noise
d) Fauna and Flora, especially corals and mangroves

a) Water Quality

Water quality samples were collected at 5 stations at each study site : Fig. 3.3.1-3, 3.3.1-4, show 1) Cebu Base Pot, 2) New Cebu Port (Consolacion site), respectively. Following parameters were analyzed in collected samples in each site for the preliminary EIA study of the project.

DENR Administrative Order No.34 defined the water quality as 8 classifications based on water usage. The water at the coastal area in this project is categorized Class SC in the classification of DENR

1) pH	2) Dissolved Oxygen
3) BOD	4) COD
5) Total Suspended Solid	6) Surface Active Agent with Methyeleneblue
7) Oil and Grease (Content)	8) Phenols
9) Total Coliform	10) Fecal Coliform
11) Copper	12) Arsenic
13) Cadmium	14) Hexavalent Chromium
15) Cyanide	16) Lead,
17) Total Mercury	18) Organic Phosphorous
19) Total P	20) Total N

The results of the seawater quality survey in respective sites are shown in Tables 3.3.1-8 and 3.3.1-9. These results shall be compared with the DENR Standards for Class SC (Coastal Water). Class SC per DENR DAO 34 (DENR Administration Order No.34 Water Quality Criteria Amending Section 68 and 69 issued in 1990) is chosen as reference because the present water use of all the project sites are for boating and navigation purposes.

2) Test results of parameters

Almost all the seawater samples collected are clear in color except for seawater samples 1, 2 and 3 from Cebu Base Port that are slightly turbid. This observation indicates that these water samples are slightly polluted.

pH: All the registered pH levels of seawater samples are within the prescribed pH range for Class SC coastal water.

DO: Comparing with the DENR Standard of 5 mg/L for dissolved oxygen, all seawater samples registered higher than the prescribed standard.

BOD: The BOD levels of seawater samples 1,2 and 3 from Cebu Base Port area are notably higher than the DENR standards. This observation can be attributed to the disposal of wastewater directly to the water channel. These samples were

taken very near the pier areas and possibly near to the outfall of the wastewater coming out of the port area. In contrast, those samples taken outward of the pier areas registered lower BOD values but still higher than the DENR standard. The BOD samples of seawater samples from Consolacion area are also higher than the DENR standards. The Seawater samples from San Remigio and Toledo Port areas registered lower BOD values compared to the BOD levels from Cebu Base Port area.

COD: The COD levels of all seawater samples follow the BOD trends for all the survey sites.

Coliform: Most of the seawater samples registered very high total coliform levels. Specifically, water samples from Cebu Base Port area except for sample 5 exceeded the DENR standard. Sample 3 from Consolacion area also registered a very high coliform count. High levels of coliform were also registered for seawater samples 2 and 3 from Toledo area. Contrastingly, all seawater samples from San Remigio area are well below the DENR standard. Fecal coliform levels were found to be very high for seawater sample 2 of Cebu Base Port area and seawater sample 3 of Consolacion area. Almost all the rest of seawater samples registered less than 2 MPN/100 mL.

Copper: Copper levels for all seawater samples taken from Cebu Base Port area registered a value of 0.05 mg/L which is the same as the DENR standard. All the rest of seawater samples taken from Consolacion, San Remigio and Toledo Port areas are very well below the DENR standard.

Arsenic: Seawater samples 1, 2, 3, and 5 from Cebu Base Port area registered concentration levels higher than the DENR standard of 0.05 mg/L. The same trend for seawater samples 2, 3 and 4 from Toledo Port area was also observed. All the rest of seawater samples are well below the DENR standard fro arsenic.

Chromium: Hexavalent chromium registered very low concentration levels for all seawater samples.

Lead: Lead levels registered higher values than the DENR standard of 0.05 mg/L.

Mercury: Mercury on the other hand registered concentration levels that are very well within the DENR standard.

For total phosphates, total nitrogen and sulfates, there are no published DENR standards. Registered concentration values for all water samples are well within the expected concentration range for seawater.

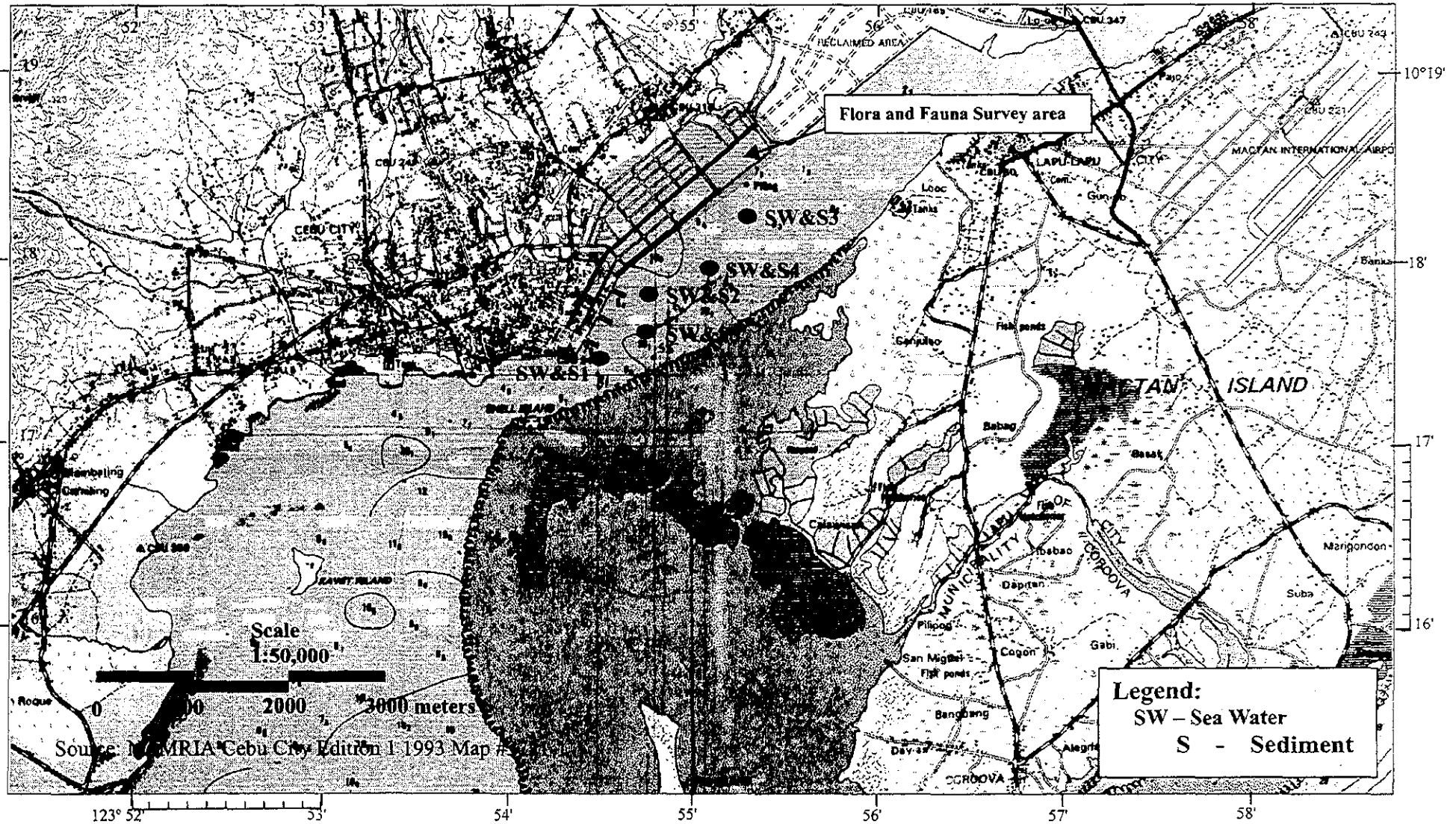

Figure 3.3.1-3 Location Map of Water Quality and Seabed Quality Surveys Sampling Points and Terrestrial Flora Survey Area in the Existing Cebu Base Port Area

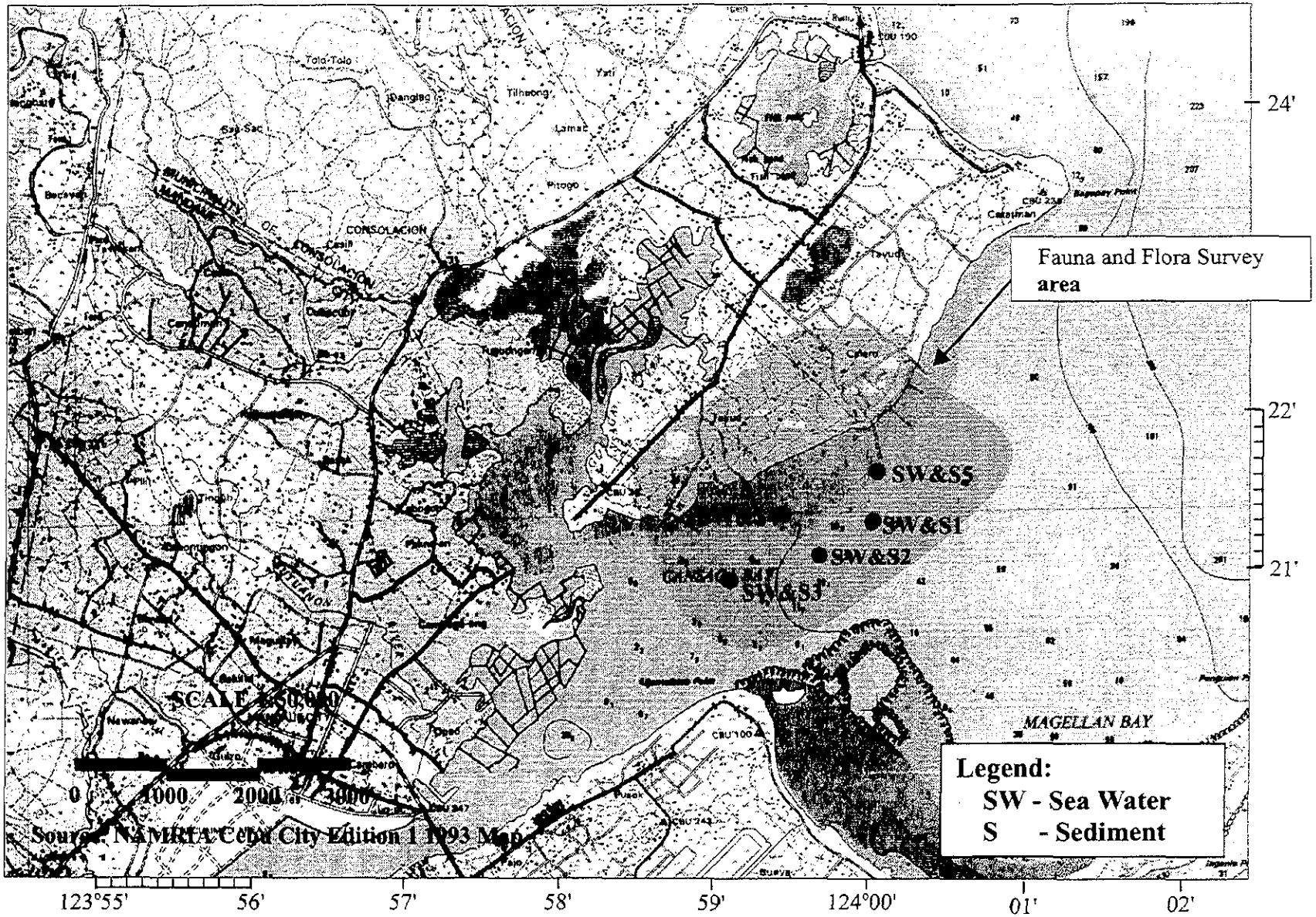

Figure 3.3.1-4 Location Map of Water Quality and Seabed Quality Surveys Sampling Points and Fauna and Flora Survey Area in Consolacion

Table 3.3.1-8 Results of the Sea Water Quality Survey at the Existing Cebu Base Port Area

Parameter	Sampling Station					DENR Standard[1]
	1	2	3	4	5	
Coordinates	10°17'.45N 123°54'.5E	10°17'.8N 123°54'.8E	10°18'.25N 123°54'.2E	10°17'.95N 123°54'.1E	10°17'.6N 123°54'.1E	
Sampling Date & Time	02 June 2001 10:51 am	02 June 2001 11:14 am	02 June 2001 11:35 am	02 June 2001 10:24 am	02 June 2001 11:09 am	
Climate	Sunny, clear day	Sunny, clear day	Sunny, clear day	Sunny, clear day	Sunny, clear day	
Color (visual)	Slightly turbid	Slightly turbid	Slightly turbid	Clear	Clear	
PH	7.84	7.26	7.99	7.99	7.75	6.0-8.5
Temperature, °C	30.8	31.3	31.4	31.2	31.2	
Conductivity, mS	59.4	59.4	59.9	59.9	59.5	
Salinity, ppt	35.4	33.2	35.2	35.2	35.2	
Dissolved Oxygen (DO), mg/L	7.11	7.26	8.56	8.83	7.75	5.0
Turbidity, NTU	0.25	0.45	0.25	0.35	0.4	
Biochemical Oxygen Demand (BOD), mg/L	80	99	110	20	19	7-10
Chemical Oxygen Demand (COD), mg/L	190	211	305	59	45	-
Total Suspended Solids, mg/L	2.0	4.5	<1.0	<1.0	2.0	-
Surfactants or Surface Active Agent with Methylene Blue, mg/L	0.02	0.04	0.02	0.03	0.02	0.5
Oil and Grease, mg/L	2.4	3.3	7.5	6.1	5.0	3
Phenols, mg/L	0.04	0.02	0.04	0.05	0.05	-
Total Coliform, MPN/100 mL	2400	>160,000,000	2,400	2,400	240	1,000
Fecal Coliform, MPN/100 mL	<2	90,000,000	<2	<2	<2	-
Copper, mg/L	0.05	0.05	0.05	0.05	0.04	0.05
Arsenic, mg/L	0.052	0.053	0.057	0.05	0.06	0.05
Cadmium, mg/L						0.01
Hexavalent Chromium, mg/L	0.002	0.003	0.001	0.004	0.001	0.1
Cyanide, mg/L						0.05
	0.034	0.32	0.29	0.35	0.40	0.05
Lead, mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.002
Organic Phosphorus, mg/L						Nil
Total PO_4, mg/L	<0.01	<0.01	<0.01	0.01	<0.01	-
Total N, mg/L	2.5	3.3	3.3	2.5	2.5	-
Sulfates, mg/L	2,528	2,121	2,727	2,813	2,867	-

Table 3.3.1-9 Results of the Sea Water Quality Survey at the New Cebu Port Area

Parameters	Sampling Stations					DENR Standard[1]
	1	2	3	4	5	
Coordinates	10°21'17N 124°00'02E	10°21'03N 124°59'47E	10°20'54N 123°59'05E	10°21'18N 123°59'33E	10°21'38N 123°59'46E	
Sampling Date & Time	03 June 2001 9:15 am	03 June 2001 9:23 am	03 June 2001 9:32 am	03 June 2001 9:40 am	03 June 2001 9:51 am	
Climate	Sunny, clear day, high tide	Sunny, clear day, high tide	Sunny, clear day, high tide	Sunny, clear day, high tide	Sunny, clear day, high tide	
Color (visual)	Clear	Clear	Clear	Clear	Clear	
PH	7.87	7.98	7.93	7.93	8.02	6.0-8.5
Temperature, °C	31.2	31.1	31.2	31.3	31.5	
Conductivity, mS	53.9	53.7	53.4	53.6	53.6	
Salinity, ppt	35.3	35.3	35.1	35.2	35.2	
Dissolved Oxygen (DO), mg/L	7.3	7.49	6.77	6.85	8.01	5.0
Turbidity, NTU	0.20	0.20	0.55	0.25	0.15	
Biochemical Oxygen Demand (BOD), mg/L	24.4	35.4	13.2	20.0	15.8	7-10
Chemical Oxygen Demand (COD), mg/L	51.3	76.5	28.2	41.3	36.2	-
Total Suspended Solids, mg/L	<1.0	<1.0	8.5	<1.0	2.5	-
Surfactants or Surface Active Agent with Methylene Blue, mg/L	0.03	0.05	0.04	0.02	0.02	0.5
Oil and Grease, mg/L	6.5	5.4	7.1	6.7	3.3	3
Phenols, mg/L	<0.01	<0.01	<0.01			-
Total Coliform, MPN/100 mL	240	240	900,000	240	240	1,000
Fecal Coliform, MPN/100 mL	<2	<2	900,000	<2	<2	-
Copper, mg/L	0.05	0.05	0.05	0.05	0.05	0.05
Arsenic, mg/L	0.022	0.03	0.021	0.031	0.021	0.05
Cadmium, mg/L						0.01
Hexavalent Chromium, mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	0.1
Cyanide, mg/L						0.05
Lead, mg/L	0.38	0.40	0.38	0.43	0.40	0.05
Total Mercury, mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.002
Organic Phosphorus, mg/L						Nil
Total PO_4, mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	-
Total N, mg/L	1.6	6.6	1.6	1.6	1.6	-
Sulfates, mg/L	2,700	2,677	2,279	2,528	2,560	-

b) Sea Bed Materials

Following parameters of seabed material were analyzed. The samples were collected at same station of the water quality survey. (see Fig. 3.3.1-3 - Fig. 3.3.1-4)

1) pH	2) Ignition loss
3) Dissolved Oxygen,	4) BOD,
5) COD	6) Surface Active Agent with Methyeleneblue,
7) Oil and Grease (Content)	8) Phenols,
9) Fecal Coliform,	10) Copper,
11) Arsenic	12) Cadmiums,
13) Hexavalent Chromium,	14) Cyanide,
15) Lead	16) Total Mercury,
17) Organic Phosphorous	18) Total P
19) Total N	20) Sulphide

The results of the seabed quality survey are shown in Tables 3.3.1-10 - Table 3.3.1-11

pH: pH values of sediment leachates registered values higher than 8. The sediment is slightly alkaline in nature.

BOD, COD: Sediment leachates registered relatively low levels of BOD and COD.

Coliform: Generally, leachates of all sediment samples registered very high concentration of total and fecal coliform levels.

Copper: Seabed sediment from Cebu Base Port area registered high levels of copper concentration. However, all samples registered lower levels. Sample 4 and 5 from Consolacion area registered lower copper levels. For sediment samples taken from San Remigio area, all sediment samples registered very low copper levels. However, the sediment samples from Toledo Port area registered higher concentration values.

Arsenic: All sediment samples registered arsenic contents lower

Lead: all sediment samples registered lower concentrations than PEL.

Mercury: With respect to mercury levels, all sediment samples registered low

Table 3.3.1-10 Results of the Sea Bed (Bottom Sediment) Quality Survey at the Existing Cebu Base Port Area

Parameters	Sampling Station				
	1	2	3	4	5
Coordinates	10°17'.45N 123°54'.5E	10°17'.8N 123°54'.8E	10°18'.25N 123°54'.2E	10°17'.95N 123°54'.1E	10°17'.6N 123°54'.1E
Sampling Date & Time	02 June 2001 10:54 am	02 June 2001 11:14 am	02 June 2001 11:35 am	02 June 2001 10:24 am	02 June 2001 11:09 am
Climate	Sunny, clear day	Sunny, clear day	Sunny, clear day	Sunny, clear day	Sunny, clear day
Sediment Appearance (depth)	Muddy mixed with plastics (12 m)	Muddy (11 m)	Muddy (13 m)	Muddy (10 m)	Sandy with shell fragments (15 m)
Color (visual)	Grayish black	Charcoal gray	Charcoal gray	Charcoal gray	Charcoal gray
Odor	Marshy	Marshy	Marshy	Marshy	Marshy
Sieve Analysis: Particle Size, Mesh:					
<10 (% w/w)	7.86	13.94	54.04	56.67	21.93
10/20 (% w/w)	34.14	37.02	26.54	24.8	16.61
20/45 (% w/w)	22.84	15.84	9.28	8.47	28.84
45/100 (% w/w)	19.39	15.34	5.64	4.06	26.99
100/200 (% w/w)	9.75	10.23	2.07	2.34	3.77
>200 (% w/w)	6.02	7.63	2.43	3.66	1.86
PH @25.0°C	8.56	8.75	8.62	8.59	8.86
Ignition loss					
Biochemical Oxygen Demand (BOD), mg/L	17.1	16.2	13.5	12.6	8.6
Chemical Oxygen Demand (COD), mg/L	41.3	32.2	32.2	27.2	18.1
Surfactants or Surface Active Agent with Methylene Blue, mg/L					
Oil and Grease, mg/L					
Phenols, mg/L	0.01	0.08	0.01		0.04
Total Coliform, MPN/g	24,000,000	8,000,000	24,000,000	1,400,000	8,000,000
Fecal Coliform, MPN/g	22,000,000	3,400,000	2,300,000	1,400,000	3,500,000
Copper, mg/L		49.5	42.7	44.47	24.4
Arsenic, mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium, mg/L	<0.1	<0.1		<0.1	<0.1
Hexavalent Chromium, mg/L					
Cyanide, mg/L	0.03	0.02	0.04	0.02	0.01
Lead, mg/L	52.8	21.3	17.8	19.6	12.7
Total Mercury, mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Organic Phosphorus, mg/L					
Total PO_4, mg/L	0.30	0.48	0.15	0.10	0.07
Total N, mg/L					
Sulfates, mg/L					

Table 3.3.1-11 Results of the Sea Bed (Bottom Sediment) Quality Survey at the Consolacion Area

Parameters	Sampling Station				
	1	2	3	4	5
Coordinates	10°21'17N 124°00'02E	10°21'03N 124°59'47E	10°20'54N 123°59'05E	10°21'18N 123°59'33E	10°21'38N 123°59'46E
Sampling Date & Time	03 June 2001 9:15 am	03 June 2001 9:23 am	03 June 2001 9:32 am	03 June 2001 9:40 am	03 June 2001 9:51 am
Climate	Sunny, clear day, high tide	Sunny, clear day, high tide	Sunny, clear day, high tide	Sunny, clear day, high tide	Sunny, clear day, high tide
Sediment Appearance (depth)	Muddy (10 m)	Silty clay (12 m)	Silty clay (7 m)	Sandy with shell fragments (1 m)	Sandy with shell fragments (1.5 m)
Color (visual)	Charcoal gray	Charcoal black	Charcoal black	Gray	Gray
Odour	Marshy	Marshy	Marshy	Marshy	Marshy
Sieve Analysis: Particle Size, Mesh:					
<10 (% w/w)	50.1	47.41	43.51	12.77	10.32
10/20 (% w/w)	24.28	26.99	29.53	25.02	21.38
20/45 (% w/w)	10.84	11.46	12.67	31.74	30.23
45/100 (% w/w)	6.37	7.11	7.53	22.6	24.65
100/200 (% w/w)	2.72	3.11	3.41	5.82	5.05
>200 (% w/w)	5.69	3.92	3.35	2.05	8.37
pH	8.59	8.62	8.50	8.38	8.54
Ignition loss					
Biochemical Oxygen Demand (BOD), mg/L	18.9	18.2	21.0	13.5	9.8
Chemical Oxygen Demand (COD), mg/L	33.2	41.3	40.3	30.2	21.2
Surfactants or Surface Active Agent with Methylene Blue, mg/L					
Oil and Grease, mg/L					
Phenols, mg/L	<0.01				
Total Coliform, MPN/g	5,000,000	11,000,000	22,000,000	5,000,000	14,000,000
Fecal Coliform, MPN/g	2,600,000	11,000,000	22,000,000	70,000	7,000,000
Copper, mg/L	32.5	39.7	41.6	7.7	8.2
Arsenic, mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium, mg/L	<0.1	<0.01	<0.1	<0.1	<0.1
Hexavalent Chromium, mg/L					
Cyanide, mg/L	0.02	0.04	0.04	0.04	0.01
Lead, mg/L	7.4	12.0	14.4	17.4	19.1
Total Mercury, mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Organic Phosphorus, mg/L					
Total PO_4, mg/L	0.06	0.04	0.17	0.15	0.09
Total N, mg/L					
Sulfates, mg/L					

(6) Terrestrial and Marine Flora and Fauna

A survey of terrestrial and marine flora and fauna along the coastline of the existing Cebu Base Port, Consolacion area, were done on June 1 - 6, 2001 (Fig. 3.3.1-3 - Fig. 3.3.1-4 shows the Fauna and Flora survey area.) This activity was conducted to determine the characteristic floristic composition of the study area. Based on actual identification of plant stands in the study area, common species of plants were identified. The terrestrial vegetation within the existing Cebu Port is presented in Table 3.3.1-12. Table 3.3.1-13 shows the vegetation identified in Consolacion.

Table 3.3.1-12 Terrestrial Vegetation in the Cebu Base Port Study Area

Scientific Name	Common Name	Economic Utilization/Ecological Importance
Non-dipterocarps		
Cocos nucifera	Coconut	Fruit is edible; different parts of the tree has variety of uses; young leaves serve as food for insects
Bougainvella spectabilis	Boganvilla	Ornamental plant
Leucaena leucoccephala	Ipil-ipil	Wood is a good source of firewood and charcoal; bark produces brown dye; leaves can be used as animal feed; seeds used as substitute for cofee; leaves serve as insect food
Acacia mangium	Yellow acacia	Wood used for light construction; source of pulp
Carica papaya	Papaya	Fruit is edible; fruit skin is source of papain ; ripened fruit serve as food for insects and birds
Grasses		
Imperata cylindrica	Kogon	Dried leaves are used as roof thatches; due to height, used by birds as nesting grounds

Table 3.3.1-13 Terrestrial Vegetation in the New Cebu Port Study Area

Scientific Name	Common Name	Economic Utilization/Ecological Importance
A. Non-dipterocarps		
Leucaena leucoccephala	Ipil-ipil	Wood is a good source of firewood and charcoal; bark produces brown dye; leaves can be used as animal feed; seeds used as substitute for coffee; leaves serve as insect food
Cocos nucifera	Coconut	Fruit is edible; different parts of the tree has variety of uses; young leaves serve as food for insects
Terminalia catappa	Umbrella Tree	Wood is used for light construction; seeds are edible; bark produces brown dye; ornamental tree
Bougainvella spectabilis	Boganvilla	Ornamental plant
Pithecellobium dulce	Kamachile	Fruit is edible; wood used for light construction/firewood
Tamarindus indica	Tamarind	Young leaves, flowers and pods are used for seasoning food; fruit used in the manufacture of jams, sweets and drinks; bark is source of ink; seed is source of oil/varnish; street ornamental plant; young leaves and ripened fruit serve as food for birds and insects
Gmelina arborea	Gmelina	Wood is used for light construction; reforestation tree species; temporary shelter for birds and insects; reforestation species; source of pulp/paper
Acacia mangium	Yellow acacia	Wood used for light construction; source of pulp
Artocarpus heterophylus	Langka	Fruit is edible; wood used for light construction; edible fruit serves as food for insects
B. Bamboo		
Bambusa arundinacea	Bamboo	Young shoots are edible; wood used for light construction/fence
C. Grasses		
Imperata cylindrica	Kogon	Dried leaves are used as roof thatches; due to height, used by birds as nesting grounds
Brachiaria reptans	Marakauayan	Fodder stock for animals

1) Coastal/Marine Environment

a) Coastal Zone Vegetation

The marine ecosystem of the proposed project area is characterized by muddy/silty substrate at the shoreline and sandy at seaward portion. The mangal community along the shoreline provides the characteristic features of the substrate in the study area. This type of vegetation depends on many factors among which are water inundation, nutrients and soil type. The minimal water motion along the mangal community of the Consolacion area is attributed to the prop roots forming a dense root system that decreases water movement. This slow water motion allows the settlement and accumulation of fine sediments on the bottom, which leads to the accumulation of mud/silt with high bacterial count, low oxygen, high salt and high organic content. Moving along the shoreline by foot, through the mangal stands is rather difficult due to thick mud/silt about 1 foot deep.

Tides also determine the association and zonation of mangroves in the study area. The seaward section is dominated by Avicennia sp., while landward, the Sonneratia sp. are abundant. The extensive prop root system of Sonneratia sp. acts to reduce tidal currents causing the extensive deposition of mud and silt, and provide surfaces for attachment of marine organisms.

A survey of mangal stands along the shoreline of Consolacion Study area was conducted on 3 June 2001. Only two identified species of mangroves were noted. These are presented in Table 3.3.1-14.

Table 3.3.1-14 Results of Mangal Survey in Consolacion Study Area

Scientific Name	Common Name	Economic Utilization/Ecological Importance
A. Mangroves		
Sonneratia alba	Firefly mangrove, Pedada	Flowers serve as source of food for insects; leaves and branches serve as temporary shelter for marine birds and insects; fish nursery ground
Avicennia marina	Bungalon, Piapi	Flowers serve as food for insects; leaves and branches serve as temporary shelter for marine birds and insects; prop roots serve as protection for juvenile fishes against currents

The density of mangal species were also determined by placing a transect line parallel to the shore and 10 quadrates of size $10m^2$ were set at right angles from the transect line. Trees inside the quadrates were identified to species level and diameter at breast height (in centimeter) were measured. Of the ten quadrates considered for the mangal survey, an average of 12 mangrove trees were noted Table 3.3.1-15). However, of the total number studied in the ten quadrates, more can be found in the study area. Approximately 1200 mangrove trees are scattered at the littoral zone and along the coastlines of the Consolacion study area. Most of the trees studied were of mature stage with average diameter at breast

height measuring from 15 cm to 29 cm. It was also noted that most of the branches of the mangrove trees are cut partially indicating utilization as fuelwood by local residents. Mangrove trees are highly utilized as firewood because of high heating capacity.

Table 3.3.1-15 Mangal Density at Consolacion Study Area

Quadrate ($10m^2$)	Species	Number	Average dbh*
1	*Avicennia marina*	4	20
	Sonneratia alba	5	16
2	*Avicennia marina*	3	18
	Sonneratia alba	7	27
3	*Avicennia marina*	5	24
	Sonneratia alba	9	17
4	*Avicennia marina*	9	18
	Sonneratia alba	8	22
5	*Avicennia marina*	8	22
	Sonneratia alba	10	17
6	*Avicennia marina*	7	22
	Sonneratia alba	8	15
7	*Avicennia marina*	9	15
	Sonneratia alba	7	29
8	*Avicennia marina*	9	26
	Sonneratia alba	3	21
9	*Avicennia marina*	11	15
	Sonneratia alba	9	24
10	*Avicennia marina*	5	23
	Sonneratia alba	10	22
	Total	146	

*diameter at breast height (cm)

The existing mangrove trees in the planed port area are found 146 pieces, these trees will not be cut, but will be either transplanted using recently available transplanting techniques or will replaced by planting mangrove seedlings 10 times of the existing number affected at the specified site called "Mangrove Mitigation Planting Area".

b) The proposed mitigation measures for protecting mangroves adopted for similar projects recently implemented under the present restriction of environmental law are described as follow:

(i) The General Santos Fishing Port funded under JBIC (then OECF) which was implemented from 1984 to 1989 is located partly in a mangrove area. When the DPWH's PMO for Fishing Ports implemented the project, the mangrove cutting was already prohibited. Since the site was the best technically suited for a regional fish port, PMO negotiated with DENR and presented a viable solution to the problem by way of re-planting at least ten (10) mangrove

seedlings for every one (1) tree cut if cutting was done; otherwise, trees were transplanted from their original locaiton to a designated area. More than a thousand seedlings were replanted thereafter. An ECC was issued and now the Port is the busiest and most productive fish port in Mindanao.

(ii) Tacloban Airport Development Project in Leyte province involves the expansion of the existing airport including the extension of the runway towards a mangrove zone. This study was done in 1998 - 1999. An ECC was recommended for approval to DENR-EMB by the review committee subject to an environmental management plan that involves replanting and/or transplantation of any mangrove trees affected to mitigate the damage to stands of mangrove trees at the north end of the runway.

(iii) The existing Cavite to Baclaran Coastal Road south of Manila also involved cutting of hundreds of mangrove trees along the ROW of the reclaimed coastal road. A DENR prohibition on mangrove cutting was already in effect then. At present, replanted and naturally growing mangrove trees are proliferating along the western edge of the road. Replanting was also done by the Proponents of the project as a condition to the issuance of the environmental clearance from DENR.

In the Environment Management Plan, the following arrangement is proposed to monitor the protection of mangrove during construction stage. "Organizing multi-partite Monitoring Team of community to assure such impacts to be minimized. Another mitigation measures will be a joint resolution of the Barangay and Municipal Councils with the concurrence of the Municipal Agriculturist and the Municipal/Community Environment officer as member of the multi-partite monitoring team"

c) Seabed Soft Benthos and Macrofauna Survey

A survey of seabed characteristic at Consolacion area was conducted on June 3, 2001. The results are presented in Table 3.3.1-16.

d) Presence of Corals

To assess the presence of corals and determine percentage coral cover, a transect survey was conducted in Consolacion Study area. The results of the transect survey are presented in Table 3.3.1-17.

Table 3.3.1-16 Results of Soft Benthos and Macrobenthic Survey in Consolacion Area

Scientific Name	Common Name	Economic Utilization/Ecological Importance
A. Seagrasses		
Halophila ovalis	Lusay	No identified economic utilization for humans; leaves serve as sources of food and oxygen for juvenile fishes and other marine organisms
Enhalus acroides	Lusay	No identified economic utilization for humans; leaves serve as sources of food and oxygen for juvenile fishes and other marine organisms; due to large size, often serve as habitat for other macrobenthic organisms
C. Algae		
Ulva lactuca	Green algae	Provides food to juvenile and small fishes
Ulva reticulata	Green algae	Provides food to juvenile and small fishes
Caulerpa serrulata	Green algae	Provides food to juvenile and small fishes
Acetabularia major	Green algae	Provides food and protection to juvenile and small fishes
Sargassum polycystum	Brown algae	Provides protection to juvenile and small fishes, food and oxygen contributor in the sea
Padina gymnospora	Brown algae	Provides protection to juvenile and small fishes
Halimenia durvilaei	Red algae	Provides protection and food to juvenile and small fishes
Gracillaria arcuata	Red algae	Provides food and protection to juvenile and small fishes
D. Macrobenthos		
Diadema setossum	Sea urchin	Marine scavenger
Eucidaris tribuloides	Pencil sea urchin	Marine scavenger
Strongylocetrotidae sp.	Purple sea urchin	Marine scavenger
Asteroidea sp.	Knobby starfish	Marine scavenger
Linklia sp.	Blue starfish	Marine scavenger
Strombus gracilor	Shellfish	As filter feeder, provides cleansing effect on water
Mitra lugubris	Shellfish	As filter feeder, provides cleansing effect on water
Anadara antiquata	Arc shell, Batotoy	As filter feeder, provides cleansing effect on water
Paphia amabilis	Venus clam	As filter feeder, provides cleansing effect on water
Tellinia alternata	Striped sunset shell	As filter feeder, provides cleansing effect on water
Terebra monilis	Divided auger	As filter feeder, provides cleansing effect on water
Solen ensis	Shellfish	As filter feeder, provides cleansing effect on water

Table 3.3.1-17 Results of Coral Survey

Station (m)	Description	Station (m)	Description
0.00	Silt and sand	25.88	Silt/sand
3.15	Coral massive - Galaxia spp	27.37	Rock
3.30	Coral massive - Goniophora spp	27.55	Coral massive
3.33	Sand	27.80	Siltsand
4.88	Coral massive - Goniophora	28.15	Coral folius
4.91	Dead coral with red algae	28.40	Silt/sand
4.93	Holothuria - Synapta spp	28.70	Dead coral
5.01	Turf algae/soft algae	28.91	Rock
5.21	Coral massive - Goniophora	29.32	Sand
5.41	Dead coral with algae - Sargassum spp.	30.05	Coral massive
5.46	Mushroom coral - Fungia spp.	30.20	Sand
5.60	Dead coral with algae - Sargassum spp.	30.40	Coral massive
5.65	Dead coral massive - Euphilia spp.	31.21	Coral massive
5.68	Dead coral with algae (red)	31.42	Rock
5.71	Sponge - Soft coral	32.00	Sand
6.93	Silt/Sand	32.30	Coral massive - Goniophora
7.06	Dead coral with algae	32.40	Dead coral
11.75	Silt	32.70	Silt
11.88	Boulder (half meter)	33.40	Rock
12.65	Silt	33.70	Coral encrusting
12.72	Coral encrusting (Pyctenia sp)	33.80	Dead coral with algae
12.80	Coral colius (Montiphora sp.)	34.11	Coral folius
14.25	Silt	34.53	Rock
13.80	Dead coral with algae (red)	34.55	Sponge
14.92	Silt	34.60	Silt
15.05	Coral encrusting	35.90	Sponge
15.21	Dead coral with algae	36.05	Coral massive
15.24	Other animal (Gorgonian)	36.30	Silt
16.66	Silt	37.00	Rock
16.74	Macroalgae (Caulerpa, Serulata)	35.15	Silt
21.65	Silt	37.60	Coral massive - Goniophora
21.80	Halimenia sp	37.65	Sponge
22.00	Dead coral with algae	37.77	Rock
22.15	Macroalgae Halimenia sp.	37.80	Silt
22.28	Coral massive Goniophora sp.	38.20	Rock
22.47	Dead coral with algae	38.30	Silt
22.49	Other organism - Gorgonian	39.25	Coral massive - Goniophora
22.63	Dead coral with algae	39.40	Silt
22.79	Encrusting coral - Porites	40.35	Coral encrusting
22.82	Encrusting coral - Montiphora	40.85	Silt
22.95	Dead coral with algae	45.90	Coral encrusting
22.99	Encrusting coral - Pectynia	46.20	Rock
23.25	Dead coral with algae	46.40	Other organims - Diadema s.
23.31	Coral massive - Goniophora	46.65	Rock
23.50	Organ pipe coral - Tubophora	46.95	Coral encrusting
23.75	Dead coral with algae	47.20	Silt with Diadema s.
24.04	Coral mass - Goniophora	48.85	Rock
24.08	Other organism - Goniophora	49.20	Silt
24.17	Organ pipe coral - Tubiphora	50.00	Silt
24.55	Dead coral with algae		
24.60	Coral Tubiphora		
24.95	Dead coral with algae		
25.00	Coral Tubiphora		
25.38	Dead coral with algae		
25.65	Encrusting coral		
25.80	Dead coral with algae		

Based on the above surveys, no threatened, extinct or rare species of mangroves, seaweeds, algae, macrobenthic organisms or coral were found in the two study areas.

2) Air Quality and Noise

a) Air Quality Survey

The Air quality and Noise survey was carried out at two sites 1) Existing Cebu Base Port and 2) Consolacion site.

The results of the air quality and noise surveys at New Cebu Port and Cebu Base Port are presented in Tables 3.3.1-18 and Table 3.3.1-19 respectively.

Gaseous Pollutants: The observed 1-hr average Ground Level Concentrations (GLCs) are presented in Tables 3.3.1-18 and 3.3.1-19 The 1-hr measured average GLC for SO_2 ranged from nil to 0.004 ppm for Consolacion area and 0.001 to 0.004 ppm for Cebu port area. These values are well within the DENR 1-hr standard of 0.13 ppm.

For NO_2, the observed 1-hr average GLC ranged from 0.0003 to 0.0064 ppm for Consolacion area and 0.0033 to 0.0190 ppm for Cebu port area. As in the SO_2 case, the measured GLCs also satisfy the DENR 1-hr standard of 0.14 ppm.

For total nitrogen oxides (NO_x), the observed concentrations ranged from not detectable to 0.7 ppm for Consolacion area and nil to 4 ppm for Cebu port area. There is no 1-hr averaging DENR standard for oxides of nitrogen.

For carbon monoxide (CO), the observed concentrations for both Consolacion and Cebu port areas were not detectable to trace of CO but below the minimum detectable limit. The 1-hr averaging DENR standard for CO is 30 ppm.

Particulates: The observed 1-hr average TSP concentrations vary from 7 to 134 microgram/Ncm^3. The DENR standard for TSP of 300 microgram/Ncm^3 was satisfied at the Consolacion area for the sampling stations. At Cebu port area, the TSP level ranged from 103 to 2702 microgram/Ncm^3 which exceeded the DENR standard. Stations P1 and P2 exceeded the TSP limit for 1-hr averaging, resuspension of dust particulates in these stations were noted during passage of trucks and cars. At stations P4 and P5, TSP levels were within the DENR limit and it was further observed at these stations the vehicles and trucks were prohibited to pass except for those official passes. Forklift and cargo lifting machine were the most visible at the area.

Table 3.3.1-18 Observed Air Quality and Noise Level at the Vicinity of the Cebu New Port Area

Station	Time & Date	Concentrations					Noise Level dB(A)
		SO_2 (ppm)	NO_2 (ppm)	NO_x (ppm)	CO (ppm)	TSP (µg/Ncm)	
C1	0815-0915 16Jun2001	0.001	0.0005	NIL	ND	134	48
	1430-1530 13Jun2001	0.002	0.0003	0.7	ND	11	46
	1900-2000 13Jun2001	0.002	0.0004	ND	ND	32	43
C2	1024-1124 13Jun2001	0.001	0.0014	ND	ND	25	49
	1600-1700 13Jun2001	0.002	0.0003	NIL	ND	24	48
	2240-2340 12Jun2001	NIL	0.0011	ND	ND	22	<40
C3	0845-0945 13Jun2001	0.001	0.0047	ND	ND	7	42
	1650-1750 12Jun2001	0.003	0.0029	ND	ND	12	<40
	2120-2220 12Jun2001	0.004	0.0027	ND	ND	25	<40
C4	0935-1035 16Jun2001	0.001	0.0054	ND	ND	45	42
	1535-1635 15Jun2001	0.001	0.0057	NIL	ND	106	42
	1910-2010 15Jun2001	NIL	0.0051	ND	ND	43	<40
C5	1055-1155 16Jun2001	0.002	0.0059	NIL	ND	37	42
	1650-1750 15Jun2001	0.002	0.0054	NIL	ND	40	42
	2030-2130 15Jun2001	0.004	0.0064	ND	ND	80	<40
DENR Standard	1-hr averaging	0.13	0.14	-	30.0	300	-

ND = Not Detectable; NIL = Trace but below detectable limit

Table 3.3.1-19 Observed Air Quality and Noise Level at the vicinity of Cebu Base Port Area

Station	Time&Date	Concentrations					Noise Level dB(A)
		SO_2 (ppm)	NO_2 (ppm)	NO_x (ppm)	CO (ppm)	TSP (µg/Ncm)	
P1	1000-1100 14Jun2001	0.002	0.0170	2	NIL	2702	66
	1640-1740 14Jun2001	0.001	0.0097	1.2	ND	530	58
	2205-2305 14Jun2001	0.003	0.0085	NIL	ND	257	42
P2	0750-0850 15Jun2001	0.001	0.0190	NIL	ND	1203	46
	1300-1400 15Jun2001	0.003	0.0110	1.5	NIL	2416	54
	2215-2315 15Jun2001	0.002	0.0110	NIL	ND	106	52
P3	1030-1130 15Jun2001	0.004	0.0098	.75	NIL	105	62
	1405-1505 14Jun2001	0.001	0.0085	1.5	NIL	103	56
	1920-2020 14Jun2001	0.002	0.0071	4	NIL	252	58
P4	0910-1010 15Jun2001	0.003	0.0073	NIL	ND	215	62
	1250-1350 14Jun2001	0.003	0.0100	NIL	NIL	125	56
	2035-2135 14Jun2001	0.002	0.0081	0.8	NIL	266	42
P5	0800-0900 14Jun2001	0.001	0.0045	NIL	ND	191	56
	1520-1620 14Jun2001	0.001	0.0042	NIL	ND	185	56
	2155-2255 13Jun2001	0.002	0.0033	NIL	ND	119	52
DENR Standard	1-hr averaging	0.13	0.14	-	30.0	300	-

ND = Not Detectable; NIL = Trace but below detectable limit

b) Noise

Noise observations were made at air quality stations. The observed noise levels at Consolacion area ranged from less than 40 to 49 dB(A) while at Cebu port area the noise level ranged from 42 to 66 dB(A). For Cebu port area, the noise sources were trucks, cars and ships docked at the pier. The maximum observed noise level could reach up to 85 to 90 dB(A) within a short period occurring during passage of trucks. The maximum average noise level at Cebu port area was 66 dB(A). At Consolacion area, noise sources were household noises like stereos, TV sets and other domestic sources.

(7) Initial Environmental Examination (IEE) for Natural Environment for the study

This section presents the systematic identification of the potential impacts (Significant Environmental Impacts: SEIs) of the project to the natural environment. The project involves reclamation, construction of horizontal and vertical structures, access road, waiting area buildings and parking areas. Recognizing these various components of the proposed project, comprehensive environmental impact assessment was undertaken and the result of which are presented in the succeeding sections. The IEE studies were carried out on following areas; 1) the Cebu Base Port, 2) the New Cebu Port in Consolacion, 3) San Remigio area and 4) Toledo port area.

1) Identification of Significant Environmental Impacts (SEIs)

The methodology for the identifying impacts and evaluation these impacts in the IEE section employs both quantitative and qualitative measures. The identification of significant environmental impacts (SEIs) considered two environmental components (natural environment and pollution) of the project area. Potential environmental impacts were briefly described and rated accordingly.

- Type of Consequence: Positive (+)/Negative (-)
- Impact duration: Long term or Short-term
- Possible rectification of impact: Reversible or Irreversible
- Magnitude: Nil/Minimal/Moderate/Significant
- Probability of Occurrence: Low/Medium/High

The results of the impact identification of Cebu Base port and New Cebu port including Access road are presented in Table 3.3.1-20 - Table 3.3.1-21.

Table 3.3.1-20 (1) Matrix for Environmental Impacts During Construction Phase
Cebu Base Port

Impact Area	Potential Impacts	Nature	Magnitude	Probability of Occurrence	Reversibility/ Permanence	Impact Duration	Geographic Extent
Natural Environment	a) Threat of Environmental Hazard	Negative	Nil to minimal	Low	Reversible/Transient	Short term	Immediate vicinity of the project area
	b) Effect on Water Quality and Quantity	Negative	Moderate	High	Reversible/Transient	Short term	Immediate vicinity of the project area
	c) Effect on Air Quality and Atmosphere	Negative	Moderate	High	Reversible/Transient	Short term	Immediate vicinity of the project area
	d) Effect on Topography and Terrain	Negative	Nil to minimal	Medium	Reversible/Transient	Short term	Immediate vicinity of the project area
	e) Effect on Ecological Environment	Negative	Nil to minimal	Low	Reversible/Transient	Short term	Immediate vicinity of the project area
	f) Effect on Visual Resources	Negative	Nil to minimal	Low	Irreversible/Permanent	Long term	Immediate vicinity of the project area
Pollution	a) Water Pollution	Negative	Significant	High	Reversible/Transient	Short term	Immediate vicinity of the project area
	b) Air pollution from emissions of NOx, SOx, and TSP	Negative	Moderate	High	Reversible/Transient	Short term	Immediate vicinity of the project area
	c) Soil Contamination	No Effect	–	–	–	–	–
	d) Effect of offensive Odor	No Effect	–	–	–	–	–
	e) Noise and Vibration	Negative	Moderate	Medium	Reversible/Transient	Short term	Immediate vicinity of the project area

Table 3.3.1-20 (2) Matrix for Environment Impact During Operation Phase
Cebu Base Port

Impact Area	Potential Impacts	Nature	Magnitude	Probability of Occurrence	Reversibility/ Permanence	Impact Duration	Geographic Extent
Natural Environment	a) Threat of Environmental Hazard	Negative	Nil to minimal	Low	Reversible/Transient	Short term	Immediate vicinity of the project area
	b) Effect on Water Quality and Quantity	Negative	Nil	Low	Irreversible/Permanent	Long term	Immediate vicinity of the project area
	c) Effect on Air Quality and Atmosphere	Negative	Nil to minimal	Medium	Irreversible/Permanent	Long term	–
	d) Effect on Topography and Terrain	Negative	Moderate	Medium	Reversible/Transient	Short term	Immediate vicinity of the project area
	e) Effect on Ecological Environment	No Effect	–	–	–	–	–
	f) Effect on Visual Resources	Negative	Nil to minimal	Low	Irreversible/Permanent	Long term	Immediate vicinity of the project area
Pollution	a) Water Pollution	Negative	Moderate	High	Reversible/Transient	Short term	Immediate vicinity of the project area
	b) Air pollution from emissions of NOx, SOx, and TSP	Negative	Moderate	High	Irreversible/Permanent	Long term	Immediate vicinity of the project area
	c) Soil Contamination	No Effect	–	–	–	–	–
	d) Effect of offensive Odor	No Effect	–	–	–	–	–
	e) Noise and Vibration	No Effect	–	–	–	–	–

Table 3.3.1-21 (1) Matrix for Environmental Impacts During Construction Phase New Cebu Port

Impact Area	Potential Impacts	Nature	Magnitude	Probability of Occurrence	Reversibility/ Permanence	Impact Duration	Geographic Extent
Natural Environment	a) Threat of Environmental Hazard	Negative	Nil to minimal	Low	Reversible/Transient	Short term	Immediate vicinity of the project area
	b) Effect on Water Quality and Quantity	Negative	Significant	High	Reversible/Transient	Short term	Immediate vicinity of the project area
	c) Effect on Air Quality and Atmosphere	Negative	Nil to minimal	Low	Reversible/Transient	Long term (3 yr.)	--
	d) Effect on Topography and Terrain	Negative	Significant	High	Reversible/Transient	Short term	Immediate vicinity of the project area
	e) Effect on Ecological Environment	Negative	Significant	High	Reversible/Transient	Long term	Immediate vicinity of the project area
	f) Effect on Visual Resources	Negative	Nil to minimal	Low	Irreversible/Permanent	Long term	Immediate vicinity of the project area
Pollution	a) Water Pollution	Negative	Significant	High	Reversible/Transient	Short term	Immediate vicinity of the project area
	b) Air pollution from emissions of NOx, SOx, and TSP	Negative	Moderate	Medium	Reversible/Transient	Short term	Immediate vicinity of the project area
	c) Soil Contamination	No Effect	--	--	--	--	--
	d) Effect of offensive Odor	No Effect	--	--	--	--	--
	e) Noise and Vibration	Negative	Significant	High	Reversible/Transient	Short term	Immediate vicinity of the project area

Table 3.3.1-21 (2) Matrix for Environmental Impacts During Operation Phase New Cebu Port

Impact Area	Potential Impacts	Nature	Magnitude	Probability of Occurrence	Reversibility/ Permanence	Impact Duration	Geographic Extent
Natural Environment	a) Threat of Environmental Hazard	Negative	Nil to minimal	Low	Reversible/Transient	Short term	Immediate vicinity of the project area
	b) Effect on Water Quality and Quantity	Negative	Nil to minimal	High	Reversible/Transient	Long term	Immediate vicinity of the project area
	c) Effect on Air Quality and Atmosphere	Negative	Nil to minimal	Medium	Irreversible/Permanent	Long term	The vicinity of the project area
	d) Effect on Topography and Terrain	Negative	Moderate	Medium	Irreversible/Permanent	Long term	Immediate vicinity of the project area
	e) Effect on Visual Resources	Negative	Significant	High	Irreversible/Permanent	Long term	Large area
	f) Effect on Ecological Environment	Negative	Minimal	Low	Irreversible/Permanent	Long term	Immediate vicinity of the project area
Pollution	a) Water Pollution	Negative	Significant	Low	Reversible/Transient	Long term	Immediate vicinity of the project area
	g) Air pollution from emissions of NOx, SOx, and TSP	Negative	Moderate	High	Irreversible/Permanent	Long term	--
	h) Soil Contamination	No effect	--	--	--	--	--
	i) Effect of offensive Odor	No effect	--	--	--	--	--
	j) Noise and Vibration	Negative	Moderate	High	Irreversible/Permanent	Long term	Immediate vicinity of the project area

2) Impact Prediction and Evaluation "With the Project Scenario" for Access Road

a) Construction Phase Impacts

A number of probable negative impacts on the natural environment during construction were identified. These impacts have magnitudes ranging from nil to significant. Most of the identified impacts on the social environment are positive or beneficial to the host community. Detailed discussions of these impacts are in the succeeding section.

Table 3.3.1-21 (3) shows the impact matrix of the access road without mitigation during construction phase.

(i) Impact on the Physical Environment

i) Water Quality and Quantity

During construction, the workers will generate domestic wastewater from the use of lavatories, canteens, and toilets. The projected volume is about 15 m^3/day for a 300 person-workforce with generation rate of 50l/day. Since this volume is small and manageable, the expected impact of this wastewater to the environment is considered nil to minimal. Direct discharge of this domestic wastewater will be avoided by installing portalets in various strategic place in the construction area.

Another cause of water quality degradation in terms of increase in suspended solids and turbidity of the nearby coastal channel is the reclamation activity for connection parts of Access road and port area. Without mitigation, the impact is expected to be significant. Although re-suspension and dispersion of earth fill materials is a normal occurrence during reclamation activities, appropriate engineered mitigation measures such as flyover type of foundation so as to allow water flow by tidal currents will be installed and constructed.

Water use shall include those used for civil works and water consumed by workers. Water demand for construction would however be minimal. Further the demand tends to be short term thus there is practically no negative impact on water resource.

ii) Air Quality and Atmosphere

The landside opening or excavation of areas and the construction of access road leading to the proposed new port site will generate suspended particulates or fugitive dusts. Without mitigation, the impact of particulates and/or fugitive dust is expected to be minimal to moderate.

iii) Noise/Sonic Environment

The operation of construction equipment will be the only source of noise pollution during construction. Noise generated from the operation and use of heavy construction equipment shall not be a major issue since the project is located far from

highly populated areas. Noise impact is expected to be nil to minimal during construction phase.

iv) Topography and Terrain

The topography of the access road site is expected to change due to construction activities like excavation of the hilly parts. Substantial parcels of property both on the landside and seaside shall be acquired. The expected impact is moderate considering that about 10 hectares of flat area will be made available for the road construction compared to rolling and hilly character of Consolacion.

v) Open Space

At present, part of the access road area is being used for minimum source of agricultural vegetation. With the construction of the access road, the present land-use will be changed. The expected impact is minimum.

vi) Impacts of air quality and noise to the Access Road Area

Regarding the air quality and noise impacts to the planned Access Road Area, at moment there are no land uses among the preset area for construction of the planned access road.

There is only agricultural land use near the construction site of the New Cebu Port.

Some private houses are scattered around the planned road area. It is observed that the present concentration of TPS, SO2, NO2, Co caused from the vehicles of construction works and container tracks during the operation stage would be less than 1/100 of the DENR specified level.

The noise level would be reduced 3db at every 2 times of distance from the source of noise. At present the access road is planned along the agricultural land and nearest residents are located around 300 - 500 m away from the planned access road area.

Therefore there will not be the serious environmental impacts by air pollution and noise level.

According to observed air quility at the vicinity of the Cebu Base Port and Cebu New Port, it is estimated that TSP in the emission gas by vehicle would cause the main source of environmental impact.

It is however, advised to conduct the air quality sampling and noise level measure survey when the alignment of the access road is determined by the project proponent in the future;

(ii) Impact on Social Environment

i) Community Structures

The project would entail acquisition of Right-of-Way (ROW) for its access road component. Relocation and/or displacement of households and other community structures such as church and other public structures are not expected. Therefore, the impact of the access road construction on community structures is nil.

The proposed new port project is to be located near the Poor Claire's Seminary,. a religious institution that requires very minimal noise and other form of disturbance all through out the day. The proposed port site is about 1 to 1.5 km away from the seminary. During the second level scooping session, the head of the seminary has expressed its support for the project but vehemently request the management of CPA to institute appropriate mitigation measures to minimize possible disturbance to them. In return, the CPA management is now seriously considering this request. CPA has committed to include mitigation measures in the final design of the proposed new port project and access road construction.

ii) Land Acquisition of Private Lots

The proposed project is not expected to cause any relocation or resettlement of households since there are no informal settlers in the proposed project site.

On the other hand, a substantial parcel of land is necessary to be acquired by the Project Proponent. At any rate, land acquisition is not seen as a major problem as most of the land owners to be affected by the proposed project are all supportive and willing to enter into mutual negotiation and settlement with the Cebu Port Authority.

b) Operation Phase Impacts

(i) Impact on the Socio-Cultural Environment

i) Vehicular Traffic

Present vehicular traffic resulting from port operation is light to moderate. With the completion of the project, more passenger and cargo traffic will pass through the port/Access road. Problems associated with increased traffic were anticipated and as such part of the project is the improvement of the present road system within the port and Access road. Thus the impact will only be minimal to moderate.

Table 3.3.1-21 (3) Matrix of Environmental Impacts During Construction Phase Without Mitigation

Impact Area	*Potential Impacts*	Nature	Magnitude	Probability of Occurrence	Reversibility/ Permanence	Impact Duration	Geographic Extent
Natural Environment	a) Threat of Environmental Hazard	Negative	Nil to minimal	Low	Reversible/ Transient	Short term	Vicinity of Construction Site
	b) Effect on Water Quality and Quantity	Negative	Significant	Medium	Reversible/ Transient	Short term	Vicinity of the project area
	c) Effect on Air Quality and Atmosphere	Negative	Minimal to moderate	Medium	Reversible/ Transient	Short term	Vicinity of the project area
	d) Effect on Noise / Sonic Environment	Negative	Nil to minimal	Medium	Reversible/ Transient	Short term	Vicinity of the project area
	e) Effect on Topography *and Terrain*	Positive	Significant	High	Reversible/ Transient	Short term	Vicinity of the project area
	f) Effect on Open Space and Recreation	Negative	Significant	High	Irreversible/ Permanent	Long term	Vicinity of the project area
	g) Effect on Visual resources	Positive	Significant	High	Irreversible/ Long term	Long term	Vicinity of the project area
	h) Effect on Visual Resources	Negative	Minimal	Low	Reversible/ Transient	Short term	Vicinity of the project area
Biological Environment	a) Effect on Ecological Environment	Negative	Moderate	High	Irreversible/ Permanent	Long term	Vicinity of the project area

Table 3.3.1-21 (3) Matrix of Environmental Impacts During Construction Phase Without Mitigation (Cont'd)

Impact Area	Potential Impacts	Nature	Magnitude	Probability of Occurrence	Reversibility/ Permanence	Impact Duration	Geographic Extent
Social Environment	a) Effect on Occupational Health Safety	Negative	Minimal	High	Reversible/ Transient	Short term	Vicinity of the project area
	b) Effect on Community Structure	Negative	Minimal	High	Reversible/ Transient	Short term	Vicinity of the project area
	c) Effect on Land Values	Positive/ Negative	Significant	High	Irreversible/ Permanent	Long term	Vicinity of the project area
	d) Effect on Population Dynamics and Employment	Positive	Significant	High	Reversible/ Transient	Short term	Vicinity of the project area
	e) Effect on livelihood and income	Positive	Significant	High	Reversible/ Transient	Short term	Vicinity of the project area
	f) Effect on Local Planning Coordination and Economic Growth	Positive	Significant	High	Irreversible/ Permanent	Long term	Vicinity of the project area
	g) Workers' Living Standard	Positive	Significant	High	Reversible/ Transient	Short term	Vicinity of the project area
	h) Women's and Children's Welfare	Positive	Significant	High	Reversible/ Transient	Short term	Vicinity of the project area
	i) Archaeology and Culture	Negative	Nil	Low	Reversible/ Transient	Long term	Vicinity of the project area
	j) Vehicular Traffic	Negative	Nil to minimal	High	Reversible/ Transient	Short term	Vicinity of the project area
	k) Land Acquisition of Private Lots	Negative	Nil to minimal	High	Reversible/ Transient	Short term	Vicinity of the project area

3) Public Participation and Social Acceptability in the EIA process

The role and concerns of the affected communities in the EIA process are given primary environmental consideration. DAO 96 - 37 expressly gives importance to meaningful public participation and transparency of the EIA process as a gauge to fully determine the acceptability of the proposed project.

The public hearing is held especially for social environmental study in the EIA process, however a few question and answer about natural environment was discussed in the sessions at two proposed sites. Natural environmental aspects of them are described in this section. Regarding social environmental aspects are described in succeeding section 3.3.2.

a) Public Hearing for Cebu Base Port Development Plan
Public Hearing session was held in October 4th in Cebu Base Port passenger terminal for the Cebu Base Port development plan. The following is the opinions concerned with natural environment;

(i) Sanitation problem in the community in the Cebu Base Port, it is the one of the causes of the water pollution in the port.

(ii) The place of the garbage-dumping site in port area is the problems and should be solved. It is also the cause of water pollution.

b) Public Hearing for New Cebu Port Development Plan
Public Hearing session was held in October 5th in Brgy Tayud in Consolacion for the New Cebu Port development plan. The following is the opinions concerned natural environment;

(i) A question was mentioned from a fisherman about the relation between existing mangrove trees and the proposed reclaimed area and access road placement.

A member of JICA study team replied that the study team is now planning the mangrove mitigation planting activities and its area instead of cutting mangrove individuals by the construction works. Mangrove substitution planting candidate area is already zoned.

Fig. 3.3.1-5 Public Participation Session for Social Acceptability (Brgy Tayud)

(8) Environmental Management Plan and Mitigation Measures for New Cebu Port

This section elaborates on the Environmental Management Plan (EMP) for the proposed New Cebu Port Project. It contains specific measures that will enhance potential positive impacts for the purpose of maximizing the beneficial impacts of the proposed project. Likewise, this section contains mitigation measures to minimize or address negative impacts to lessen its adverse effects at different stages of project implementation.

The Monitoring Plan is a pro-active plan that will serve as a blue print in overseeing and preventing the occurrence of identified adverse impacts during the construction and operation phases of the Project. Monitoring works are recommended to be undertaken by the Cebu Port Authority where the results shall be used in assessing the compliance of the project on matters stipulated in this EIS document and the ECC.

Distinct in all organizational set up are its operation and mandates. Presented in the Institutional Plan under this EIS are the basic functions of the Cebu Port Authority in relations to the implementation of the proposed new port project. The bounds and limits of its authority as mandated by relevant laws that created CPA are likewise presented. In turn, preliminary institutional linkages and organizational scheme that will facilitate the task of implementing the EMP on one hand, and in providing the Port Management a means to directly address environmental problems in the Port Zone are recommended. Further presented in this section are the functions of the environmental unit and the responsible officers especially the Pollution Control Officer (PCO) who shall take charge of overall management and supervision of the EMP implementation during all phases of the Project.

1) Environmental Management Plan (EMP) of New Cebu Port Development and Access Road Construction

a) EMP for Construction Phase Impacts

Based on the impact assessment presented in Chapter 4 in Volume 1, the following construction phase impacts are considered important in this EIA study and thus, demand important management attention.

(i) Impact on the physical environment

i) Threat of environmental hazards

One of the identified sources of hazards during construction stage is the potential generation of pollution from construction materials which can be classified as hazardous materials. Examples of hazardous materials typically found at construction sites are petroleum products (e.g., lubricating oils, grease), fuels (e.g., gasoline, kerosene), solvents, paints, batteries, and other miscellaneous equipment and supplies. These are usually temporarily stored at the construction site.

In order to prevent the occurrence of any unwanted event of pollution in the project area during construction phase, all these hazardous construction materials will be properly handled and stored in accordance with standard code of safety and technical specifications of the civil works contract. Storage of hazardous materials should be in special-purpose storage warehouse or buildings (with secondary containment and hard stands) to be located in a considerable distance from the active construction zone.

Other precautions such as relevant provisions on the control of marine pollution as stipulated in the MARPOL Agreement will be likewise imposed and observed at all times as mandatory practices to all port construction contractors.

ii) Effect on water quality and quantity

Domestic wastewater would generally come from the activities of construction workers on-site. Adequate number of portalets will be provided and placed in strategic areas to temporarily contain and store wastewater. A third party collection company will be engaged to collect and properly dispose of accumulated wastewater in the project site.

Siltation due to erosion of earth fill materials may be possible especially during rainy days. This will eventually increase the turbidity and suspended solids of the immediate coastal water and at worse will result in siltation.

Temporary embankment of earth fill materials will be provided in the construction site. In this embankment area, some engineered containment system will be constructed in order to prevent siltation problem due to earth fill materials. These may include the following:

- Interceptor dikes. These are generally built around the perimeter of a construction site before any major soil disturbing activity takes place
- Pipe slope drains. These reduce the risk of erosion by discharging runoff to stabilized areas. This is effective before a slope has been stabilized or before permanent drainage structures are ready for use.
- Straw bale. It can be used as a temporary sediment barrier by placing them end to end in a shallow excavated trench.
- Sediment trap. It is appropriate for sites with short time schedules. It is formed by excavating a pond or by placing an earthen embankments across a low area or drainage and;
- Temporary sediment basin. It is a settling pond with a controlled water release structure used to collect and store sediment produced by construction activities.

iii) Effect on topography and terrain

Reclamation of some 40 hectares of coastal area will be undertaken during construction of the proposed new port project. At all times, acceptable and safe engineering practices shall be observed. Earth fill materials of acceptable engineering quality will be used for reclamation. It should be noted that quarrying and hauling of earth fill materials for the purpose of undertaking the reclamation component shall be a subject of a separate ECC application.

Appropriate temporary and permanent retaining or containment structures for earth fill materials will be constructed in accordance with approved technical specifications, other earth moving operations will be subject to sound engineering practices.

vi) Effect on Open Space and Recreation

The construction of access road and reclamation of some 40 hectares of coastal area will results to a moderate change in the panorama of the vicinity of the project area. The change is dramatic and in one point of view, negative. The reason is that the existing breezy open space marked by old ship repair yards and antiquated quay and jetty, a littoral strip where local folks walk by during ebb tide for leisure, and an on-going development for a private marina, will be remarkably change by major infrastructure built of concrete and steel structures.

To mitigate the loss of informal recreation area, the Proponent must incorporate a landscaped recreation plaza with a seaside boulevard or similar public rest and recreation zone within the port zone. For instance, a view deck cum restaurants may be allowed to be constructed in a strategic area in order for interested local and outside residents of Consolacion to view and appreciate the operation of the proposed new port. Some educational information written in local dialect including signages on how to preserve the port coastal environment as a form of enhancing local environmental awareness may be added as special features of the view deck cum restaurant.

v) Effect on visual resources

The aesthetics of the project area will be affected by the presence of various construction activities. To minimize undesirable visual effects, the Project Proponent will ensure that construction debris and other construction materials would not create nuisance or become eyesores. The construction site will be maintained as orderly and clean as possible.

(ii) Biological environment

By implementing the proposed project, ecological disturbance is imminent. Considering that the project has reclamation component, the construction of the port project shall have direct impact on marine resources such as small section of mangrove community and sea grasses and weeds. The project will require clearing and displacement of affected mangal community in

the project area. However, the overall impact to the immediate marine and terrestrial ecosystem is expected to be minimal since the project will occupy an area whose vicinity and present land use is geared towards port development including shipbuilding and repair operations.

The proposed new Cebu port has undergone a series of re-designing in order to exert the least possible impact to the existing mangrove community. In the event that the project design has been finalized, the project proponent (Cebu Port Authority) shall coordinate and seek advise from Regional Office of the DENR to be able to institute appropriate mitigation measures to minimize the adverse ecological effects of disturbance due to construction activities especially on the remaining mangrove area. Further, engineering measures will be strictly implemented to prevent re-suspension of earth fill materials during reclamation that could potentially affect nearby marine resources.

At this stage of project development, CPA as recommended by its Consultants is eyeing the enhancement of the almost vacant littoral spaces around the project area. For instance, CPA can implement mangrove tree planting and reforestation program to replace all affected mangrove trees and further enhance the aesthetic value of the project area. For this purpose, a separate budget is specifically indicated for the purpose of undertaking mangrove tree replacement and mangrove reforestation.

The success of this undertaking, which is mangrove reforestation and enhancement, hinges on the cooperation of the concerned government agency such as BFAR of the Department of Agriculture and DENR. Among others. More importantly, the support of the concerned local government units is vital in order to ensure sustainable environmental conservation and enhancement of the project area.

The environmental management plan (EMaP) and mitigation program for New Cebu port development plan is summarized in Table 3.3.1-22.

(iii) Socio-Economic Environment

i) Vehicular traffic and public safety
Hauling of construction materials and movement would not generate significant impact as the construction materials will be hauled to the project site via water and land transport system.

However, as a pro-active measure, the Project Proponent will devise a contingency traffic management scheme to assist the local government units in case of occurrence of traffic-related problem near and around the project area. Posting of traffic-related advisory will be a component of the traffic management scheme.

For earth-moving activities, markers with warning signs against entry and unwanted activity near the construction site will be installed. These markers aim to prevent accidents caused by moving machineries or altered terrain.

ii) Compensation for Affected Private Land Owners

The design of the port project is anchored on CPA policy of incurring minimal impact and disturbance to the stakeholders. The road alignment for the access road will be selected in such a manner that there will be no affected housing and community structures. For the acquisition of land for port and access road development, the start of the negotiation will be made before the commencement of the construction proper. Through a common agenda, a multi-sectoral support will be solicited by the project proponent. This is to ensure that the proposed project will result to maximum benefits of the society and would cause the least possible negative impact to the host community.

b) Environmental Management Plan (EMP) for the Operation Phase Impacts

The following operation phase impacts are considered important in this study:

(i) Impact on the physical environment (Marine Pollution)

Construction and operation of environmental infrastructure such as sewage treatment plant would address the concern for domestic wastewater management. Discharge of treated domestic wastewater with physical and chemical characteristics following the effluent standards set by DENR is advisable. In the project master plan, construction and operation of a sewage treatment plant is included.

Management of the port's wastewater will be easy since these are mainly floor-drain wastes and those generated by the people's use of the sanitary facilities, restaurants and coffee shops. The wastewater is expected to contain about 200-400 mg BOD, typical concentration for domestic wastewater.

The project is proposing the use of biological sewage treatment plant to treat the wastewater. In the design of the sewage treatment plant, the following considerations are factored in : (1) BOD removal; (2) effluent characteristics; (3) oxygen requirements; (4) energy requirement for mixing; and (6) solid separation. The proposed treatment plant will be designed to meet DENR Effluent Standard for Coastal and Marine Water (Class SC): Fishery Water Class II (commercial and sustenance fishing). The DENR Effluent Standards for Class SC are the following: (1) BOD = 100 mg/L; (2) COD = 200 mg/L; (3) Total suspended Solids = 150 mg/L; (4) Oil and Grease = 10 mg/L; and pH = 6-9.

Similarly, effective solid waste management is also necessary to avoid disposal of these solid wastes into the coastal area. Provision of hiegenic public restrooms and waste bins or trash

receptacles will enhance management's efforts to keep wastes from entering the harbor waters. It is now acknowledged that solid waste problems are quite complex and there is difficulty in using general solutions to these problems. The new port management will therefore employ an integrated solid waste management system by setting its solid waste management goals and objectives and then selecting and applying the suitable techniques, technologies, and management programs to achieve those goals and objectives.

In order to implement such a goal, there is a need to view the entire situation in a holistic and integrated manner by considering the six functional elements of an integrated solid waste management system covering the point of generation to the final disposal. These are: (1) waste generation, (2) waste handling and separation, storage and processing at source, (3) collection, (4) separation and processing and transformation of solid wastes, (5) transfer and transport, and (6) disposal.

There are at least three classification of solid wastes that will be generated by the project. These are 1) recyclable, 2) non-recyclable and 3) large-sized discharges article waste. To manage these solid wastes, the new port management will seek assistance to the Municipal Public Service Division who manages the town solid waste collection and disposal. In the new port, the janitorial staff shall keep all-recyclable items for possible re-use/recycling by the port management. Non-recyclable wastes consisting of wet (food wastes) and dry wastes (broken glasses) will be stored in separate containers. These will then be collected by the town solid waste collection crews for disposal. The frequency of collection of the port waste can be everyday to avoid build up or accumulation of wastes.

(ii) Effect on biological environment

With normal conditions coupled with excellent port management, port projects can co-exist with the environment without harming the integrity of the surrounding coastal and marine environment. Following the recommended management plans for handling and managing domestic wastewater and solid waste, the operation and maintenance of the proposed port project is not expected to adversely impact the environment.

The sustenance of the proposed mangrove rehabilitation and planting activities during the operation stage would enhance the ecological balance and condition of the marine ecosystem in the project area. As mentioned, multi-sectoral, multi-agency efforts are needed to ensure success of this kind of environmental conservation and rehabilitation project.

(iii) Socio-Economic Environment

i) Effect on land values

As mentioned earlier, the implementation of the port and access road construction project will greatly influence the present and future land use of the project area.

Appropriate short-term and long-term land use plans will be formulated to avoid resource use (i.e., land use and water use) conflicts in the project area. The Project Proponent must work hand in hand with LGUs in planning and managing areas inside and out of the project area.

ii) Population dynamics and employment

Operation of the port and access road construction project will attract transient port passengers thus resulting to an increase in the demand for services such as food, accommodation and leisure. The overall impact is expected to be highly beneficial in the local economy of the project area. To enhance this, service providers must be regulated by the LGU and other regulatory agencies with fairness and equitably. To maintain acceptable standards of service, regular inspection and monitoring of such service establishments must be carried out consistently.

iii) Effect on local planning, coordination and economic growth

As previously mentioned, coordination between LGUs and port management (CPA) is important to carefully balance and plan the development of areas surrounding the port area. Pro-active and responsive land use and development plans must be formulated to maximize potential economic benefits of the port project. To enhance productive collaboration in agencies and offices concerned, Port Management will provide a permanent medium through which port users, local government agencies and private business entities can manifest their concerns vis a vis port operations and port services. In the age of internet, a website for Consolacion Port should be set up.

iv) Vehicular traffic

Implementation of a well-coordinated traffic management scheme will prevent the occurrence of vehicular traffic problems. Maintenance of directional signage and warning signs along roads leading to the port area will help prevent the occurrence of road-related accidents. CPA will designate vehicular parking areas, pedestrian access, egress and entrance gates within the port. A system of entry and parking fees within the port for vehicles will discourage unnecessary entry and parking of vehicles at the same time generate port revenues.

Table 3.3.1-22 Environmental Management Plan (EMaP) for New Cebu Port Development Plan **New Cebu Port**

Project Phase and Impact Area	Impact Description	Mitigation Program	Institutional Plan	Schedule	Guarantees
A. Construction Phase					
1. Threat of Environmental Hazard	Hazards due to accidental spills or discharge of construction, materials, etc.	Proper storage and handling of construction materials	CPA/Cebu Port Management/Contractor	During the entire period of the construction phase	Included in the master plan of the project
2. Effect on Water Quality and Quantity	Coastal water pollution	Proper handling and/or disposal of wastewater	CPA/Cebu Port Management/Contractor	During the entire period of the construction phase	Included in the master plan of the project
3. Effect Air Quality (particulates/ fugitive dust)	Particulates/dust pollution	Sprinkling of open areas to suppress dust generation/ resuspension	CPA/Cebu Port Management/Contractor	During the entire period of the construction phase	Included in the master plan of the project
4. Effect Topography and Terrain (Dredging/Civil Works)	Siltation and impairment of nearby coastal water due to dredged and excavated materials	Sound engineering practices/ Proper handling of dredged and excavated materials	CPA/Cebu Port Management/Contractor	During the entire period of the construction phase	Included in the master plan of the project
5. Effect Visual Resources	Nuisance/eyesores	Maintenance of the order and cleanliness of the construction site	CPA/Cebu Port Management/Contractor	During the entire period of the construction phase	Included in the master plan of the project
6. Effect on Ecological Environment	Water pollution	Proper treatment and disposal of wastewater and solid waste	CPA/Cebu Port Management/Contractor	During the entire period of the construction phase	Included in the master plan of the project
B. Operation Phase					
1. Effect on Water Quality and Quantity	Water pollution	Treatment of the domestic wastewaters using multi-chamber septic tanks	CPA/Cebu Port Management	During the entire period of the operation phase	Included in the feasible study of the project
2. Effect Air Quality (particulates/fugitive dust)	Particulates/dust pollution	Sprinkling of open areas to suppress dust generation/ resuspension	CPA/Cebu Port Management	During the entire period of the operation phase	Included in the feasible study of the project
3. Effect Visual Resources	Nuisance/eyesores	Maintenance of the order and cleanliness of the construction site	CPA/Cebu Port Management	During the entire period of the operation phase	Included in the feasible study of the project
4. Effect on Ecological Environment	Water pollution	Proper treatment and disposal of wastewater and solid waste	CPA/Cebu Port Management	During the entire period of the operation phase	Included in the feasible study of the project

(9) Environmental Management Plan and Mitigation Measure for Cebu Base Port

This section elaborates on the Environmental Management Plan (EMP) for the proposed Cebu Baseport Rehabilitation and Improvement Project. It contains specific measures that will enhance potential positive impacts for the purpose of maximizing the beneficial impacts of the proposed project. Likewise, this section contains mitigation measures to minimize and lessen its adverse effects at different stages of project implementation.

The Monitoring Plan is a pro-active plan that will serve as a blue print in overseeing and preventing the occurrence of identified adverse impacts during the construction and operation phases of the Project. Monitoring works are recommended to be undertaken by the Cebu Port Authority where the results shall be used in assessing the compliance of the project on matters stipulated in this EIS document and the ECC.

Distinct in all organizational set up are its operation and mandates. Presented in the Institutional Plan under this EIS are the basic functions of the Cebu Port Authority in relations to the implementation of the proposed baseport rehabilitation and improvement project. The bounds and limits of its authority as mandated by relevant laws that created CPA are likewise presented. In turn, preliminary institutional linkages and organizational scheme that will facilitate the task of implementing the EMP on one hand, and in providing the Port Management a means to directly address environmental problems in the Port Zone are recommended. Further presented in this section are the functions of the environmental unit and the responsible officers especially the Pollution Control Officer (PCO) who shall take charge of overall management and supervision of the EMP implementation during all phases of the Project.

1) Environmental Management Plan (EMP)

a) EMP for Construction Phase Impacts

Based on the impact assessment presented in Chapter 4, the following construction phase impacts are considered important in this EIA study and thus, demand important management attention.

(i) Impact on the Physical Environment

i) Threat of environmental hazards
One of the identified sources of hazards during construction stage is the potential generation of pollution from construction materials which can be classified as hazardous materials. Examples of hazardous materials typically found at construction sites are petroleum products (e.g., lubricating oils, grease), fuels (e.g., gasoline, kerosene), solvents, paints, batteries, and other miscellaneous equipment and supplies.

These are usually temporarily stored at the construction site.

In order to prevent the occurrence of any unwanted event of pollution in the project area during construction phase, all these hazardous construction materials will be properly handled and stored in accordance with standard code of safety and technical specifications of the engineering works contract. Storage of hazardous materials should be in special-purpose storage warehouse or buildings (with secondary containment and hard stands) to be located in a considerable distance from the active construction zone.

Other precautions such as relevant provisions on the control of marine pollution as stipulated in the MARPOL Agreement will be likewise imposed and observed at all times as mandatory practices to all port construction contractors.

ii) Effect on water quality and quantity

Domestic wastewater would generally come from the activities of construction workers on-site. Adequate number of portalets will be provided and placed in strategic areas to temporarily contain and store wastewater. A third party collection company will be engaged to collect and properly dispose of accumulated wastewater in the project site.

Siltation due to erosion of earth fill materials may be possible especially during rainy days. This will eventually increase the turbidity and suspended solids of the immediate coastal water and at worse, result in siltation.

Temporary embankment of earth fill materials will be provided in the construction site. In this embankment area, some engineered containment system will be constructed in order to prevent siltation problem due to earth fill materials. These may include the following:

- Interceptor dikes. These are generally built around the perimeter of a construction site before any major soil disturbing activity takes place
- Pipe slope drains. These reduce the risk of erosion by discharging runoff to stabilized areas. This is effective before a slope has been stabilized or before permanent drainage structures are ready for use.
- Straw bale. It can be used as a temporary sediment barrier by placing them end to end in a shallow excavated trench.
- Sediment trap. It is appropriate for sites with short time schedules. It is formed by excavating a pond or by placing an earthen embankments across a low area or drainage and;
- Temporary sediment basin. It is a settling pond with a controlled water release structure used to collect and store sediment produced by construction activities..

iii) Effect on visual resources

The aesthetics of the project area will be affected by the presence of various construction activities. To minimize undesirable visual effects, the Project Proponent will ensure that construction debris and other construction materials would not create nuisance or become eyesores. The construction site will be maintained as orderly and clean as possible

The environmental management plan (EMaP) and mitigation program for Cebu Base port development plan is summarized in Table 3.3.1-23.

Table 3.3.1-23 Environmental Management Plan (EMaP) for Cebu Baseport Development Plan **Cebu Baseport**

Project Phase and Impact Area	Impact Description	Mitigation Program	Institutional Plan	Schedule	Guarantees
A. Construction Phase					
1. Threat of Environmental Hazard	Hazards due to accidental spills or discharge of construction, materials, etc.	Proper storage and handling of construction materials	CPA/Cebu Port Management/Contractor	During the entire period of the construction phase	Included in the feasible study of the project
2. Effect on Water Quality and Quantity	Coastal water pollution	Proper handling and/or disposal of wastewater	CPA/Cebu Port Management/Contractor	During the entire period of the construction phase	Included in the feasible study of the project
3. Effect Air Quality (particulates/ fugitive dust)	Particulates/dust pollution	Sprinkling of open areas to suppress dust generation/ resuspension	CPA/Cebu Port Management/Contractor	During the entire period of the construction phase	Included in the feasible study of the project
4. Effect Topography and Terrain (Dredging/ Civil Works)	Siltation and impairment of nearby coastal water due to dredged and excavated materials	Sound engineering practices / Proper handling of dredged and excavated materials	CPA/Cebu Port Management/Contractor	During the entire period of the construction phase	Included in the feasible study of the project
5. Effect Visual Resources	Nuisance/eyesores	Maintenance of the order and cleanliness of the construction site	CPA/Cebu Port Management/Contractor	During the entire period of the construction phase	Included in the feasible study of the project
6. Effect on Ecological Environment	Water pollution	Proper treatment and disposal of wastewater and solid waste	CPA/Cebu Port Management/Contractor	During the entire period of the construction phase	Included in the feasible study of the project
B. Operation Phase					
1. Effect on Water Quality and Quantity	Water pollution	Treatment of the domestic wastewaters using multi-chamber septic tanks	CPA/Cebu Port Management	During the entire period of the operation phase	Included in the feasible study of the project
2. Effect Air Quality (particulates/ fugitive dust)	Particulates/dust pollution	Sprinkling of open areas to suppress dust generation/ resuspension	CPA/Cebu Port Management	During the entire period of the operation phase	Included in the feasible study of the project
3. Effect Visual Resources	Nuisance/eyesores	Maintenance of the order and cleanliness of the construction site	CPA/Cebu Port Management	During the entire period of the operation phase	Included in the feasible study of the project
4. Effect on Ecological Environment	Water pollution	Proper treatment and disposal of wastewater and solid waste	CPA/Cebu Port Management	During the entire period of the operation phase	Included in the feasible study of the project

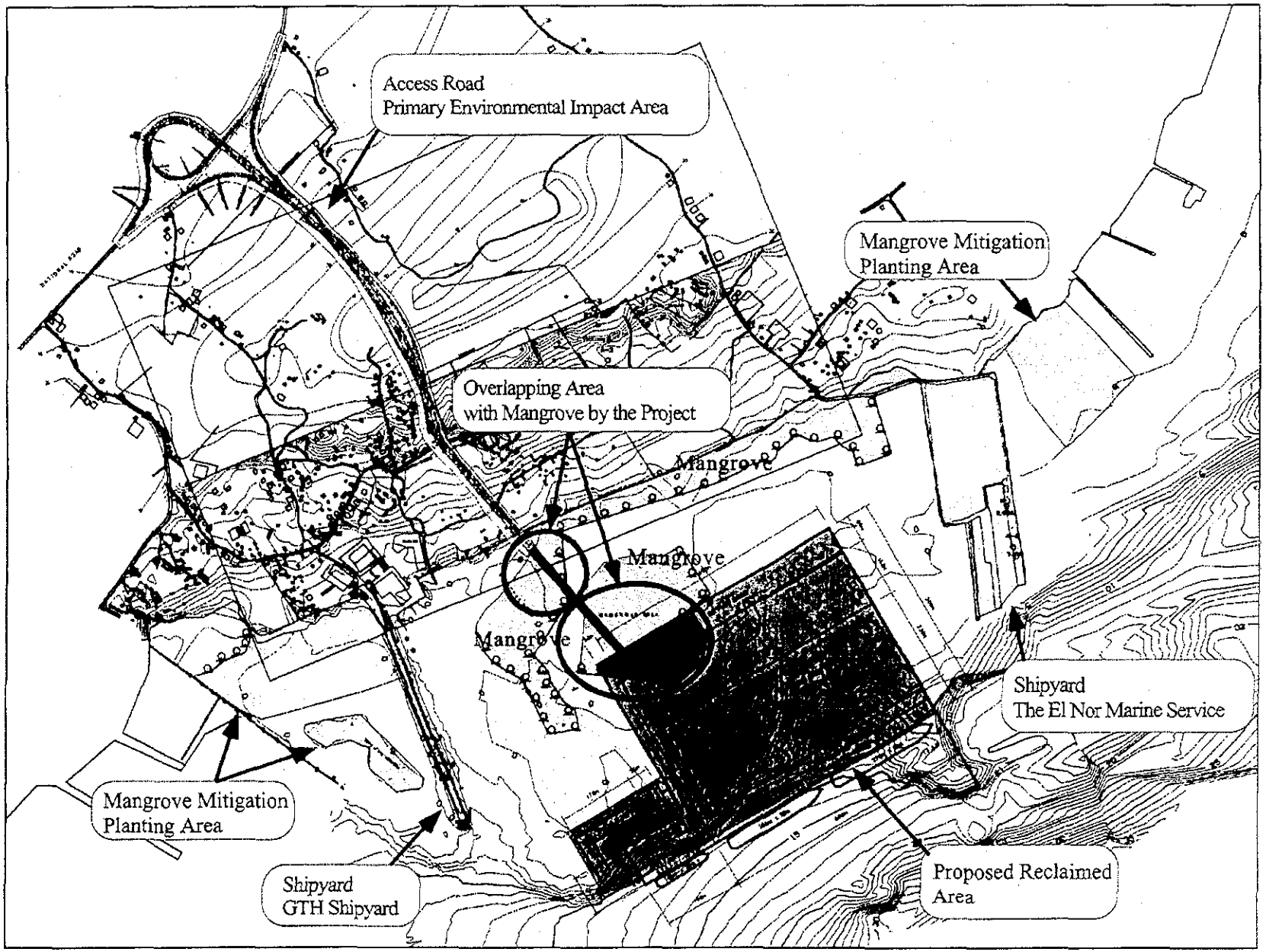

Figure 3.3.1-6 Environmental Impact Mitigation Area in New Cebu Port