

K. ENVIRONMENT (IEE AND EIA)

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K.1 IEE AND ENVIRONMENTAL IMPACT BY THE PROJECT

K.1.1 OBJECTIVES OF IEE

In general, environmental impact assessment (EIA) comprises the whole environmental elements. EIA is a very important management tool for development project. EIA provides not only evaluation of environmental impact caused by implementation of the project but also information on changes and modification of the project including design of structure, construction methods and others before implementation in order to minimize environmental negative impact.

An Initial Environmental Examination (IEE) is a form of EIA. In general, the IEE is carried out in the early stage of projects. On the other hand, the Philippine Government established “Philippine EIA Law” or Presidential Decree No. 1586 of 1978. As mentioned in *Chapter 2.9.3 of Main Report*, the Philippine Government established the Philippine EIS system. DENR Administrative Order No. 30 of 2003, and its Implementing Rules and Regulations (IRR) for the Philippine Environmental Impact Statement System include IEE. “As a document similar to EIS with reduced details and depth of assessment and discussion”.

However, in the Philippines IEE is carried out during feasibility stage. The IEE in this Study was carried out during the master plan stage. In this report, therefore, IEE is carried out by the Study Team based on JICA’s Social and Environmental Guidelines 2004.

IEE provides the following information through preparation of environmental impact matrix, screening, and scoping.

- To identify possible environmental impact caused by implementation of the proposed projects and programs based on available data and information and limited field reconnaissance,
- To recommend necessary preventive measure and modification of projects and programs, if necessary
- To suggest necessary environmental impact study such as IEE and/or EIS at feasibility study stage

K.1.2 FRAMEWORK OF IEE

(1) Targets of IEE

Target project for IEE consist of five sub-components including:

- Rehabilitation of pumping station
- Improvement of regional inundation problem in North Manila
- Improvement of regional inundation problem in South Manila
- Improvement of management facilities along esteros and drainage mains
- Dredging of other esteros and drainage mains

Contents of target sub-components are shown in *Table K.1.1*.

Table K.1.1 Target Sub-Components for IEE

1. Rehabilitation of pumping stations		
	(1) Balut Pumping Station (2) Vitas Pumping Station (3) Escolta Pumping Station (4) Binondo Pumping Station (5) Quiapo Pumping Station (6) Aviles Pumping Station (7) Valencia Pumping Station (8) Pandacan Pumping Station	(9) Balete Pumping Station (10) Paco Pumping Station (11) San Andres Pumping Station (12) Sta. Clara Pumping Station (13) Makati Pumping Station (14) Libertad Pumping Station (15) Tripa de Gallina Pumping Station
2. Improvement of regional inundation problem in North Manila		
	Improvement of the existing drainage facilities within the Aviles-Sampaloc drainage block and the Maypajo-Blumentritt-Balut Drainage block. Major activities are: (1) Improvement of Estero de Sunog Apog/Maypajo (mainly dredging) (2) Declogging of Blumentritt interceptor (3) Remedial works of Blumentritt interceptor (4) Construction of a new interceptor (5) Other remedial works related to the new interceptor	
3. Improvement of regional inundation problem in South Manila		
	Improvement of the Libertad-Tripa de Gallina drainage block. Major activities are: (1) Improvement of parts of Estero de Tripa de Gallina (bottlenecks) (2) Dredging and declogging of secondary channels (3) Construction of new drainage mains	
4. Improvement of management facilities along esteros and drainage mains		
	Construction of facilities intended to facilitate maintenance and management of the drainage systems including: (1) Roads and related facilities along esteros (2) Manholes along drainage mains (3) 42 esteros with a total length of 72 km (4) 37 drainage mains with a total length of 34 km	
5. Dredging of other esteros and drainage mains		
	Dredging of the following drainage channels: (1) 42 esteros with a total length of 72 km (2) 37 drainage mains with a total length of 34 km	

(2) Phasing of the Project

The project activities can be divided into three phases such as Pre-Construction Phase, Construction Phase and Operation and Maintenance phase. The solutions of environmental impact caused by the project will be evaluated at each phase. Major activities are as follows:

Pre-construction phase

- Surveys
- Land acquisition
- Resettlement
- Employment of workers

Construction Phases

- Traveling of construction vehicles
- Operation of heavy equipment, and
- Other construction activities.

Operation and Maintenance Phase

- Existence of structure
- Nature of raw materials to be utilized and their source
- Processes and operation procedures of the project
- Maintenance under normal conditions
- Employment for operation and maintenance

(3) Information sources for preparation of IEE

The following surveys were conducted in order to study IEE:

- Water quality survey
- Sediment quality survey
- Encroached building survey
- Structure survey
- Other field reconnaissance survey and secondary data analysis

K.1.3 ENVIRONMENTAL IMPACT BY PROJECT ACTIVITIES

Possible environmental impact caused by the master plan is shown in *Table K.1.2*.

Table K.1.2 Possible Environmental Impact and its Sources by Project Activities

	Project Activities		Sources of Environmental Impact		Environmental Impact	
1. Rehabilitation of Pumping Stations						
Pre-construction Phase	<ul style="list-style-type: none"> • employment of construction workers 	<ul style="list-style-type: none"> ➤ provide job to workers 	<ul style="list-style-type: none"> ➔ employment opportunity will be increased 			
Construction Phase	<ul style="list-style-type: none"> • transportation of construction equipment and construction of materials • transportation of new pumps and other facilities/equipment • removal and installation of facilities/equipment • transportation of used facilities/equipment • transportation of construction waste 	<ul style="list-style-type: none"> ➤ generate noise and air pollutants by transportation of construction equipment and construction materials ➤ increase traffic volume an access roads by transportation of construction equipment and construction materials ➤ generate noise and air pollutants by transportation of new and used pumps and other facilities/equipment ➤ generate noise by renovation of buildings, interior finishing work and exterior finishing work ➤ generation of construction waste 	<ul style="list-style-type: none"> ➔ noise level and air pollution level will be increased by transportation of construction equipment, construction materials and new/used pumps on access roads. ➔ traveling cars around pumping stations where have no parking space will be obstructed by parking construction vehicles ➔ construction waste will increased 			
O & M Phase	<ul style="list-style-type: none"> • operation of pumping stations • maintenance of pumping station 	<ul style="list-style-type: none"> ➤ generation of noise by operation of pumps 	<ul style="list-style-type: none"> ➔ flood risk will be decreased by stable operation under the capacity ➔ no significant environmental negative impact identified 			
2. Improvement of Regional Inundation Problems in North Manila						
Pre-construction Phase	<ul style="list-style-type: none"> • employment of construction workers • cleaning of construction sites on Estero de Maypajo 	<ul style="list-style-type: none"> ➤ providing job to workers 	<ul style="list-style-type: none"> ➔ employment opportunity will be increased ➔ social uneasiness will be increased 			
Construction Phase	<ul style="list-style-type: none"> • <u>Improvement of Estero de Sunog Apog / Maypajo</u> • transportation of construction equipment and construction materials • dredging of Estero de Sunog Apog/Maypajo • transportation and disposal of sediment from Estero de Sunog Apog / Maypajo • <u>Improvement of the inlet of Blumentritt</u> • transportation of construction equipment and construction materials • operation of construction equipment 	<ul style="list-style-type: none"> ➤ <u>Improvement of Estero de Sunog Apog / Maypajo</u> ➤ temporary increase in traffic volume on access roads by transportation of construction equipment and construction materials ➤ temporary generate noise and air pollutants by transportation of construction equipment and construction materials ➤ generate noise and air pollutants by heavy equipment ➤ generate odor from dredged sediment ➤ temporary increase in traffic volume on access roads by transportation of dredging 	<ul style="list-style-type: none"> ➔ <u>Improvement of Estero de Sunog Apog / Maypajo</u> ➔ noise level and air pollutants level will be increased temporary by transportation of construction equipment and construction waste ➔ noise and air pollution will be increased by operation of heavy equipment ➔ unpleasant will be given to residents by odor through dredging of sediment ➔ life span of disposal site(s) will be reduced by disposal for dredging of sediment, if dredged sediment will be disposed at 			

Project Activities	Sources of Environmental Impact	Environmental Impact
<ul style="list-style-type: none"> • demolition of the existing inlet of Blumentritt interceptor • construction of inlet structure at Blumentritt interceptor • transportation of construction waste <p><u>Dredging of Blumentritt Interceptor</u></p> <ul style="list-style-type: none"> • transportation of construction equipment and construction materials • removal of sediment from Blumentritt Interceptor • transportation and disposal of sediment from Blumentritt Interceptor • disposal of dredged sediment from Blumentritt Interceptor <p><u>Construction of a new interceptor at Sampaloc</u></p> <ul style="list-style-type: none"> • transportation of construction equipment and construction materials • operation of construction equipment • removal and re-installation of underground installations • excavation of road for installation of culvert • installation of culvert • transportation of surplus soil • transportation of construction waste • pavement of road 	<p>sediment</p> <ul style="list-style-type: none"> ▶ temporary generate noise and air pollutant by transportation of dredged sediment ▶ exude pollutants to water and soil from disposed dredged sediment <p><u>Improvement of the inlet of Blumentritt</u></p> <ul style="list-style-type: none"> ▶ temporary increase traffic volume on access roads by transportation of heavy equipment and construction materials ▶ temporary generate noise and air pollutants by transportation of heavy equipment and construction materials ▶ generate noise and air pollutants by operation of heavy equipment ▶ temporary generate noise and air pollutant by transportation of dredged sediment <p><u>Dredging of Blumentritt Interceptor</u></p> <ul style="list-style-type: none"> ▶ temporary increase traffic volume on access roads by transportation of construction equipment and construction materials ▶ temporary generation of noise and air pollutants by transportation of construction equipment and construction materials ▶ partially stop the traffic around construction sites on Blumentritt Interceptor ▶ generate noise and air pollutants by operation of construction equipment ▶ generate odor from dredged sediment ▶ temporary increase traffic volume on access roads by transportation of dredged sediment ▶ temporary generate noise and air pollutants by transportation of removed sediment ▶ temporary generation of noise and air pollutants by transportation of dredged sediment ▶ exude pollutants to water and soil from disposed dredged sediment <p><u>Construction of a new interceptor at Sampaloc</u></p> <ul style="list-style-type: none"> ▶ temporary increase traffic volume on access 	<ul style="list-style-type: none"> ▶ existing disposal site ▶ noise level and air pollution level will be increased temporary by transportation of dredged sediment ▶ water and soil pollution may occur by disposal of sediment at disposal site(s) <p><u>Improvement of the inlet of Blumentritt</u></p> <ul style="list-style-type: none"> ▶ noise level and air pollution level will be increased temporary by transportation of construction equipment and construction materials ▶ noise level and air pollution level will be increased by operation of heavy equipment ▶ noise level and air pollution level will be increased by transportation of construction waste <p><u>Dredging of Blumentritt Interceptor</u></p> <ul style="list-style-type: none"> ▶ traffic at construction sites will be obstructed around construction sites ▶ noise and air pollutants level will be increased temporary by transportation of construction equipment and construction materials ▶ noise and air pollution will be increased temporary by transportation of dredged sediment ▶ life span of disposal site(s) will be reduced by disposal for dredging of sediment, if dredged sediment will be disposed at existing disposal site ▶ water and soil pollution may occur by disposal of sediment <p><u>Construction of a new interceptor at Sampaloc</u></p> <ul style="list-style-type: none"> ▶ noise level and air pollution level will be increased by transportation of construction equipment and construction materials ▶ current traffic will be obstructed around construction sites by excavation, and installation of culvert

	Project Activities	Sources of Environmental Impact	Environmental Impact
		<ul style="list-style-type: none"> ➤ roads by transportation of construction equipment and construction materials ➤ temporary generate noise and air pollutants by transportation of construction equipment and construction materials ➤ partially stop the traffic around construction sites ➤ generate noise, vibration and dust from excavation for installation of culvert ➤ transport surplus soil and construction waste ➤ generate noise and air pollutant by transportation of surplus soil and construction waste ➤ temporary stop services ➤ flow discharge water 	<ul style="list-style-type: none"> ➤ noise and vibration level and air pollution level especially dust will be increased by excavation work ➤ life span of disposal sites will be reduced by disposal for excavated surplus soil, if excavate soil will be disposed at the existing of disposal site.
O & M Phase	<ul style="list-style-type: none"> • <u>Improvement of Estero de Maypaio</u> • existence of rehabilitated structure • <u>Improvement of the inlet of Blumentritt</u> • existence of new inlet structure • <u>Dredging of Blumentritt Interceptor</u> • flowing water under the ground • Construction of a new interceptor at Sampaloc • flowing water under the ground 		<ul style="list-style-type: none"> ➤ no significant negative environmental impact identified ➤ flood risk will be decrease
3. Improvement of Regional Inundation Problems in South Manila Pre-construction Phase	<ul style="list-style-type: none"> • employment of construction workers • cleaning of construction sites on Estero de Tripa de Gallina • resettlement of informal settlers at some bottle neck sections of Estero de Tripa de Gallina 	<ul style="list-style-type: none"> ➤ providing job to workers ➤ relocate informal settlers who live at some bottle neck sections of Estero de Tripa de Gallina 	<ul style="list-style-type: none"> ➤ providing job to workers ➤ cleaning of construction site of Estero de Tripe de Gallina ➤ social uneasiness will be increased
Construction Phase	<ul style="list-style-type: none"> • <u>Improvement of Estero de Tripa de Gallina</u> • transportation of construction equipment and construction materials • operation of heavy equipment • dredging at Estero de Tripa de Gallina • transportation and disposal of sediment from Estero de Tripa de Gallina • disposal of dredged sediment from Estero de Tripa de Gallina • <u>Dredging of PNR canal</u> 	<ul style="list-style-type: none"> ➤ <u>Improvement of Estero de Tripa de Gallina</u> ➤ temporary increase in traffic volume on access roads by transportation of construction equipment and construction materials ➤ partially stop the traffic on roads ➤ temporary generate noise and air pollutants by transportation of construction equipment and construction materials ➤ generate noise and air pollutants by operation 	<ul style="list-style-type: none"> ➤ <u>Improvement of Estero de Tripa de Gallina</u> ➤ noise level and air pollution level will be increased temporary by transportation of construction equipment and construction materials ➤ noise level and air pollution level will be increased by operation of heavy equipment ➤ dust, noise and vibration levels will be increased by demolition work ➤ temporary traffic will be obstructed at

Project Activities	Sources of Environmental Impact	Environmental Impact
<ul style="list-style-type: none"> transportation of construction equipment and construction materials operation of heavy equipment demolition of structure within canal dredging of sediment on canal transportation of dredged sediment from PNR canal to disposal site(s) disposal of dredged sediment from PNR canal 	<ul style="list-style-type: none"> of heavy equipment generate odor from dredged sediment temporary increase in traffic volume on access roads by transportation of dredged sediment generate noise and air pollutant by transportation of dredged sediment and construction waste exude pollutants to water and soil from disposed dredged sediment 	<ul style="list-style-type: none"> construction sites unpleasant odor will be given to residents by odor through dredging of sediment life of disposal site will be reduced by disposal for dredged sediment, if dredged sediment will be disposed at the existing disposal site water and soil pollution may occur by disposal of dredged sediment generate noise level and air pollution level will be increased temporarily by transportation of construction waste
<p><u>Dredging of PNR canal</u></p> <ul style="list-style-type: none"> transportation of construction equipment and construction materials operation of heavy equipment removal and re-installation of underground installation excavation of road for installation of culvert installation of culvert transportation of surplus soil transportation of construction waste pavement of road 	<p><u>Dredging of PNR canal</u></p> <ul style="list-style-type: none"> temporary increase traffic volume on access roads by transportation of construction equipment and materials partially stop the traffic on roads for construction temporary generate noise and air pollutants by transportation of construction equipment and construction materials generate dust, noise and vibration by demolition of structures within PNR canal generate odor from dredged sediment temporary increase traffic volume on access roads by transportation of dredged sediment increase traffic volume on access roads by transportation of dredged sediment generate noise and air pollution by transportation of dredged sediment and construction work exude pollutants to water and soil from disposed dredged sediment 	<p><u>Dredging of PNR canal</u></p> <ul style="list-style-type: none"> noise level and air pollution level will be increased temporarily by transportation of construction equipment and construction materials noise level and air pollution level will be increased by operation of heavy equipment temporary traffic will be obstructed at construction sites unpleasant odor will be emitted to residents through dredging life of disposal site will be reduced, if dredged sediment will be disposed at the existing disposal site water and soil pollution may occur by disposal of dredged sediment noise level and air pollution level will be increased by transportation of construction waste
<p><u>Construction of new drainage mains</u></p> <ul style="list-style-type: none"> transportation of construction equipment and construction materials operation of heavy equipment removal and re-installation of underground installation excavation of road for installation of culvert installation of culvert transportation of surplus soil transportation of construction waste pavement of road 	<p><u>Construction of a new drainage main</u></p> <ul style="list-style-type: none"> temporary increase traffic volume on access roads by transportation of construction equipment and construction materials temporary generate noise and air pollutants by transportation of construction equipment and construction materials partially stop the traffic around construction 	<p><u>Construction of a new drainage main</u></p> <ul style="list-style-type: none"> noise level and air pollution level will be increased by transportation of construction equipment and construction materials current traffic will be obstructed around construction sites by excavation work and installation of culvert life of disposal site will be reduced, if

	Project Activities	Sources of Environmental Impact	Environmental Impact
O & M Phase	<ul style="list-style-type: none"> Improvement of Estero de Tripa de Gallina existence of rehabilitated structure <u>Dredging of PNR canal</u> existence of rehabilitated structure Construction of a new interceptor at Sampaloc flowing water under the ground 	<ul style="list-style-type: none"> generate noise, vibration and dust from excavation due to installation of culvert from transportation vehicle for construction waste generate noise, vibration and dust by excavation for installation of culvert temporary stop services which are installed underground flow discharge water 	<p>excavated soil will be disposed at the existing disposal site</p> <ul style="list-style-type: none"> no significant negative environmental impact identified flood risk will be decreased
4. Improvement of Management Facilities along Esteros and Drainage Mains	<ul style="list-style-type: none"> land acquisition for construction of maintenance roads and facilities employment of construction workers 	<ul style="list-style-type: none"> providing job to workers 	<ul style="list-style-type: none"> employment opportunity will be increased social uneasiness will be increased
Construction Phase	<p>Roads and related facilities along esterros</p> <ul style="list-style-type: none"> transportation of construction equipment and materials operation of heavy equipment pavement a part of roads along esterros transportation of construction waste <p><u>Manholes along drainage mains</u></p> <ul style="list-style-type: none"> transportation of construction equipment and materials installation of manhole facilities with drainage main transportation of construction waste 	<p>Roads and related facilities along esterros</p> <ul style="list-style-type: none"> temporary increase traffic volume by transportation of construction equipment and construction materials temporary generate noise and air pollutants by transportation of construction equipment and materials generate dust, noise and vibration by demolition work for structures within maintenance road and other facilities partially stop the traffic around construction sites temporary generate noise and air pollutant from transportation of construction waste dispose construction waste from demolition of structure <p><u>Manholes along drainage mains</u></p> <ul style="list-style-type: none"> temporary increase traffic volume on access roads by transportation of construction equipment and construction materials temporary generate noise and air pollutants 	<p>Roads and related facilities along esterros</p> <ul style="list-style-type: none"> noise level and air pollution level will be increased temporary by transportation of construction equipment and construction materials dust, noise and vibration levels will be increased by demolition work temporary traffic will be obstructed at construction sites life span of landfill site will be reduced by disposal of construction waste due to demolishment of structures, if waste will be disposed at landfill site <p><u>Manholes along drainage mains</u></p> <ul style="list-style-type: none"> noise level and air pollution level will be increased temporary by transportation of construction equipment, construction materials and waste current traffic at construction sites will be obstructed by installation of manholes with drainage mains

	Project Activities	Sources of Environmental Impact	Environmental Impact
O & M Phase	<ul style="list-style-type: none"> • maintenance of roads and facilities along esteros • maintenance of drainage mains 	<ul style="list-style-type: none"> ➤ by transportation of construction equipment and materials ➤ partially stop the traffic around construction sites of manhole construction ➤ generate dust, noise and vibration level will be increased by demolition work ➤ generate noise and air pollutant from transportation of construction waste ➤ increase traffic volume on access roads by transportation of construction work ➤ temporary stop traveling cars around manholes for maintenance of drainage mains 	<ul style="list-style-type: none"> ➤ no significant negative impact identified ➤ flood risk will be decrease
5. Dredging of Other Esteros and Drainage Mains			
Pre-construction Phase	<ul style="list-style-type: none"> • cleaning of construction sites • employment of construction workers • resettlement of informal settlers who live within esteros 	<ul style="list-style-type: none"> • employment of construction workers • relocated informal settlers who live within esteros 	<ul style="list-style-type: none"> ➔ employment opportunity will be increased ➔ social uneasiness will be increased
Construction Phase	<p><u>Dredging of esteros</u></p> <ul style="list-style-type: none"> • transportation of construction equipment and construction materials • operation of heavy equipment • demolition of structure within canal • dredging of sediment on esteros • transportation of dredged sediment from esteros to disposal site(s) • disposal of dredged sediment from esteros <p><u>Dredging of drainage main</u></p> <ul style="list-style-type: none"> • transportation of construction equipment and construction materials • removal of sediment from drainage mains • transportation and disposal of sediment from drainage mains • disposal of dredged sediment from drainage mains 	<p><u>Dredging of esteros</u></p> <ul style="list-style-type: none"> ➤ temporary increase traffic volume on access roads by transportation of construction equipment and materials ➤ temporary generate noise and air pollutants by transportation of construction equipment and construction materials ➤ partially stop the traffic on roads for construction ➤ generate dust, noise and vibration by demolition of structures within esteros ➤ generate noise and air pollutants by transportation of dredged sediment ➤ temporary generate odor from dredged sediment ➤ exude pollutants to water and soil from disposed dredged sediment ➤ temporary increase traffic volume on access roads by transportation of dredged sediment ➤ generate noise and air pollution by transportation of dredged sediment <p><u>Dredging of drainage mains</u></p> <ul style="list-style-type: none"> ➤ traffic at construction sites will be obstructed around construction sites by 	<p><u>Dredging of Esteros</u></p> <ul style="list-style-type: none"> ➔ noise level and air pollution level will be increased by transportation of construction equipment and construction materials ➔ noise and air pollution will be increased by operation of heavy equipment ➔ temporary traffic will be constructed at construction sites ➔ unpleasant odor will be emitted to residents through dredging ➔ life of disposal site will reduced, if dredged sediment will be disposed at the existing disposal site ➔ water and soil pollution may occur by disposal site of dredged sediment ➔ noise level and air pollution level will be increased by transportation of construction waste <p><u>Dredging of drainage mains</u></p> <ul style="list-style-type: none"> ➔ traffic at construction sites will be obstructed around construction sites by

	Project Activities	Sources of Environmental Impact	Environmental Impact
		<p>Dredging of drainage mains</p> <ul style="list-style-type: none"> ➤ temporary increase traffic volume on access roads by transportation of construction equipment and construction materials ➤ temporary generation of noise and air pollutants by transportation of construction equipment and construction materials ➤ partially stop the traffic around construction sites of drainage mains ➤ generate noise and air pollutants by operation of construction equipment ➤ generate odor from dredged sediment ➤ temporary increase traffic volume on access roads by transportation of dredged sediment ➤ temporary generate noise and air pollutants by transportation of removed sediment ➤ temporary generation of noise and air pollutants by transportation of dredged sediment ➤ exude pollutants to water and soil from disposed dredged sediment ➤ flood risk will be decrease 	<p>construction activities</p> <ul style="list-style-type: none"> ➔ noise and air pollutants level will be increased by transportation of construction equipment and construction materials ➔ noise and air pollution will be increased temporary by transportation of dredged sediment ➔ life span of disposal site(s) will be reduced by disposal for dredging of sediment, if dredged sediment will be disposed at existing disposal site ➔ water and soil pollution may occur by disposal of sediment
O & M Phase	<ul style="list-style-type: none"> • maintenance of esteros • maintenance of drainage mains 		<ul style="list-style-type: none"> ➔ no significant negative environmental impact ➔ flood risk will be decreased

K.1.4 RESULT OF IEE

(1) Environmental Impact Matrix

An environmental impact matrix is used as a checklist of environmental impact. Environmental elements of impact matrix are based on DENR Form-2 named First Level Scoping. Other environmental elements were added into original element of DENR Format-2. Scoping (DPWH: Social and Environmental Management System Operations and Manual 2003). Environmental impact is evaluated including not only negative impact but also positive impact. Environmental evaluation elements are shown in *Table K.1.3*.

(2) Screening

1) JICA Screening

In the context of the IEE, screening is the process of deciding upon the level of environmental review required. JICA formulated Guidelines for Environmental and Social Consideration in 2004. The JICA Screening Format is a tool used to screen whether the project would bring about negative impacts on the environment and social aspect. Result of screening which follows the format of JICA Guidelines is shown in *Table K.1.4*.

Table K.1.3 Environmental Impact Matrix

Project Details		Land Features and Uses		Species and Ecosystem			Air and Water			Socio-economic Consideration													
		Land Use	Topography/Physiography	Geology/Soils	Aesthetics	Terrestrial fauna	Terrestrial Flora	Aquatic Fauna	Aquatic Flora	Air Quality	Surface Water Quality	Ground Water Quality	Noise	vibration	Population Settlement	Employment /Livelihood	Health	Hazardous Substance	Solid Waste	Transportation	Cultural and Historical Value	Resource use Competition	Accessibility
Rehabilitation of Pumping Stations																							
Balut Pumping Station	Pre-construction																						
	Construction																						
	O & M																						
Vitas Pumping Station	Pre-construction																						
	Construction																						
	O & M																						
Escolta Pumping Station	Pre-construction																						
	Construction																						
	O & M																						
Balete Pumping Station	Pre-construction																						
	Construction																						
	O & M																						
Paco Pumping Station	Pre-construction																						
	Construction																						
	O & M																						
San Anderson Pumping Station	Pre-construction																						
	Construction																						
	O & M																						
Binondo Pumping Station	Pre-construction																						
	Construction																						
	O & M																						
Quiapo Pumping Station	Pre-construction																						
	Construction																						
	O & M																						
Aviles Pumping Station	Pre-construction																						
	Construction																						
	O & M																						
Valencia Pumping Station	Pre-construction																						
	Construction																						
	O & M																						
Pandacan Pumping Station	Pre-construction																						
	Construction																						
	O & M																						
Sta Clara Pumping Station	Pre-construction																						
	Construction																						
	O & M																						
Makati Pumping Station	Pre-construction																						
	Construction																						
	O & M																						
Libertad Pumping Station	Pre-construction																						
	Construction																						
	O & M																						
Tripa de Gallina Pumping Station	Pre-construction																						
	Construction																						
	O & M																						
Improvement of regional inundation problem in North Manila																							
Improvement of Esterode Maypajo (mainly dredging)	Pre-construction																						
	Construction																						
	O & M																						
Remedial Works of Bulmentritt Interceptor	Pre-construction																						
	Construction																						
	O & M																						
Declogging of Blumentritt interceptor	Pre-construction																						
	Construction																						
	O & M																						
Construction of a new interceptor	Pre-construction																						
	Construction																						
	O & M																						
Other remedial works related to the new interceptor	Pre-construction																						
	Construction																						
	O & M																						
Improvement of regional inundation problem in South Manila																							
Improvement of parts of Estero de Tripa de Gallina (Bottlenecks)	Pre-construction																						
	Construction																						
	O & M																						
Dredging and Declogging of Secondary Channels	Pre-construction																						
	Construction																						
	O & M																						
Construction of new drainage mains	Pre-construction																						
	Construction																						
	O & M																						
Improvement of Management facilities along esteros or drainage mains																							
Roads and related facilities along the esteros	Pre-construction																						
	Construction																						
	O & M																						
Manholes along drainage mains	Pre-Construction																						
	Construction																						
	O & M																						
Dredging of the esteros and drainage mains																							
Dredging of esteros	Pre-construction																						
42 esteros with a total length of 74 km	Construction																						
	O & M																						
Dredging of Drainage Mains	Pre-construction																						
37 Drainage mains with a total length of 35 km	Construction																						
	O & M																						

Environmental Impact Score:

A+: Significant positive impact
 A-: Significant negative impact
 B+: Moderate positive impact
 B-: Moderate negative impact
 C+: Negligible positive impact
 C-: Negligible negative impact

?: Unclear

A+: Significant positive impact
 A-: Significant negative impact
 B+: Moderate positive impact
 B-: Moderate negative impact
 C+: Negligible positive impact
 C-: Negligible negative impact

Blank: No negative and positive impact caused by project activities

Table K.1.4 Result of Screening for the Projects

JICA GUIDELINES FOR ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

Screening Format

Name of the Proposed Project: **Drainage Improvement in the Core Area of Metropolitan Manila**

Project Executing Organization: **Metropolitan Manila Development Authority (MMDA) or Department of Public Works and Highways (DPWH)**

Name of Officer:

Position:

Tel. Nos.:

Fax No.:

E-mail Address

CHECK ITEMS

1. Address of Project Site: Metropolitan Manila, Philippines

- Major portion of Manila City
- Parts of Caloocan City, Quezon City, Makati City, Pasay City and Municipality of Taguig

2. Outline of the Project

2-1 Does the project come under the following sectors?

Yes No

If yes, please mark the corresponding items

- Mining development
- Industrial development
- Thermal power (including geothermal power)
- Hydropower, dams and reservoirs
- River/erosion control

- Power transmission and distribution lines
- Roads, railways and bridges
- Airports
- Ports and harbors
- Water supply, sewage and waste treatment
- Agriculture involving large-scale land clearing or irrigation
- Forestry
- Fishery
- Tourism

2-2 Does the project include any of the following items?

- Yes No

If yes, please mark the following items that the project includes

- Involuntary resettlement (scale: 5,500 households persons)
- Groundwater pumping (scale: m³/year)
- Land reclamation, land development and land clearing (scale: hectares)
- Logging (scale: hectares)

**2-3 Description of the Project:
(Scale and/or Basic Information)**

The Project involves: (1) rehabilitation of pumping stations, (2) improvement of the regional inundation problem in North Manila, (3) Improvement of the regional inundation area in South Manila, (4) Improvement of management facilities along esteros and drainage mains, and (5) dredging of other esteros and drainage mains. Each of these sub-projects is described below:

(1) Rehabilitation of Pumping Stations

The project plans to rehabilitate fifteen (15) pumping stations in the core area of Metropolitan Manila. These are:

- | | |
|---------------------------------|---------------------------------------|
| (i) Balut Pumping Station | (ix) Balete Pumping Station |
| (ii) Vitas Pumping Station | (x) Paco Pumping Station |
| (iii) Escolta Pumping Station | (xi) San Andres Pumping Station |
| (iv) Binondo Pumping Station | (xii) Sta. Clara Pumping Station |
| (v) Quiapo Pumping Station | (xiii) Makati Pumping Station |
| (vi) Aviles Pumping Station | (xiv) Libertad Pumping Station |
| (vii) Valencia Pumping Station | (xv) Tripa de Gallina Pumping Station |
| (viii) Pandacan Pumping Station | |

(2) Improvement of regional inundation problem in North Manila

This would involve improvement of the existing drainage facilities within Aviles-Sampaloc drainage block and Maypajo-Blumentritt-Balut Drainage block. Specifically, this would involve:

- (i) Improvement of Estero de Sunog Apog / Maypajo (mainly dredging)

- (ii) Remedial works of Blumentritt interceptor
- (iii) Declogging of Blumentritt interceptor
- (iv) Construction of a new interceptor
- (v) Other remedial works related to the new interceptor

(3) Improvement of the regional inundation problem in South Manila

This involves improvement of Libertad-Tripa de Gallina drainage block. Specifically, this would involve:

- (i) Improvement of parts of Estero de Tripa de Gallina (bottlenecks)
- (ii) Dredging and declogging of secondary channels
- (iii) Construction of new drainage mains

(4) Improvement of management facilities along esteros and drainage mains

This would involve construction of facilities intended to facilitate maintenance and management of the drainage systems. Among these are:

- (i) Roads and related facilities along esteros
- (ii) Manholes along drainage mains
- (iii) 42 esteros with a total length of 72 km
- (iv) 37 drainage mains with a total length of 34 km

(5) Dredging of other esteros and drainage mains

This would involve dredging of the following drainage channels:

- 42 esteros with a total length of 72 km
- 37 drainage mains with a total length of 34 km

2-4 Is the project consistent with the higher program/policy

Yes: Please describe the higher program/policy.

No

On the national level, the project is consistent with the Medium-Term Philippine Development Plan (2001-2004), which emphasizes:

- Flood relief by improving the drainage system structure and increasing capacity with additional facilities, and
- Establishment of more appropriate and well-coordinated mechanism among the MMDA and LGUs on drainage system and solid waste collection and disposal system such as waste segregation facilities, waste reduction programs and new landfills

On the regional level, the project is in line with the programs for flood control embodied in the “NCR Development Plan 2001-2004” which identified the following flood control strategies:

- To provide a physical framework for drainage system for the adaptive use from national to local levels
- To provide an effective mechanism for a better coordination among stakeholders in the design until the implementation of the policy, plan and project
- To design a regular maintenance of the facilities.

Furthermore, the “Medium-Term Investment Plan 2001-2005” of MMDA included programs on flood control and sewerage management.

2-5 Did the proponent consider alternatives before this request?

Yes: Please describe outline of the alternatives.

No

Did the proponent have meetings with the related stakeholders before this request?

Yes: No

If yes, please mark the corresponding stakeholders

Administrative body

Local residents

NGO

Others (Organizations including schools, hospitals, clinics, government offices, banks, private companies, small businesses, transport sector, and small industries)

These were carried out through the three social surveys conducted during the study, namely:

- The house-to-house survey conducted from among 542 households in 78 barangays coming from the low-income including informal settlers, middle-income and high-income families.
- The key informant survey with respondents coming from the barangay leaders, heads or responsible persons from organizations, teachers, priests or pastors
- The survey questionnaire to various institutions, schools, government offices, hospitals, NGOs, big and small businesses

The above surveys are intended to get initial perceptions about the proposed project and are not considered as public consultations. Public consultations will be conducted during the full-scale environmental impact study.

2-6 Is the project a new one or an on-going one? In case of an on-going one, have you received strong complaints, etc. from local residents?

New On-going (there are complaints) On-going (there are no complaints)

Others (Improvement and rehabilitation of the existing structures and facilities)

3. Name(s) of laws or guidelines

PD 1186 - Philippine Impact Assessment System

DAO 96-37 Implementing Rules and Regulations of PD 1186

DAO 2003-30 Implementing Rules and Regulations of PD 1186 superceding DAO 96- (Procedural Manual for this DAO is not yet available)

Is Environmental Impact Assessment (EIA) including Initial Environmental Examination (IEE) required for the project according to the laws or guidelines in the host country?

Yes No

If yes, please mark corresponding items

Required only IEE (Implemented, On-going, planning)

- Required both EIA and IEE (Implemented, On-going, planning)
 Required only EIA (Implemented, On-going, planning)
 Others:

4. In the case when EIA steps were taken, was the EIA approved by the relevant laws in the host country? If yes, please mark data of approval and the competent authority

<input type="checkbox"/> Approved: without supplementary condition	<input type="checkbox"/> Approved: with supplementary condition	<input type="checkbox"/> Under appraisal
--	---	--

(Date of approval: _____ Competent authority: _____)

Not yet started an appraisal process

Others: (_____)

5. If the project requires a certificate pertaining to the environment and society other than the EIA please indicate the title of that certificate;

- Already certified Required a certificate but not yet done
 Title of the certificate: _____ Title of the certificate: _____ (Endorsement from LGUs) Not required
 Others

6. Are any of the following areas located inside or around the project site?

Yes No

If yes, please mark corresponding items

- National park, protected area designated by the government (coast line, wetlands, reserved area for ethnic or indigenous people, cultural heritage), and areas being considered for national parks or protected areas
 Virgin forests, tropical forests
 Ecological important habitat areas (coral reef, mangrove, wetland, tidal flats)
 Habitat of valuable species protected by domestic laws or international treaties
 Likely salts cumulus or soil erosion areas on a massive scale
 Remarkable desertification trend areas
 Archeological, historical or cultural valuable areas

The City of Manila is the seat of Philippine history and is host to many valuable historical and cultural areas. These include the churches like Quiapo Church, Manila Cathedral, and Binondo Church; historical landmarks like the Philippine Post Office Building, Plaza Lawton, Jones Bridge, Fort Santiago, Luneta Park, Manila Hotel. Pasig River is a historical site itself. The City of Manila especially the district of Binondo was

the center of trade and industry from the pre-hispanic era until the late 1970's.

Living areas of ethnic, indigenous people or nomads who have a traditional lifestyle or special socially valuable areas

7. Does the project have adverse impacts on the environment and local communities?

Yes No Not identified

Reason: (1) The project will require relocation of informal settlers occupying portions of the waterways.

(2) The project will generate large volume of potentially contaminated dredged materials and disposed solid waste

(3) The project might affect the flow of traffic along major thoroughfares

8. Please mark related environmental and social impacts, and describe their outlines.

- | | |
|---|---|
| <input checked="" type="checkbox"/> Air pollution | <input checked="" type="checkbox"/> Involuntary resettlement |
| <input type="checkbox"/> Water pollution | <input type="checkbox"/> Local economy such as employment and livelihood, etc. |
| <input type="checkbox"/> Soil Pollution | <input type="checkbox"/> Land use and utilization of local resources |
| <input checked="" type="checkbox"/> Waste | <input type="checkbox"/> Social institutions such as social infrastructure and local decision-making institutions |
| <input checked="" type="checkbox"/> Noise and vibration | <input checked="" type="checkbox"/> Existing social infrastructure and services |
| <input type="checkbox"/> Ground subsidence | <input type="checkbox"/> The poor, indigenous or ethnic group |
| <input checked="" type="checkbox"/> Offensive Odors | <input type="checkbox"/> Misdistribution of benefit and damage |
| <input type="checkbox"/> Geographical features | <input type="checkbox"/> Local conflict of interests |
| <input type="checkbox"/> Bottom sediment | <input type="checkbox"/> Gender |
| <input type="checkbox"/> Biota and ecosystem | <input type="checkbox"/> Children's rights |
| <input type="checkbox"/> Water usage | <input type="checkbox"/> Cultural heritage |
| <input checked="" type="checkbox"/> Accidents | <input type="checkbox"/> Infectious diseases such as HIV/AIDS, etc |
| <input type="checkbox"/> Global warming | <input checked="" type="checkbox"/> Others (Water-borne diseases, e.g. cholera, typhoid fever) |

Outline of related impacts:

Air pollution – The project activities will generate air pollutants particularly dust and other air pollutants such as Nox and COs from transportation, operation of construction equipment, excavation works, and other construction works as well as from the dried dredged sediment that contain much silt. These will create nuisance to the public and add on to the worsening air pollution problem already being experienced in Metro Manila

Solid Waste – Large volume of solid wastes in the form of dredged sediment including refuse, construction debris will be generated during the construction phase. If people still throw refuse,

sediment may contain refuse so that sediment including refuse may be generated during operation and maintenance phase. Improper handling of these wastes might inconvenience the public, cause nuisance, health hazards or contaminate water and soil.

Noise and vibration – Depending on the construction method and type of equipment to be used, noise and vibration beyond allowable levels might be produced and inconvenience the public, particularly at night or near noise-sensitive areas such as hospitals, schools and churches. The construction method must ensure that the maximum allowable limits for noise as prescribed based on P.D 984 will not be exceeded.

Offensive odors – The project will involve desilting/dredging of esteros. The esteros have very offensive (stinky) odor. It is expected that the odor will become more offensive when the garbage/bottom sediment gets disturb by the desilting or dredging operations.

Involuntary resettlement – Several hundred informal settler families that are encroaching on the esteros will have to be resettled as they will be affected by the dredging operation.

Existing social infrastructure and services – The existing roads in the project area are almost always heavily occupied. The construction/improvement works on the drainage mains and laterals located in busy streets might render traffic conditions worse. Traffic problem creates a web of many other problems that may finally affect socio-economic conditions. Among these are public disturbance, longer travel time for commuters and motorists, delay in reaching destinations and consequently in performing personal and economic activities, effect on business, commerce, etc.

Water-borne diseases –The workers that will be involved in the dredging/desilting operations may be exposed to the contaminated water from the esteros and drainage channels, which is at risk of acquiring water-borne diseases such as typhoid, cholera and diarrhea.

10. Information disclosure and meetings with stakeholders

10-1 If environmental and social considerations are required, does the proponent agree on information disclosure and meetings with stakeholders in accordance with JICA Guidelines for Environmental and Social Considerations?

Yes No

10-2 If no, please describe the reasons below:

2) Categories of the Project

The proposed projects are categorized based on the JICA Guidelines for Environmental and Social Considerations and on Philippine environmental regulations, specifically DAO 96-37 and DAO 2003-30, as follows:

Table K.1.5 Categories of Proposed Project

Project	JICA	DAO 96-37	DAO 2003-30
1. Rehabilitation of pumping stations	Category C	ECA	Category C
2. Improvement of regional inundation problem in North Manila	Category A	ECP	Category A
3. Improvement of regional inundation problem in South Manila	Category A	ECP	Category A
4. Improvement of management facilities along esteros and drainage mains	Category A	ECP	Category A
5. Dredging of esteros and drainage mains	Category A	ECP	Category A

Described below are relevant sections of the JICA Guidelines for Environmental and Social Consideration (2004) and applicable regulations of the Philippine Government that were used as basis in categorizing the project. JICA

Guidelines for Environmental and Social Consideration (April 2004).

Section 2.5 of the Guidelines states that Projects are classified as Category A if they are likely to have significant adverse impacts on the environment and society. Projects with complicated impacts or unprecedented impacts, which are difficult to assess or which have a wide range of impacts or irreversible impacts, are also classified as Category A. Projects are also classified as Category A if they require a detailed environmental impact assessment by environmental laws and standards of the recipient governments. The impacts may affect an area broader than the sites or facilities subject to physical construction. Category A, in principle, includes projects in sensitive sectors (i.e., characteristics that are liable to cause adverse environmental impact) and projects located in or near sensitive areas.

DAO 96-37 and its Procedural Manual.

Section 3 (h) Article I of the DAO and Chapter 2 of the Procedural Manual stipulate that major infrastructure projects are environmentally critical projects that would require full-scale environmental impact assessment (EIA). Although dredging and drainage improvement projects are not included in the list of major projects, the Procedural Manual recommends the conduct of EIA instead of IEE for projects that will affect an area of more than 10 ha.

The rehabilitation of pumping stations will be considered a project in an Environmentally Critical Area (ECA) for which an IEE either in a form of a checklist or a more detailed IEE will be required. Under DAO 96-37, the conduct of EIA or IEE studies goes almost through the same process. The difference only lies in the level of scoping required. IEE does not require the conduct of second level scoping and preparation of a scoping report which is a compulsory requirement for EIA.

For selected projects falling under the ECA category, the DENR has pre-prepared checklists to facilitate their evaluation. However, there is no such checklist for pumping facilities. This implies that the IEE study for the project would follow the process EIA process without second

level scoping.

DAO 2003-30, the revised Implementing Rules and Regulations (IRR) for the Philippine Environmental Impact Statement (EIS).

Based on this DAO Category A projects are Environmentally Critical Projects (ECPs), which means that it has significant potential to cause negative environmental impacts. A full-scale environmental impact assessment is required for such projects.

Category C projects are Projects that are intended to address environmental problems whose implementation has no significant potential to cause negative environmental impacts. The rehabilitation of the pumping stations fall under this category if implemented alone but will fall under Category A is implemented with the other components.

(3) Scoping

Scoping is the process of determining the issues to be addressed, the recommendations on measures to mitigate or offset the adverse impacts that should be considered in planning the implementation of the project and recommendations on monitoring requirements to be considered for the project.

The recommended mitigating measures and monitoring requirements are described below. These measures will apply to any project and project phase where the issues were identified.

Table K.1.6 Result of Scoping for the Master Plan

Issues	Mitigating Measures	Monitoring and Institutional Requirements
Air pollution	<ul style="list-style-type: none"> • All vehicles and equipment that will be used must pass the emissions tests prescribed by the Clean Air Act. • Proper management of construction activities including storage and transport of dredged sediment and garbage to minimize generation of dust should be included in an environmental management plan that should form part of project implementation plan 	<ul style="list-style-type: none"> <input type="checkbox"/> Emissions test reports for vehicles and equipment <input type="checkbox"/> Monitor level of air pollutants compared with Air pollution Standards, RA No.8749, 1999, Clean Air Act <input type="checkbox"/> Form a monitoring team to monitor compliance with the environmental management plan
Transport and disposal of bottom sediment and garbage	<ul style="list-style-type: none"> • Temporary storage and transport of dredged materials must be considered in the construction plan. • Identify landfill site for disposal before construction. Temporary storage, transport and disposal should conform to RA 9003. 	<ul style="list-style-type: none"> <input type="checkbox"/> Monitor compliance with requirements during implementation stage. For disposal arrangements, coordinate with LGUs where sanitary landfills exist, otherwise plan for the construction of a sanitary landfill.
Noise and vibration	<ul style="list-style-type: none"> • Proper scheduling of activities to avoid use of noise and vibration producing equipment during critical periods of the day like nighttime and early mornings and near sensitive areas like church, schools, hospitals. Avoid use of much noise and vibration producing-equipment as much as possible • Should form part of environmental management plan during construction 	<ul style="list-style-type: none"> <input type="checkbox"/> Identify location of noise and vibration sensitive areas so that works schedules should be prepared taking these into account. <input type="checkbox"/> Monitor noise level compared with Noise Standards <input type="checkbox"/> Monitoring team to monitor compliance during implementation stage.

Issues	Mitigating Measures	Monitoring and Institutional Requirements
Offensive odors	<ul style="list-style-type: none"> • Employ proper construction technique, management of spoils and application of odor-reducers (where practicable). This should also form part of the environmental management plan during construction. 	<input type="checkbox"/> Review and approval by proper authorities (e.g., DPWH, MMDA, DENR) of environmental plan for construction before actual works. If odor-reducers will be applied, type of odor-reducers must be environment-friendly and must be environmentally acceptable. This should be an item in compliance monitoring.
Accidents	<ul style="list-style-type: none"> • Sufficient provisions for prevention of accidents to workers like safety gadgets. Proper construction methods and safety precautions can prevent risks to workers, pedestrians and motorists, e.g. warning signs, temporary cover for excavated areas, proper management of stockpile of construction materials or spoils from excavation, etc. All safety precautions and construction methods to prevent risks to workers' and public's life and health must be detailed in environmental management plan for construction. 	<input type="checkbox"/> Review and approval by proper authorities (e.g., DPWH, MMDA, DENR) of environmental plan for construction before actual works. <input type="checkbox"/> Monitoring team to monitor compliance.
Involuntary Resettlement	<ul style="list-style-type: none"> • This should be addressed before deciding to proceed with the project. Much preparatory works such as public consultations is needed to get conformity of all affected families to resettle. It is advised that resettlement action plan that will look deep into the issue of resettlement be prepared to serve as guide in the conduct of negotiations, resettlement site identification and development before deciding on pursuing the project. The concerns of affected families must be the primary consideration in the preparation of the RAP. 	<input type="checkbox"/> Monitoring of resettlement aspects is better handled by a resettlement monitoring task force that must be created specifically for the project. The task force must have varied sectoral representation. The monitoring task force must be created even before the preparation of the RAP so that they can participate in the RAP planning process. Institutional responsibilities will be determined by the task force members themselves.
Existing social and infrastructure services	<ul style="list-style-type: none"> • Proper construction techniques and precautionary measures employed during construction can minimize the impact of activities on utilities such water, telephone and electrical connections. However as traffic problems usually cause a host of many other problems as seen from the screening process, it is highly advisable to look deeper into the traffic management aspect of the project. A traffic management plan needs to be drawn out to ensure that the project will not add on to the traffic problems being experienced in the project areas. 	<input type="checkbox"/> Coordination with the MMDA and concerned LGUs in preparing the traffic management plan.
Water-borne diseases	<ul style="list-style-type: none"> • Sufficient precautionary measures for workers considering their anticipated exposure to unsanitary conditions of the project sites should be taken into account in environmental management plan for construction. 	<input type="checkbox"/> Compliance should be included in the monitoring plan.

K.2 ENVIRONMENTAL IMPACT ASSESSMENT (EIA) STUDY

K.2.1 EIA APPROACH AND METHODOLOGY

The DPWH as the Project Proponent and the JICA Study Team has diligently followed the methodological approach prescribed in the Procedural Manual of DAO 96-37 and DAO 2003-30, the most recently issued Implementing Rules and Regulations (IRR) for the Philippine Environmental Impact Statement (EIS) System (PD 1586).

Among the key features of the EIA approach and methodology adopted in this assessment include:

1. Experienced EIS preparers were involved as member of the EIA Study Team to prepare the EIS for the project to assure quality of the submittal;
2. The project proponent avails of the EMB-DENR fast-track EIS processing and review;
3. Social acceptability of the project has been given equal importance with that of the anticipated environmental impacts of the drainage improvement project;
4. Concerns of directly affected community or barangay was given special consideration;
5. The study considered the examination of the relationship of population, resources and the environment; and
6. Environmental Guarantee Fund (EGF) and Environmental Monitoring Fund (EMF) have been proposed by the project proponent for the project.

(1) Pre-EIA Activities

Per DAO 96-37 and DAO 2003-30, the project proponent has submitted Project Description and requested for the schedule of the First Level Scoping Session. The session was held at the Office of Director Sixto Tolentino of the EMB-NCR on 11 November 2004. Representatives from EMB, EIA Review Committee (EIARC), JICA Study Team, DPWH and EIA Consultants attended the session.

The objectives of the first level scoping session are:

1. To provide early link between EMB, the project proponent and the EIA consultants;
2. To ensure that the EIA will address only relevant issues and concerns;
3. To establish clear cut agreement on the scope of environmental studies, issues and alternatives that requires thorough examination; and
4. To ensure that results are to be presented in a form consistent with EIA review requirements.

Public participation and stakeholders consultation are major requirements of DAO 96-37 and DAO 2003-30. Under the EIS System, the project stakeholders and project affected community can participate during the second level scoping session. In this study, the second-level and stakeholders' consultation was held on 28 November 2004 at two separate venues. For the North Manila stakeholders, the session was held at the Pamantasan ng Maynila from 9:00 am to 12:00 noon while the session for the stakeholders from South Manila, the session was held at Malibay Sports Complex, Pasay City from 1:00 pm to 4:00 pm. The two separate sessions were attended by the municipal and barangay officials, representatives from the project affected people, government agencies, JICA Study Team, DPWH and EIA Consultant.

The objectives of the community-level and stakeholders' consultations were:

- (a) To provide early link between the DENR, the project proponent and the stakeholders
- (b) To provide venue for the stakeholders to voice out their issues and concerns and ensure that the EIA will adequately address these issues and concerns; and,
- (c) To address issues and identify the carrying capacity of the environment and the possible constraints and requirements
- (d) To agree on the process of dealing with issues related to technical and socio-economic concerns.

(2) EIA Study Proper

During the initial planning for the project and using the results of the scoping sessions as reference, the project proponent and the JICA Study Team in consultation with the EIA Study Team Members has thoroughly and carefully examined key areas of the EIA study. These include discussion and identification of appropriate EIA study approach and methodology for the project, additional expertise requirements, data requirements, time requirements, flexibility and level of effort and involvement of both the project proponent and the Consultant. This planning strategy was done to adequately satisfy the requirements of DENR for a complete and quality Environmental Impact Statement (EIS).

Among the identified major activities and tasks that the EIA Study Team needs to undertake are the following:

1. Assist the project proponent in the conduct of consultations with the concerned agencies and stakeholders;
2. Undertake the comprehensive characterization of the existing environmental setting which are likely to be affected by the project, covering the physico-chemical, biological and the socio-economic environments of the study area, to wit:
 - Climate
 - Air Quality and Noise
 - Terrain
 - Hydrology and Water Quality
 - Atmosphere
 - Sediment (Dredged Materials) Disposal
 - Aquatic and Terrestrial Flora and Fauna
 - Traffic Conditions
 - Land and Resource Use
 - Socio-Economic Aspects
3. Advise the project proponent on relevant government laws and regulations applicable to the project;
4. Conduct a socio-economic perception survey to determine project awareness and social acceptability of the project;
5. Undertake Social Development Plan as part of the social preparation initiatives of the project to ensure smooth and orderly relocation of directly affected people;
6. Undertake the assessment of the future quality of the environment “with the project” and “without the project” scenario;

7. Propose and formulate appropriate mitigation and abatement measures to minimize the effects of all significant adverse impacts during the construction, operation and abandonment phase of the project;
8. Formulate monitoring plans for the project; and
9. Render other support services to the project proponent as indicated in the TOR for the engagement of the Consultant.

The project proponent, on the other hand, shall secure all relevant government endorsements, permits and clearances that are required by EMB-DENR. The project proponent shall likewise ensure sound engineering planning and design of the project and further take initiative on matters related to IEC works and activities to ensure social acceptability of the project.

(3) Basis of the EIS Preparation

This Environmental Impact Statement (EIS) is the product of the environmental study undertaken for the Drainage Improvement in the Core Area of Metro Manila (DICAMM) Project. This document is a requirement of the Terms of Reference (TOR) for the engagement of the Consultant and follows the prescribed format and requirements prescribed under DAO 96-37 and DAO 2003-30 of the Philippine EIS System (PD 1586). The findings of this EIS aim mainly to guide the Project Proponent in project planning and development as well as in formulating an appropriate environmental management plan for the Project. Likewise, the EIS was designed to fully comply with the requirements of the EIS System in relation to the securing of the project Environmental Compliance Certificate (ECC) from EMB-DENR.

The following documents provided essential information in the preparation of the EIS:

1. Master Plan and the Feasibility Study for the Study on Drainage Improvement in the Area of Metropolitan Manila, Republic of the Philippines prepared by Pacific Consultants International and Nikken Consultants, Inc. (2004);
2. DENR DAO 96-37 otherwise known as the Revised Implementing Rules and Regulation of PD 1586 (Environmental Impact System);
3. DAO 2003-30, new IRR for PD 1586
4. DAO 35 (Revised Effluent Regulation of 1990)
5. DAO 34 (Revised Water Usage and Classification/Water Quality Criteria)
6. RA 6969 (Toxic Substances and Hazardous and Nuclear Wastes control Act of 1990)
7. PD 984 – Pollution Control Law
8. RA 8749 – The Philippine Clean Air Act of 1999
9. RA 9003 – The Ecological Solid Waste Management Act of 2000
10. RA 9275 – The Philippine Clean Water Act of 2003
11. RA 3571 – An act prohibiting the cutting, destroying, or injuring planted or growing trees, flowering plants and shrubs or plants of scenic value along public roads, plazas, parks, school premises, or in any other public grounds.
12. Other relevant DENR environmental laws and regulations
13. Scoping meeting among the project proponent, EIS preparer, stakeholders, EIARC and EMB-DENR

(4) Baseline Data Collection

1) Primary Data Collection and Analysis

The primary data collection undertaken in this study is based on the requirements of the

JICA Study Team of the Government of Japan (GOJ) for Flood Control and Drainage Improvement Projects. These are specified in the Terms of Reference (TOR) for the engagement of the environmental consultant. Further, these requirements are complemented with the requirements from EMB DENR and the project stakeholders which were all solicited during the conduct of the First and Second Level Scoping Sessions.

The following are the descriptions of data gathering or methodologies in carrying out the environmental baseline study for the proposed project.

A. Water Quality Survey

Following the prescribed requirement of the Project proponent, JICA Study Team and EMB-DENR, water sampling was undertaken during the conduct of the full blown EIA.

Six water samples were collected on January 25 and 26, 2005. The sampling sites and number of samples taken are as follows:

- 1 water sample from open drainage channel located along Blumentritt and Maria Clara Streets;
- 2 water samples (1 upstream and 1 downstream) from Estero de Sunog Apog;
- 2 water samples (1 sample below Gil Puyat Bridge and 1 sample below Zobel Roxas Avenue Bridge) from Estero de Tripa de Gallina-below Tripa;
- 1 water sample from the drainage intersection of Medina and Faraday Streets.

For these water samples, the test parameters include: DO, Color, BOD5, TSS, TDS, Oil and Grease, Total Coliform, MPN/100mL, COD, PO4-3, Surfactants (MBAS), and Total Nitrogen.

During water sample collection, the following procedures were strictly observed:

1. Collection of composite samples of water (upper and lower layers)
2. Establishment of coordinates of sampling locations using Magellan GPS-4000
3. Specification of the following parameters during sample collection:
 - Water temperature at surface
 - Electric Conductivity
 - Dissolved Oxygen (DO)
 - pH
 - Salinity
 - Sampling records such as time, climate and coordinates of the sampling location
4. Water temperature, pH, and coordinates of the sampling location were measured using portable pH meters, and Geographic Positioning System (GPS) respectively. For Electric Conductivity and Salinity, portable equipment was used. The probe was submerged at a depth of about 1 ft and 3 feet from the water surface. Average was then taken and reported as the final reading.

Water samples in 1-gallon bottles were sealed, marked and stored in icebox for storage and preservation. For DO samples, DO bottles were used. Sterilized bottles were used to contain the samples for bacteriological analysis. Samples were transported to the laboratory for immediate analyses. Laboratory analysis of samples focused on several parameters in compliance with DENR Standard Methods of Analysis (*Table K.2.1*).

Table K.2.1 Drainage Channel Water Sample Analyses

Parameters	Method of Analysis
pH	Glass Electrode
BOD ₅ , mg/L	Azide Modification
COD _{Cr} , mg/L	Open Reflux
TDS, mg/L	Gravimetry and portable equipment
TSS, mg/L	Gravimetry
Phosphorus as P	Colorimetry - Ascorbic acid
Total Nitrogen	Kjeldahl Method
Hexavalent Chromium, mg/L	Colorimetry – Diphenylcarbazide
Oil and Grease	Gravimetric (Petroleum Ether Extraction)
Total Coliform, MPN/100mL	Methylene Blue Method (Colorimetric)
Surfactants (MBAS)	Distillation – Colorimetric Method
Methodologies are based on the approved Methods of Analysis of DENR DAO No. 35 and AWWA/APHA Standard Methods of Analysis (1992)	

Results of water quality survey during the IEE phase were likewise used and treated as secondary data for this EIS. During the IEE phase, five water samples were collected on June 29 and 30, 2004. The sampling sites are as follows: Estero de Tripa de Gallina, Estero de Paco, Estero de San Miguel and Estero de Maypajo. For these water samples, the test parameters include: Electric Conductivity (EC), pH, Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total Coliform, Total Nitrogen and Total Phosphorous.

B. Bottom Sediment Quality Survey

Following the prescribed requirement of the Project proponent, JICA Study Team and EMB-DENR, sediment samples were collected simultaneously with the water samples collection. Six (6) sampling sites of sediments were collected using the same sampling sites were used as with water samples.

During sediment sample collection, the following parameters were noted.

1. Sediment appearance
2. Odor
3. Color
4. Sampling records such as time, climate and coordinates of the sampling location

Sediment samples weighing about 2-2.5 kg were collected and placed in clean plastic jars with cap. The samples were securely sealed, marked and stored inside an icebox for storage and preservation. After collection, these sediment samples were transported to the laboratory for immediate analyses following Standard Methods of Analysis (*Table K.2.2*).

Table K.2.2 Sediment Sample Analyses

Parameter	Method of Analysis
Arsenic, mg/L	Toxicity Characteristics Leaching Procedure (TCLP)
Cadmium, mg/L	Toxicity Characteristics Leaching Procedure (TCLP)
Hexavalent chromium, mg/L	Diphenylcarbazide Colorimetric Method
Total cyanide, mg/L	Toxicity Characteristics Leaching Procedure (TCLP)
Lead, mg/L	Toxicity Characteristics Leaching Procedure (TCLP)
Mercury, mg/L	Toxicity Characteristics Leaching Procedure (TCLP)
Derived from the Approved Methods of Analysis of DENR DAO No. 35 and other internationally accepted methods of analysis.	

C. Ambient Air Quality Survey

The objective of the survey is to obtain existing air quality data in the surrounding environment of the project area with specific concern on ambient Total Suspended Particulates (TSP), as well as SO₂ and NO₂ concentrations.

Baseline air quality measurement was conducted on November 26, 2004 at seven (7) sampling stations along the drainage alignment in Metro Manila. The sampling stations presented in *Table K.2.3*.

The method of sampling used for sulfur dioxide (SO₂) and nitrogen dioxide (NO₂) is by bubbling the ambient air through an absorbing solution in the glass impingers using the Air Chek Gas Sampler. For total suspended particulates (TSP), a Staplex high-volume sampler is used with a filter paper that is weighed prior to and after sampling.

Table K.2.3 Sampling Stations for Ambient Air Quality Survey

Station Number	Coordinates	Description of Sampling Stations
MD1	14°37'17"N, 120°59'45"E	Corner Blumentritt and Dapitan Sts., Manila
MD2	14°37'39"N, 120°59'16"E	Gasoline Station Area, Blumentritt-Dimasalang, Manila, Fronting Manila North Cemetery
MD3	14°37'43"N, 120°59'07"E	Corner of Rizal Ave-Aurora Blvd, Manila
MD4	14°37'50"N, 120°58'54"E	Corner of Juan Luna and Hermosa Sts., Manila
MD5	14°34'04"N, 121°00'06"E	Corner of Zobel Roxas – South Expressway, Makati
MD6	14°33'29"N, 121°00'25"E	Along South Expressway near Faraday St, Makati
MD7	14°34'27"N, 121°00'22"E	Corner Dian and Finlandia Sts., Makati

The method used for the analysis of SO₂ was the Pararosaniline Method, while the Griess-Saltzman Method was used for the analysis of NO₂ concentrations. TSP on the other hand was analyzed using the gravimetric method. The methods used for the analysis of the aforementioned parameters are the one specified under DENR DAO 14. The sampling was done in conformity with the National Ambient Air Quality Standards (NAAQS) of the Department of Environment and Natural Resources (DENR).

During the conduct of the sampling, on-going activities that could affect air quality in the area were noted.

D. Traffic Count Survey

Traffic count survey was undertaken in nine (9) observation sites in December 2004. The observation sites were as follows: 1) Blumentritt corner Calamba Street; 2) Andres Bonifacio Avenue (in front of North Cemetery); 3) along Aurora Boulevard; 4) Along Hermosa corner Juan Luna; 5) along Juan Luna Street (corner Hermosa); 6) along Faraday Street (corner Batangas Street); 7) along Finlandia Street (corner Batangas Street); 8) along Zobel Roxas Avenue (corner Pres. Sergio Osmena Highway); and, 9) along Pres. Sergio Osmena Highway (corner Zobel Roxas).

Traffic volume counting was done from 6:00 am to 7:00 pm with traffic volume summed at per hour basis. The types of vehicles are divided into two modes: private and public modes. For private modes, the classifications are as follows: car/jeep, vans, truck, motorcycle, bicycle, others. For public modes, the classifications are as follows: PUJ, minibus, bus, FX/taxi, tricycle, pedicab and others.

E. Perception Survey

To determine the perception of directly and indirectly affected people, a perception survey questionnaire was prepared.

For the indirectly affected people, sample size was determined by using the formula:

$$\text{Sample size} = \frac{N}{(1+Ne^2)}$$

Where:

N = estimated population size

e = margin error

Respondents were divided into two groupings: North Manila and South Manila. Based on the results of the calculation for the two groupings, using a margin of error of 5%, each group was assigned 400 survey respondents (with total respondents of 800).

For directly impacted people who are expected to experience relocation and property disturbance, sample size considered was 100%.

The perception survey was undertaken in December 2004 and early part of January 2005. Among the primary data gathered during the perception survey include the people's level of awareness on the project as well as social validation of the project's social acceptability. Data parameters include population dynamics, health conditions, traffic conditions and access to amenities among others.

2) Secondary Data Collection and Validation

For this EIS, secondary data were gathered from sources available from various government agencies, libraries, professional and academic papers and related literature from Makati, Pasay, Caloocan, Manila and Quezon cities. A listing of these data and sources is in *Table K.2.4*.

Table K.2.4 Types and Sources of Environmental (Secondary) Data

Agency/Office Acronym	Agency/Office	Information
PAGASA	Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA)	Meteorology, Natural Disasters
NAMRIA	National Mapping and Resource Information Authority	Topographic Maps
DENR-BMG	Department of Environment and Natural Resources/Bureau of Mines and Geosciences	Geology, Pertinent Laws and Regulations
NSO	National Statistics Office	Demographic Statistics
DPWH	Dept. Of Public Works and Highways	Department's program on Flood Control Projects Details of the project from the Master Plan and Feasibility Study for DICAMM Project
DOH	Dept. of Health	Sanitation and Public Health Data
PHIVOLCS	Philippine Institute of Volcanology and Seismology	Geology, seismicity
LGUs	Local Government of Makati, Pasay, Quezon, Manila and Caloocan Cities	Land Use Plans, Land Values, Land Use Plans, Socio-economic Data
Local Residents, Local Anthropologist and Barangay Officials	Barangay (Makati, Pasay, Manila, Caloocan and Quezon Cities)	Ethnographic Information/data in the project area

(5) Assessment of Impacts and Formulation of Environmental Management Plan (EMP)

A systematic identification of significant environmental impacts using two scenarios: (1) without-the-project scenario and, (2) with-the-project scenario was conducted by considering the ecological, physical, and social aspects of the environment. Each aspect comprises detailed impacts of the project for both construction and operation phases. After identifying potential impacts, the most significant were discussed in detail together with corresponding mitigating and enhancement measures. Elaborated in *Chapter K.2.4* are the environmental management plan, monitoring plan, and institutional plan to address the aforementioned issues.

For the assessed adverse or significant environmental impacts associated with the construction, operation and abandonment phases of the project, environmental mitigation measures were formulated to:

1. Mitigate environmental impacts;
2. Provide in-kind compensation for lost environmental resources;
3. Provide socially acceptable programs for displaced or relocated project affected people; and,
4. Enhance environmental resources.

The mitigation measures define the following:

1. The technical work program to mitigate adverse impacts including resources to implement the plan;

2. The estimated costs to implement the plan; and
3. The planned operation or implementation of the plan, including a staffing chart and proposed schedules of participation by the various members of the project management, and activities and inputs from various government agencies.

To further comply with the requirements of DAO 96-37 and DAO 2003-30, the Consultant formulated an environmental monitoring plan. The monitoring plan involves the systematic collection of data to determine:

1. The actual environmental effects of the proposed project;
2. The degree of compliance of the project with regulatory standards; and
3. The degree of implementation of the formulated environmental mitigation measures and success of the environmental protection measures.

In the monitoring program plan, the Consultant outlined the specific information to be collected, the data collection program (including sampling design), and the management of the monitoring program. This included assigning institutional responsibility, defining reporting requirements and confirming that adequate resources are provided in terms of skilled staff, equipment, training and funds.

(6) Consolidation/Collection of Clearances and Permits for the Project

The various permits and clearances gathered in this ECC application are as follows:

1. Barangays' endorsements; and
2. Endorsements from local organization

The project proponent was furnished a copy of this list and was requested to secure these endorsements / clearances.

(7) EIA Process Documentation

The following Process Documentation inputs have been documented by the Consultant:

1. Minutes of scoping sessions;
2. Minutes, transcripts and analysis of Community/Site Scoping Meeting;
3. Minutes, transcripts and analysis of Community Validation Presentation;
4. Role of Stakeholders in the EIA Study and Conflict Management Processes; and
5. Results of information drive/campaigns.

K.2.2 PROJECT DESCRIPTION

(1) Project Features/Components for the "Priority Projects"

In general, the proposed drainage improvement project is composed of the following components:

- Improvement and rehabilitation for drainage channels,
- Improvement and rehabilitation for drainage pumping stations,
- Improvement for solid waste collection and segregation,
- Improvement for O & M organizations and activities,
- Pilot examination, and
- Social framework of resettlement.

As specified in the Feasibility Study, the "priority projects" consist of the following

improvement works:

1) Rehabilitation Works of Drainage Channels

- Dredging of esteros/creeks: 138,000 m³
 - Estero de Sunog Apog/ Maypajo (partially)
 - Estero de Tripa de Gallina (partially)
 - PNR canal (partially)
 - Calatagan Creek I
- Declogging of drainage mains (D.M): 20,000 m³
 - Blumentritt interceptor
 - Buendia Outfall
 - Zobel Roxas D.M.
 - Faraday D.M.
 - Pasong Tamo D.M.

2) Drainage Improvement of the Severe Inundation Areas

North Manila:

- Additional works for Aviles – drainage area
 - Increasing of pump capacity at Aviles Pumping Station
- Additional works of the existing Blumentritt interceptor
 - Remedial works of the existing Blumentritt interceptor
 - Construction of additional interceptor.

South Manila:

- Additional works for the severe inundation area in South Manila
 - Additional B.C. along Zobel Roxas D.M
 - Additional B.C. along Faraday D.M.

3) Urgent Rehabilitation of 4 Major Pumping Stations

- Quiapo
- Aviles
- Valencia
- Tripa de Gallina

4) Rehabilitation of 8 Major Pumping Stations

- Pandacan
- Paco
- Sta. Clara
- Libertad
- Makati
- Binondo
- Balete
- Escolta

5) Supporting Measures

- Improvement of operation and maintenance organization and activities and promotion of community-involved activities
- Installation of additional hydrological equipment
- Introduction of emergency operation and maintenance equipment
- Preparation of guideline for resettlement

(2) Project Activities

For this EIS document, the project can be divided into three phases, namely:

- Pre-construction phase
- Construction phase
- Operation and Maintenance phase

The undertakings or activities under each phase are described below.

1) Pre-Construction Phase

During the pre-construction phase, the Project Proponent with assistance from local and foreign consultants shall undertake the following activities:

- (a) Conduct of the Master Plan and Feasibility Study on Drainage Improvement in the Core Area of Metropolitan Manila;
- (b) Pilot examination;
- (c) Consultations and securing of relevant permits, endorsement and clearances from pertinent government agencies;
- (d) Conduct of Initial Environmental Examination (IEE) and full-blown Environmental Impact Assessment (EIA) and the subsequent securing of an Environmental Compliance Certificate (ECC) for the project (the subject of this application/study);
- (e) Detailed Engineering Design and Tendering Stage;
- (f) IEC Action Program;
- (g) Land and Right-of-Way acquisition
- (h) Resettlement of informal settlers; and,
- (i) Procurement of construction contractor services and of facilities

2) Construction Phase

During construction phase, the following major activities which could potentially impact the existing environment shall be carried out:

1. Mobilization/transport of heavy equipment and construction materials
2. Preliminary works which shall include clearing of ROW of drainage lines, staking and layout of drainage lines and fabrication of project sign.
3. Displacement of informal and formal settlers and other properties that fall within the alignment of drainage channels (existing and proposed).
4. Dredging of esteros / creeks.
5. Excavation and dredging/declogging of drainage mains.
6. Construction of structures and facilities.

7. Rehabilitation of major pumping stations.
8. Increase pumps capacities (especially in severe inundated areas).
9. Transport/disposal of construction wastes and dredged spoils.
10. Road works/pavement works.

A. Construction Schedule

The construction of the project will be pursued anytime within the designated time frame of implementation for the priority projects (2005-2010) or as soon as the project fund is secured by the project proponent.

The construction phase will likewise involve compliance reporting and monitoring to EMB-DENR especially those ECC conditionalities that would require periodic monitoring and feed back reporting to EMB-DENR.

B. Manpower Requirement

Construction of the project consists mainly of civil works and requires hiring of skilled and unskilled manpower. It is considered that common laborers will be available in the area. Meanwhile, skilled labor for the project's construction may be supplied from other areas. Specialized technical workers will be hired from both locally and internationally known designer firms.

During construction phase, an estimated 200-300 workers consisting of contractual and regular laborers will be employed to carry out the construction of the proposed project. While during the O & M phase, the project may require more or less 100 workers to carry out the O & M requirements for the project.

C. Permits and Clearances

Pertinent permits and clearances shall be secured by the project proponent. Already in the possession of the Project Proponent are the Barangay Endorsements that favorably endorsing the project.

D. Preliminary Engineering Plans and Drawings

The engineering plans and drawings are presented in *Chapter 8 of Databook*.

3) Operation & Maintenance (O&M) Phase

Once all the construction activities are completed, an evaluation of all construction activities will be undertaken whether improvements in schedule and costing have been implemented. After the official turn-over by the contractor to the project proponent, the O & M phase shall involve the full operation of the improved drainage/flood control facility coupled with periodic maintenance activities.

Similar with the construction phase, the O & M phase will likewise involve compliance reporting and monitoring to EMB-DENR especially those ECC conditionalities that would require periodic monitoring and feed back reporting to EMB-DENR.

4) Post-Construction Phase/Abandonment Phase

For this project, abandonment phase means that particular period after construction when the contractor will vacate the construction site and subsequently turn over the completed facilities to the project proponent. It will involve final inspection, turn-over and acceptance of completed structures and equipment, clean-up and demobilization.

Construction works and debris shall be properly collected and disposed off before the site is turned over by the contractor to the project proponent.

The abandonment of the project may not be possible since the project is designed to operate in long term basis. Periodic maintenance shall be carried out by the project proponent and other concerned agencies and LGUs to ensure working efficiency of the improved drainage/flood control facilities.

K.2.3 ENVIRONMENTAL IMPACT

(1) Impact Identification and Assessment Approach

This section presents the systematic identification of the potential impacts of the Drainage Improvement in the Core Area of Metropolitan Manila (herein referred to as DICAMM or the Project) to the environment. During construction phase, the major construction activity that would most likely exert positive and negative impacts to the environment are the civil works - mostly esteros widening, dredging, excavation and removal of structures, silt and solid wastes that obstruct the subject waterways and drainage channels. Operation phase will involve the operation and maintenance of the installed drainage improvement structures which are expected to generate long-term beneficial and positive impacts to the project area. Recognizing these various actions that may impact the environment during construction, operation and O&M phases of the project, a comprehensive environmental impact assessment was undertaken and the results presented in the succeeding sections.

1) Impact Assessment Scenarios

Considering the physico-chemical, biological and social attributes of the study area, the identification of environmental impacts were done using two scenarios, namely,

1. “without-the-project scenario” and
2. “with-the-project scenario”

For without-the-project scenario, a plain qualitative assessment was done. For the with-the-project scenario, impact was separately detailed for construction and operation and maintenance phases of the proposed project. Presentation of impact matrices for all these phases intend to simplify the presentation of identified impacts. Only the most significant impacts were discussed in detail together with their corresponding mitigating and enhancement measures. The details of the environmental management, monitoring, and institutional plans are presented in *Chapter K.2.4*.

2) Impact Rating

The potential impacts were identified and described in terms of its polarity (negative and positive), geographic extent (localized or regional), reversibility (reversible/irreversible), magnitude (nil/minimal/moderate/significant/unknown), probability of occurrence (low/medium/high) and duration (short term and long term). Impacts were rated accordingly using the following criteria:

1. Type of consequence: Positive (+) / Adverse (-)
2. Geographic extent of impact
3. Impact duration: Long-term or short-term
4. Possible rectification of impact: Reversible or irreversible
5. Magnitude: nil/minimal/moderate/significant
6. Probability of occurrence: Low/medium/high

Any actions or activities of the project are considered negative impacts if they: (1) alter or have detrimental effects on natural systems (processes and conditions); (2) affect any area/item that the government seeks to protect; and (3) violate or exceed government standards and/or known best practices. On the other hand, activities are classified as positive impacts when they: (1) ecologically and environmentally enhance existing conditions and processes; (2) reinforce the use of best practices; and (3) support government programs and efforts for environmental protection. The magnitude of an impact is rated using a relative scale of nil, minimal, moderate, significant and unknown. The magnitude is assessed based, among others, on the area or size of the land that will be affected, the volume of waste or material that will be generated, the number of animals and plants affected, the cost of damage, the length of time the impact will prevail and the reversibility of an impact.

Since the project activity is expected to be completed within more or less five-year period, temporal nature of certain impacts is expected to be relatively of short duration. Nevertheless, the duration of an impact is described using relative rating of short term and long term. Those impacts predicted to prevail during the pre-construction or construction stages are classified as short-term impacts while those that are identified to be co-terminus or are expected to persist beyond the project life are considered as long term impacts.

(2) Impact Prediction and Evaluation “Without the Project”

1) Physico-Chemical Environment

At present, there are no existing developments within and around the project site that may instantaneously trigger meteorological changes in the region for the next five years. The hydrological process in the project area will remain the same for the next decade. However, the incidence of worsening flooding in the project area may continue to persist due to non-implementation of any effective flood control projects in the area.

Without the project, the geologic condition in the general area of proposed project will remain the same assuming that: (1) no major geologic event (e.g. volcanic eruption or major earthquake event) occurs; and/or (2) no major human induced alteration of the terrain in the project site. Geologic processes are expected to operate at existing rates and magnitudes.

For the next few years, ambient air quality will continue to deteriorate due to increase industrialization, commercialization and habitation of the project area. While on the other extreme, with strict implementation of the Clean Air Act, the Metropolitan Manila may experience gradual improvement in air quality. Groundwater resources depletion may be likely experience due to increase water supply demand coupled with frequent occurrence of El Nino phenomenon. It is likewise expected that surface water quality will continue to be degraded due to progressive increase in population, settlement, industrialization and commerce in the project area. This scenario may become imminent especially in the absence of environmental infrastructure such as domestic and industrial wastewater treatment plant among wastewater generators.

2) Biological Environment

The terrestrial vegetation in the proposed project site is likely to remain the same without the project. However, with government intervention such as the implementation of tree planting, urban renewal focusing on planting ornamental plants and trees in open spaces and other similar projects, the terrestrial vegetation may increase in density and number.

Aquatic vegetation would still be dominated by the proliferation of water lilies side by side with deterioration of water quality in major river systems in Metropolitan Manila. Likewise, it is expected that within the next 5 to 10 years, without other intervention, no increase in fish and wildlife is expected.

3) Socio-Cultural Environment

Should the Project not be implemented due to operational and funding constraints, the status quo will prevail characterized by the relative continuance of present conditions within study areas but at the same time compromising the possibilities in which integrity of the physical environment could be improved and the ability of the national government and LGUs to manage flooding occurrence, on one hand, and the rise of informal settlements, on the other.

I) Flooding and the Physical Environment

Without the Project, present flooding situation in the area would worsen especially if complementary efforts such as the removal of garbage in waterways, more conscientious solid waste management (e.g., waste reduction and waste utilization measures), and declogging and desilting measures, are also foregone. The natural and human-made drainage capacities would continue to be exceeded by the fallout of waters from thereby aggravating the encumbrance caused by flooding to the local economies and constituents in affected areas within Pasay, Manila, Caloocan, Makati and Quezon City. Although not as problematic as in KAMANAVA areas, flooding in the study areas, if left unattended by appropriate engineering interventions, may be exacerbated in the future especially if factors behind the lowering of drainage capacities would continue to manifest. Drainage capacity in the study areas appear to have been strained by the poor functioning of drainage facilities from wear and tear and obsolescence, occupation of waterways by informal settlements, and pile-up of garbage and polluting materials, among others.

Without flood control and drainage improvement, flooding would continue to exact economic and social costs. Economic costs tend to manifest in the loss of revenues to the local economy due to the following (among others):

- Stoppage in operations of inundated commercial and industrial establishments
- Decline in market activity given difficulties in transporting good and commodities, and accessing necessary services
- Labor costs due to absences and tardiness from work
- Medical expenditures from flooding-induced sickness and diseases
- Damages to housing and property
- Decline in land values
- Transport costs from maintenance of vehicles
- Loss of investments due to unattractiveness of area

Social costs, on the other hand, are incurred from loss of lives, decline in living standards and displacement should housing structures be severely damaged. Flood prone areas also tend to have poor aesthetics with households hesitating generally to invest in the maintenance and upkeep of their dwellings.

II) Flooding and Local Development Management

The incidence of flooding does not contribute to local development and neither does the lack of engineering interventions enhance the capability of the national and local

governments to effectively control flooding. Flooding occurrence, as assessed in the feasibility study, suggest that concerned local governments, on their own, would be constrained in undertaking the necessary design and construction works as well as funding the required investments from their own revenues and allotments. The Project, therefore, must be seen as a way to augment technical capability at the LGU level other than being an effective channel for investments that would provide long-lasting structural solutions to flooding problems in the study areas.

Meanwhile, if left unabated, flooding would itself cost the LGU in the continued provision of transfers and subsidies to flood victims in the form of emergency assistance and disaster relief. Funds expended for these purposes, although necessary, could have alternative uses if flooding is reduced to a minimum. Flood control and drainage improvement therefore could have resulted to better rationalization of LGU funds to serve other equally important and cost-effective investments in social infrastructure such as education, health care and traffic management.

The absence of flood control measures, as those in the Project, also exerts an impact on governance because frequent flooding does not help in improving the image of the LGU to its constituents. The absence of interventions could well reflect on the inability of the local government to be responsive to immediate needs, and could be used by detractors as a way to discount its credibility. Thus, although indirectly, the Project would have been significant in demonstrating not only responsiveness but also the political will and sense of responsibility of concerned LGUs.

III) Flooding and Informal Settlements

It may be construed that problems in the rise of informal settlements in the study areas could not be addressed alone by the Project although it could not be denied that drainage improvement and other similar flood control measures involving the necessary clearing of informal settlements would contribute significantly in decongesting occupied waterways and improving aesthetics.

The Project, upon consultation with key LGU officials, has been found to integrate well with local plans to improve the integrity of their waterways through the removal of unwanted settlements. Thus, if allowed to proceed, the Project may augment local efforts to manage informal settlements through physical and regulatory controls to entry and at the same time, enabling their effective and humane removal through a well-designed and responsive relocation plan.

The Project, if left unimplemented, however, would devoid the LGU of the necessary support to respond to the problem of informal settlements. Effective action then is postponed to the uncertain future where more informal settlements may inhabit the affected areas in such level that would render engineering interventions inadequate and more costly.

(3) Impact Prediction and Evaluation “With the Project Scenario”

The project is an infrastructure project that was designed to improve and enhance the existing environmental condition in the project area particularly to abate and mitigate flooding problems. In this section, predicted environmental issues/impacts and their level of significance at various stages of development during pre-construction, construction and operation phases are presented. In general, most of the impacts identified are positive. On the other hand, corresponding

mitigating measures for each negative impact are also provided in *Clause K.2.4* to minimize or eliminate these negative impacts.

1) Pre-construction Phase

Pre-construction activities such as topographic survey, detailed engineering, project acceptability survey, master planning, feasibility study and environmental impact assessment had minor or insignificant effect in the physical, biological and socio-economic environment of the project.

Other activities such as site clearing, mobilization of heavy equipment and relocation of people that are directly affected by the project need to be observed and monitor in order to minimize its effects in the environment.

I) Geologic Consideration (Structural Integrity and Stability)

The engineering design team of the project has incorporated in the detailed design the geological considerations of the primary impact area. In the design of the proposed drainage structures and improvement works, local and international engineering standards shall be observed and considered.

II) Site Clearing

During site preparation, few vegetation mostly ornamental plants (the number of which is however insignificant) where the drainage passes will be affected. However, the project is designed to avoid those ecologically important vegetation so that the affected area will only be composed of patches of grasses and is void of economically important vegetation, thus, the ecological impact of the project is nil to minimal.

In terms of vegetation density, the most abundant is the Gil Puyat Avenue where trees are planted in the center island where intermittent maintenance holes are located. However, the required maintenance works will not in anyway disturb or displaced the surrounding vegetation. In totality, the ecological impact of site clearing is nil to minimal.

III) Disturbance of Wildlife

During site clearing possible displacement of disturbed wildlife habitat and feeding grounds is not expected. Only insects and small animals could be displaced at selected sites since the project area is already developed.

IV) Mobilization of Heavy Equipment

The mobilization of heavy equipment during the pre-construction stage may generate dust and other suspended particulates in the vicinity. Increase in vehicle emissions such as CO₂, CO, NO_x and other suspended particulates are also expected and are nuisance to the road users and nearby residents. Noise level in the area may also increase due to the movement of these large vibrating equipments. Heavy traffic is also anticipated that will increase the level of public inconvenience. The magnitude of noise disturbance is expected to be moderate.

However, this impact could be minimized by ensuring that those heavy vehicles will be properly maintained and operated. Piles of sand, gravel and waste materials that would be generated during site clearing should be watered frequently to prevent the wind from turning them into sources of dust. Site clearing activities will be suspended

during nighttime to minimize public nuisance.

V) Relocation of Affected Communities

It is possible to predict significant negative environmental impact will be relocation of informal settlers caused by dredging work of Tripa de Gallina. It is estimated that encroached 442 buildings including affected buildings and potentially affected buildings or 663 households will be removed from inside of Tripa de Gallina (see *Table K.2.5*). It is also necessary to remove the intruding part of 42 formal buildings which are located along Tripa de Gallina. Number of potentially affected buildings will be identified clearly at detail design stage.

Construction of additional drainage mains also will affect 15 buildings including formal and informal buildings (see *Table K.2.6*). During the construction, these buildings should be removed temporarily. Compensation should be made for owner of these buildings, or, if they want, assistance for relocation should be considered as one of options.

Table K.2.5 Number of Affected Buildings Caused by Dredging of Estero de Tripa de Gallina

Name of Barangays	Buildings			No. of Affected Household	No. of Household to be relocated *
	Affected Buildings	Potentially Affected Buildings	Total		
Informal					
Pasay City					
Barangay 43	71	0	71	97	91
Barangay 46	111	0	111	165	143
Barangay 51	53	0	53	74	71
Barangay 54	20	0	20	32	29
Makati City					
Barangay Palanan	80	27	107	231	214
Barangay San Isidro	80	0	80	122	115
Sub-Total	415	27	442	721	663
Formal					
Barangay Palanan	23	19	42	>50	-
Sub-Total	23	19	42	>50	-
Total	438	46	484	>771	663

Source: JICA Study Team Note: * Excluding non-residing, absentee house owners.

Table K.2.6 Number of Affected Buildings Caused by Construction of Drainage Main

Locations	Buildings			No. of Affected Household
	Formal	Informal	Total	
Manila City				
Blumentritt Street	4	0	4	27
Outlet of Blumentritt	2	2	4	2
Makati City				
Faraday	0	7	7	11
Total	6	9	15	40

Source: JICA Study Team

The Urban Development and Housing Act of 1992 (UDHA Law) prescribes the conduct of a systematic and participatory process in three (3) stages; namely, pre-relocation, relocation and post-relocation. For the Project, said activities are recommended and set within an intervention framework elaborated with the Relocation Action Plan. In this framework, several guidelines are prescribed for consideration of the Project Proponent including, among others, entitlement scheme for relocation/resettlement assistance, innovative means/options for rendering support and assistance to relocates, evaluation scheme for relocation sites (based among others on survey results), and a responsibility matrix for participating agencies. As the project values and recognize the need for a humane relocation of project affected families, various consultations and careful planning as part of social development plan (SDP) have been undertaken by the project proponent. These initiatives are carried out during the master planning, feasibility study stage and EIA phase of the project to ensure that all project affected people who will be a subject of relocation or displacement will be given due course and decent and humane treatment.

VI) Public Acceptance of the Project

Public consultation and SDP (Social Development Plan) workshop was conducted to address the concerns of the stakeholders and gain public acceptance for the project. Proof of social acceptability is in the form of barangay resolution endorsing the project from almost all affected barangays of the Project area have been secured.

2) Construction Phase Impacts

During construction, few significant negative impacts on natural or physical environment were identified. Most of the impacts identified ranged in magnitude from nil to significant. As to social environment, several impacts identified were both negative and positive or beneficial to the host communities.

The impact matrix for the pre-construction and construction phase without mitigation is presented in *Table K.2.7*.

A. Impact on the Physico-Chemical 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 and are potential environmental hazards. For instance, spillage of gasoline and lubricants, which are originally intended for heavy equipment operations, can cause water pollution in the surrounding surface water. However, present construction practices in handling such materials is adequate in minimizing and totally avoiding this potential pollution, thus the impact is expected to be nil to minimal.

II) Water Quality and Quantity

During construction, workers will generate domestic wastewater from the use of lavatories, canteens, and toilets. The projected volume is about 10 m³/day for a 200 person-workforce with generation rate of 50 L/day. Direct discharge of this volume of

domestic wastewater is not a good practice and unhealthy for the receiving water bodies. Since this volume is small and manageable, the expected impact of this domestic wastewater to the environment is considered nil to minimal. Direct discharge of this domestic wastewater will be avoided by installing portalets in various strategic places in the construction area.

Water demand of the project shall include those to be used during 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 resources.

The dredging and excavation component of the civil works will generate temporary negative impacts to the surrounding water, as it will temporarily impair water quality in the concerned water bodies. There shall be increase in suspended solids, turbidity, changes in color and at worse resuspension of BOD and possibly heavy metals that are deposited in the dredged materials. In a shorter term, this impairment of water quality may significantly generate adverse impacts to the existing or remaining aquatic biota in the water bodies. In this case, the negative impact is minimal but short term in nature.

III) Surface Hydrology

During construction of the project, temporary disruption and interference with surface waterways and drainage channels will be experienced. In order to mitigate the temporary disruption and interference with surface waterways and drainage channels during construction, the contractor should provide temporary drainage diversion canals to redirect water flows. The scheme to be implemented must be able to prevent local water impoundment in the construction area and should be implemented with the least possible disturbance to the public. The impact is minimal to moderate.

IV) Air Quality and Atmosphere

The magnitude of potential air pollutants to be generated by the construction of the project is minimal to moderate considering the project size and type of construction activities. Dusts generations are expected during construction phase, which is normally a consequence of various civil and ground works especially when the weather is dry. NO_x and SO_x may be emitted from heavy equipment but however minimal. TSP may be generated during civil works due to re-suspension of excavated or dried up dredged materials but however minimal. These air pollutants are only temporary and can be easily dispersed through the open breeze of the project area, thus, the impact to air quality and atmosphere is nil to minimal.

Table K.2.7 Matrix for Environmental Impacts during Pre-Construction and Construction Phases Without Mitigation (1/3)

Impact Area	Potential Impacts	Nature	Magnitude	Probability of Occurrence	Reversibility/Permanence	Impact Duration	Geographic Extent
PRE-CONSTRUCTION PHASE							
	1) Geologic Consideration (Structural Integrity and Stability)	No effect	---	---	---	---	---
	2) Site clearing	Negative	Nil to Minimal	Low	Reversible/Transient	Short term	Project site
	3) Disturbance of Wildlife	No effect	---	---	---	---	---
	4) Mobilization of heavy equipment	Negative	Minimal to moderate	Low	Reversible/Transient	Short term	Project site
	5) Relocation of Affected communities	Negative	Significant	High	Permanent	Long term	Project site
	6) Public Acceptance of the Project	No effect	---	---	---	---	---
CONSTRUCTION PHASE							
Physico-Chemical Environment	1) Threat of Environmental Hazards	Negative	Nil to Minimal	Low	Reversible/Transient	Short term	Vicinity of the project site
	2) Effect on Water Quality and Quantity	Negative	Minimal	Low	Reversible/Transient	Short term	Vicinity of the project site
	3) Effect on Surface and Hydrology	Negative	Minimal to Moderate	High	Reversible/Transient	Short term	Vicinity of the project site
	4) Effect on Air Quality and Atmosphere	Negative	Nil to Minimal	High	Reversible/Transient	Short term	Vicinity of the project site
	5) Effect on Noise/ Sonic Environment	Negative	Moderate to Significant	High	Reversible/Transient	Short term	Vicinity of the project site

Table K.2.7 Matrix for Environmental Impacts during Pre-Construction and Construction Phases Without Mitigation (2/3)

Impact Area	Potential Impacts	Nature	Magnitude	Probability of Occurrence	Reversibility/Permanence	Impact Duration	Geographic Extent
CONSTRUCTION PHASE							
Physico-Chemical Environment	6) Solid Waste Generation	Negative	Moderate to Significant	High	Reversible/Transient	Short term	Vicinity of the project site
	7) Offensive Odors	Negative	Moderate to Significant	High	Reversible/Transient	Short term	Vicinity of the project site
	8) Effect on Drainage, Topography and Terrain	No Effect	-	-	-	-	-
	9) Flooding/Inundation in some areas	Negative	Significant	High	Reversible/Transient	Short term	Vicinity of the project site
	10) Effect on Open Space and Recreation	No Effect	-	-	-	-	-
	11) Aesthetic Effect	Negative	Nil to Minimal	Low	Reversible/Transient	Short term	Vicinity of the project site
Biological Environment	1) Effect on Ecological Environment		Nil to Minimal	Low	Reversible/Transient	Short term	Vicinity of the project area
Socio-Economic Environment	1) Population Dynamics	Positive/Negative	Nil	High	Reversible/Transient	Short term	Vicinity of the project area
	2) Employment and Income	Positive	Significant	High	Reversible/Transient	Short term	Vicinity of the project area
	3) Dependency Burden	Positive	Significant	High	Reversible/Transient	Short term	Vicinity of the project area
	4) Housing Characteristics and Utilities	Positive	Moderate to nil	High	Reversible/Transient	Short term	Vicinity of the project area

Table K.2.7 Matrix for Environmental Impacts during Pre-Construction and Construction Phases Without Mitigation (3/3)

Impact Area	Potential Impacts	Nature	Magnitude	Probability of Occurrence	Reversibility/Permanence	Impact Duration	Geographic Extent
CONSTRUCTION PHASE							
Socio-Economic Environment	5) Health and Safety of Construction Workers	Positive / Negative	Significant / Minimal	Low	Reversible/Transient	Short term	Vicinity of the project area
	6) Health and Safety of General Public	Negative	Minimal	Low	Reversible/Transient	Short term	Vicinity of the project area
	7) Income, the Household, and the Local Economy	Positive	Significant	High	Reversible/Transient	Short term	Vicinity of the project area
	8) Impact on Traffic and Vehicular/Road Safety	Negative	Significant	High	Reversible/Transient	Short term	Vicinity of the project area
	9) Women's Welfare	Positive	Modelate	High	Reversible/Transient	Shot term	Vicinity of the project area
	10) Archaeology/ Heritage	No effect	-	-	-	-	-

V) Noise/Sonic Environment

Any construction activities will lead to an unavoidable noise increase when heavy equipments will be used during construction. However, such increases are temporal and short-term. Noise generated from the operation and use of heavy equipment shall be a major issue since the project is located near highly populated areas. The magnitude of noise disturbance is expected to be moderate to significant.

During construction phase, operation of different construction equipment generates noise that varies in intensity. The expected noise sources during the construction of the project are the earthworks equipment such as jackhammers, bulldozers, graders, payloaders, generators, compressors and heavy trucks. The expected noise levels at various distances from the equipment are shown in *Table K.2.8*. The DENR standards for noise in general areas are shown in *Table K.2.9*.

Impacts would be felt by the commuting public, transport operators as well as residential and commercial establishments close to construction sites. In such case, noise pollution is inevitable if equipment and operations would generate considerable noise within reach of those in the influence area. The magnitude of noise disturbance however is expected to be minimal.

Dust generation would also be inevitable as works would be conducted in major thoroughfares exposed regularly to traffic. Dust emissions would particularly manifest during the dry season and worsen aesthetics in study areas. Measures to lighten these negative impacts would revolve around the following measures, among others:

Table K.2.8 Expected Noise Levels from Construction Equipment, dB(A)

Equipment	Distance, meters				
	15	30	60	120	240
Earthmoving Equipment					
Front loaders	75	69	63	57	51
Backhoes	85	79	73	67	61
Graders	88	82	76	70	64
Trucks	91	85	79	73	67
Materials Handling					
Concrete mixers	82	79	73	67	61
Cranes	83	77	71	65	59
Stationary sources					
Generators	78	72	66	60	54
Compressors	81	75	69	63	57
Pumps	76	70	64	58	52
Impact Equipment					
Pile drivers	101	95	89	83	77
Jackhammers	88	82	76	70	64

Table K.2.9 DENR Standards for Noise in General Areas

Maximum Allowable Noise Level, dB(A)			
Area	Daytime	Morning/ Early Eve.	Nighttime
Schools, Hospitals	50	45	40
Residential	55	50	45
Commercial	65	60	55
Light Industrial	70	65	60
Heavy Industrial	75	70	65

- Preference for equipment generating the least noise Lubrication of equipment and regular inspection and upkeep
- Provision of muffling devices
- Regular watering of transport routes and the stockpile of materials to reduce dust generation
- Scheduling of construction during daytime
- Minimal use of equipment for nighttime works

VI) Solid Waste Generation

Large volume of construction wastes in the form of dredged sediments, construction debris and garbage from esteros and drains will be generated during the construction stage of the project. Improper transport and disposal of these wastes might caused inconvenience and nuisance to the public, health hazards and contaminate water resources. This impact can be minimized with proper storage, transport and disposal of the dredged material and solid waste.

VII) Offensive Odors

The project will involve desilting/dredging of esteros. The esteros have very offensive (stinky) odor. It is expected that odor will become more offensive when the garbage/bottom sediment gets disturbed by the desilting or dredging operations. However, the impact though moderate to significant is short term.

VIII) Drainage, Topography and Terrain

The project construction will not affect the topography and terrain of the project area.

IX) Flooding/Inundation in Some Areas

Flooding in some areas may be relieved by channel improvement and other construction activities but uncontrolled flooding may be experienced in other areas. This is because dredging, excavation and other construction activities may hamper the natural flow of floodwater and induce ponding and inundation in areas that are not previously affected. For instance, completed drainage improvements may protect against flooding in the direct impact areas and nearby areas but redirect the floods to the still unprotected areas. Although areas outside the core area will not be directly affected by such events, the domino effects of flooding such as heavy traffic, suspension of transport, difficulty of access to public services, etc. may extend to these areas. The geographical extent of this impact makes it highly significant.

X) Open Space and Recreation

The project construction will not in anyway affect open space and recreational areas in the project area.

XI) Aesthetic Effect

During construction, the only activity that will affect the visual character of the project area is the installation of temporary scaffoldings, presence of heavy equipment and working personnel as well as construction debris. However, this will only persist during the construction phase of the project. Therefore, the impact is expected to be nil to minimal.

Construction works especially drainage improvement works involving earth-moving activities and excavation activities would generally hurt aesthetics especially under wet-weather conditions. Wet soil and dirt tends to be uncomely and further aggravated by the passage of traffic thus causing undue nuisance to commuters and pedestrians. Debris, if left uncollected, could further slow down traffic and be mistaken as garbage disposal sites that cause eyesores to the public.

Mitigating measures to these include solid waste management activities such as setting-up of buffer strips for equipment and stockpiles and the regular clean-up and clearing activities on a daily basis that would be incorporated and closely monitored in the work plan of the Contractor. Collection and disposal of debris and solid waste would be coordinated with truck collection schedules enforced by concerned LGUs. Similar to the TMP, the solid waste management plan to be developed jointly by the Construction Supervision and Contractor would be disseminated to concerned LGUs. These however, will only persist during the construction phase of the project. Therefore, the impact is expected to be nil to minimal.

B. Impact on Biological Environment

As most of the target waterways and drainage channels are void of economically important aquatic organisms, the ecological impact of the project is nil to minimal.

C. Impact on Socio-Cultural Environment

The impacts of the Project in its construction phase is qualified based on different manifestations to show the direction of effects and enable mitigating measures to be designed especially for negative impacts indicated.

I) Population Dynamics

Should the works require substantial amount of migrant labor, the Project would contribute to population growth although of a transitory nature only concurrent with its construction period of 12 months or so. Population increase due to migrant entry would be temporary, corresponding with the length of time allotted for construction as well as the implementation phase involving mobilization, construction proper to closeout stages. Construction proper would yield insignificant increases in the population of the project area if say for example, only 200 work forces is required during construction phase. Assuming a ratio of 70:30 in favor of unskilled workers and a workforce of about 200 people, labor requirements would consist of 140 unskilled and 60 skilled workers. As mentioned above, population increase in the project area would be minimal. The remaining 60 skilled workers would probably be sourced from DPWH as the department may have ample number of construction planning and

supervision personnel.

II) Labor and Employment

Impacts would generally be positive in the assumption that local labor would be utilized for the Project correspondingly increasing the employment rate, and diversifying income structure and generation at the local level.

Labor requirements would likely be sourced from the local population especially those for both skilled and unskilled positions. Skilled positions would be filled up by senior and junior construction engineers fielded by consulting firms commissioned to undertake construction supervision. While these consulting firms may already maintain a pool of engineers for the Project, still skilled engineers may come from the study areas. The Project would cover a lengthy construction period that would demand a considerable amount of professional and support staff that may not be adequately provided by the workforce complement of consulting firms.

Local hires though could have better chances of assuming unskilled positions such as foremen, truck/equipment operators, and peons who may directly apply at the job site or sourced through the LGUs. It has been scored that private contractors often maintain and assign their own workforce for unskilled labor requirements. Thus, it would be helpful to design a recruitment scheme that would prioritize the employment of locals as a value-added service to study areas.

The impact on the employment rate in study areas would be significant if locals are recruited and actually hired for the Project. Assuming a 30:70 worker ratio (skilled and unskilled, respectively) and a 100 percent success rate of hiring locals for unskilled jobs, it may be estimated from out of 200 unemployed persons per study area that 1400 persons would be employed. All other things equal, this would correspondingly reduce the unemployment rate in study areas especially among males who are preferred over females to undertake construction work. The decline in unemployment is expected to prevail over the whole construction period estimated to run from 4-5 years.

Indirect employment, on the other hand, would also increase as construction work would yield demands for goods, services, including housing that could be sourced from the formal and informal economy.

III) Dependency Burden

The ability to support children and elderly dependents would be enhanced by increases in household income from expected employment in the Project. A possible improvement would be on the school allowances given to children as well as the budget allocated for education, health care and nutrition. Especially for local workers, transportation savings generated from not needing to travel to more remote workplaces may be channeled as additional budget for the needs of young and elderly dependents.

In particular, the impact on education would be significant although short-term. An issue would be the salary levels pegged for construction workers and whether these would be enough to cover schooling expenses. Education is a priority expense among the surveyed households although several no longer put their children through school due to economic difficulties. The relative vulnerability of schooling as a priority expense shows such that in periods of economic crisis, education is one expense sacrificed by low-income households for other more important expenses such as food

and health care.

The foregoing assessment, however, presupposes the existence of altruistic motives among direct and indirect workers. This does not take into consideration attitudinal factors that include predilection to vices (e.g., drinking, gambling) or other forms of enjoyment incurring reductions in take-home pay. Inflation is also not factored in its tendency to dilute the purchasing power of the peso. Nevertheless, it is assumed that should the construction period extend beyond ten (10) months to more than a year, escalation factors would be applied to capture the effects of inflation and tender salaries competitive and adequate for household needs.

IV) Housing Characteristics and Utilities

As the income stream from construction work would be short-term, the issue of whether these could be saved for future housing improvement may be insignificant although a positive outcome if realized. This would apply perhaps for minor improvements such as repair and maintenance of dilapidated sections that can be covered by temporary increases in household income.

V) Health and Safety of Construction Workers

Impacts may be negative or positive depending on context. Increased household incomes may increase the capability of workers' families to avail of health services and purchase medical goods and supplies. As an incentive, health and accident insurance may be provided for workers thus granting them medical coverage. In this case, impacts tend to be positive and significant. Positive impacts may be realized more by skilled workers though rather than for unskilled workers who are normally classified as temporary workers without special medical privileges.

Meanwhile, the impact may be negative should construction activities not adhere to strict procedures on occupational safety. Accidents and hazards may occur on site thus there are risks facing both skilled and unskilled workers. These hazards may also be experienced in adjoining communities in activities that would generate noise, pollution and dust; hence, construction activities would have to adopt proper measures to ensure public health and safety. Another factor is whether safeguards are in place to secure the project site from outsiders and ensure that petty crimes such as theft, trespassing and other forms of illegal entry are prevented. Under strict enforcement of safe conditions on-site and off-site, the impact to public health would be nil.

Workers that will be involved in the dredging/desilting operations will also be exposed to the dirty water from the esteros and drainage channels. The water quality surveys undertaken during the study indicated that the esteros contain very high levels of coliform or pathogenic organisms. The workers will be exposed to this condition and thus have risk of acquiring diseases such as typhoid, cholera, diarrhea and the like. The exposure can be minimized with the use of safety protective gears and proper construction methods.

VI) Health and Safety of General Public

To prevent accidents for the passing general public, the contractor must provide proper signages in conspicuous places and perimeter fencing in the construction area during the entire duration of construction activities.

VII) Income, the Household, and the Local Economy

Construction work would widen the income base of households (whose member will be hired for the project) by hiring unemployed members and increasing the pool of disposable income. At the household level, incomes earned by skilled and unskilled workers would go a long way in sustaining household needs, providing for upkeep and maintenance, and managing the dependency burden. Household needs, in particular, that may be better taken care of are food, schooling and health care; thus, in a way, better supporting the needs of dependents (especially the young). Meanwhile, at the minimum, incomes may be able to provide for minor housing repairs and improvements.

In general, the local economy in the project site could be positively influenced and catalyzed by the construction of the project since investors and business men alike could anticipate better business climate as problems and damage cause by flooding or inundation could be minimize (if not eliminated at all). On a micro scale, the local economy would benefit as construction activities tend to diversify and deepen the structure of employment and income generation. In this manner, multiplier effects could be realized as from above, increased household incomes tend to encourage more consumption that in turn increases the demand for goods and services, encourages production and supply, and generates revenues plowed back to local coffers. Multiplier effects would also arise should the migrant population increase by the number of non-locals entering the area (see next section) and once more instituting the same positive changes in demand and consumption. This virtual cycle is deemed to operate throughout the whole construction period and contribute in bolstering economic activities in study areas.

VIII) Impact on Traffic and Vehicular/Road Safety

Based on the selected Project design, construction works would be undertaken in major thoroughfares such as those in Pasay, Manila, Makati, Caloocan and Quezon City thus traffic flow may be encumbered during the construction period.

According to traffic sampling study, trip ends generated by the project construction will increase the current roadway service flow rate due to the movement of construction equipment and materials delivery trucks. Thus, the future level-of-service (LOS) is expected to increase further aggravating already worsen traffic condition in the affected thoroughfares. Commuters and public transportation as well as residences and establishments lying along this road would be exposed to heavy traffic, dust and noise pollution thus causing inconvenience and delays in travel time.

Being exposed to such risks, safety along the affected stretch of roads would also be affected especially that these routes are regular plied by both public and private transport and pedestrians. As such, traffic and safety risks would have to be undertaken in strict consideration during construction supervision, particularly through a Traffic Management Plan (TMP) to be developed by the Construction Supervision Engineer and Contractor). The TMP should include guidelines on the rationalization of construction schedules to manage construction during daytime and periods of peak traffic, and the use of appropriate signage, lighting and warning devices for approaching traffic. Copies of the TMP would be provided to concerned LGUs and agencies in-charge of traffic in the Metropolitan Manila for dissemination to their respective engineering and traffic enforcement divisions, and solicit their assistance in its implementation.

IX) Women's Welfare

The impact on women may depend on their position within the economy and the household. Given the male bias of construction work where jobs are offered mainly to men based on perceptions and stereotypes regarding 'men's work' and 'women's work', women in general may not avail of direct employment opportunities during construction, and may participate only in the provision of informal work in their capacity as food vendors, helpers, and sex workers.

Indirect employment may be available because as mentioned, food vending and domestic help may be work opportunities. In such case, the impact on women may be positive and significant as it enhances their position as income-contributing members of the household. This position could be further enhanced should women be able to control and decide the use for such incomes.

The same positive effect could manifest in the households of male workers. With the incomes brought about by male workers to their households, women who are part of these households are able to stretch their budgets accordingly. However, this is insofar as women are entrusted with the budget. Likewise, this will not compare to the opportunity of being direct or indirect workers during construction. This work alternative grants women the opportunity to be independent income-raisers than just remain wives dependent on the incomes handed over by their spouses or male relatives.

The direction of impacts are not that straightforward though when it comes to sex work, a trade outwardly unsanctioned yet permitted discreetly under societal norms. Construction activities, as it is with the rise of male-dominated occupations in an area (e.g., mining), are often considered enhancing the demand for sex workers. Sex work is generally discouraged in the job-site though and measures would have to be enforced to ensure proper decorum and behavior on-site of skilled and unskilled male workers, and other hirees. As to sex work, the impact on women tends to be dual in being positive on one hand, as the opportunity to have incomes may enable them to fulfill personal and household obligations; but also negative, on the other hand, in the intangible loss of self-esteem, dignity and other personal values sacrificed by being engaged in the sex trade.

X) Archaeology/Heritage

There are no known archaeological sites that are likely to be affected by the implementation of the project. The impact on archaeology/cultural heritage is nil.

3) Operation Phase Impacts

Potential impacts during the operation phase are discussed in the succeeding sections. The discussion considers potential occurrence of various unmitigated impacts. Mitigating measures are partly presented for each adverse impact. Detailed discussion on mitigations is presented in *Chapter K.2.4*. A scaling checklist for unmitigated operation phase impacts is presented in *Table K.2.10*.

Table K.2.10 Matrix for Environmental Impacts During Operation Phase Without Mitigation

Impact Area	Potential Impacts	Nature	Magnitude	Probability of Occurrence	Reversibility/Permanence	Impact Duration	Geographic Extent
Physico-Chemical Environment	1) Threat of Environmental Hazard	No Effect	-	-	-	-	-
	2) Water Quality and Quantity	Positive	Significant	High	Reversible/Permanent	Long term	Vicinity of the project area
	3) Surface and Ground Water Hydrology	Negative/Positive	Moderate to significant	High	Reversible/Permanent	Long term	Vicinity of the project area
	4) Open Space and Recreation	No Effect	-	-	-	-	-
	5) Geological Impact	No Effect	--	--	--	--	--
Biological Environment	1) Effect on Ecological Environment	Positive	Significant	High	Reversible/Permanent	Long term	Vicinity of the project area
Socio-Economic Environment	1) Land Values	Positive	Significant	High	Irreversible/Permanent	Long term	Vicinity of the project area
	2) Management of Vacated Areas	Positive	Significant	High	Irreversible/Permanent	Long term	Vicinity of the project area
	3) Aesthetics	Positive	Significant	High	Reversible/Permanent	Long term	Vicinity of the project area
	4) Public Health and Safety	Positive	Significant	High	Reversible/Permanent	Long term	Vicinity of the project area
	5) Women's Welfare	Positive	Modelate	High	Irreversible/Permanent	Long term	Immediate vicinity of the project area
	6) Employment Opportunities	Positive	Significant	High	Permanent	Long term	
	7) Local Economy	Positive	Significant	High	Reversible/Permanent	Long term	Vicinity of the project area

A. Impact on the Physico-Chemical Environment

I) Threat of Environmental Hazards

No threat of environmental hazard is expected from the project. The project is in fact an environmental enhancement project.

II) Water Quality and Quantity

During the operation of the project, the project is expected to help improve the water quality in the subject waterways and drainage canals by eliminating stagnant waterways in drainage channels. In times of heavy rains, increase capacity of the waterways and drainage channels will prevent flooding thus the impact is positive. Conveyance of water from upstream to downstream is expected to improve.

Increased velocity of flowing waters creates aeration of the water, thus enhancing self-purification. Quantity of flowing water per unit time may likewise increase. This will either have positive or negative impacts. In case where water quality is bad, especially the conveyance of untreated domestic wastewater from commercial, and households, negative impact will be experienced in the ultimate receptor of floodwater. Conveyance of water pollutants such as solid wastes as well as silt/sediment transport may likewise speed up possibly polluting the nearby water streams. Scouring of river, increase transport of silt, and contaminants will be the negative effects. In times of heavy rains, increase capacity of the waterways and drainage channels will prevent flooding thus the impact is positive.

III) Surface and Groundwater Hydrology

During the operation of the project, conveyance of water from upstream to downstream (ultimately to Manila Bay) is expected to be improved. In case where water quality is bad, negative impact will be experienced in Manila Bay which is the ultimate receptor of floodwater. Conveyance of water pollutants such as solid wastes and raw sewage, as well as silt/sediment transport may likewise speed up possibly polluting Manila Bay. Scouring of riverbanks may also be possible because of improved velocity of flowing water.

To minimize conveyance of raw sewage and solid, strong community participation is required. Proper solid waste management and disposal must be practiced in the project area to prevent clogging of drainage channels. With minimize or total elimination of dumping garbage into drainage channels, the flow capacity of the drainage would be maintained as well as the efficiency of the rehabilitated pumping stations would be maintained. In the case of raw sewage which deteriorate water quality, the LGUs and the community could help improve it by voluntarily constructing septic tanks that could partially treat the raw sewage before discharging it to the drainage channels. All of these measures depend on the degree of cooperation of the concerned LGUs and local people in the project area. Consequently, the project purpose of improving the living environment of the communities living in the primary and secondary impact zones will not be defeated.

IV) Open Space and Recreation

The project operation will not in anyway affect open space and recreation of the project area.

V) Geological Impact

The proposed project has very little impact on the geologic resources and processes. This is primarily due to the fact that the waterways that will be improved have already been altered by previous activities. In addition, the general environment in the region where the project will be undertaken is largely a built-up environment.

B. Impact on the Biological Environment

Flooding usually result in damages of terrestrial and aquatic resources in the project area. These include the greeneries in open parks and spaces, ornamental plants, trees and field or backyard crops. With the operation of the project, vegetation and biomass in the project area may be improved and increased.

Commercial and backyard animal rising may likely to improve since the threat property damages caused by flooding is minimized. In this case, the impact is positive.

C. Impact on the Socio-Cultural Environment

The proposed drainage system improvement work when constructed and made functional based on design standards would generate positive social impacts.

I) Land Values

Land values in the study areas would tend to appreciate as improvements in drainage capacity halts further deterioration of the natural environment and enables land to recover its usefulness under flood-free conditions. The quality of land is therefore enhanced and made available for diverse uses (e.g., residential, commercial and industrial) considering that safety standards may have been addressed by the drainage improvement works. Particular to the study areas, the quality of land is essential to accommodate increasing population growth rates and be responsive to increasing land requirements of investors. Meanwhile, the clearing of informal settlements along waterways could contribute to increasing land values by improving aesthetics and enhancing livability of barangays bereft of such settlements. Clearing could likewise enable concerned LGUs to implement projects that could revive affected waterways their quality and pristine conditions.

II) Management of Vacated Areas

The absence of informal settlements along waterways would particularly enable LGUs to pursue recovery efforts such as beautification, greening and parks development that could be undertaken in partnership with communities, NGOs, and the private sector. It should be noted, however, that cleared areas should be safeguarded with physical and regulatory controls by the LGUs (and partner communities) because open access may encourage re-entry of settlements and the return of relocatees. Physical controls would include fencing, 24-hour patrols and weekly monitoring, possibly with the help of barangay councils. Regulatory controls, meanwhile, comprise of laws and ordinances setting conditions of entry and setting penalties for incursions made by groups (e.g., squatting syndicates) and individuals.

III) Aesthetics

Clearing of obstructions along waterways and demolition of structures in esteros, channels and easement areas will improve to a great extent the general environmental condition in the core area of Metro Manila. The dredging and desilting activities will result in better water quality of the esteros/channels and consequently the surrounding

bodies of water where most of the esteros/channels feed into. The improvement will greatly help in restoring the image of the various historical landmarks in the core area, whose image, to some degree is marred by the dismal condition in the core area. Thus, the impact is highly significant and positive.

IV) Public Health and Safety

Public health and safety would be substantially improved as flood control works would reduce the incidence of flooding-related sickness and diseases. From mortality and morbidity data in study areas, diseases from water pollution are prevalent such as diarrhea/dysentery, gastroenteritis, skin diseases and parasitism. Control of such diseases although not entirely the purview of flood control is made much effective by the absence of aggravating factors such as inundation and deterioration of flood waters.

Indirectly, benefits redound to the household in the reduction of related medical expenditures and the diversion of extra income to other essential needs. Public health improvements from flood control also generates economic benefits in the reduction of absences of the local workforce and correspondingly, of health-related transfers such as health subsidies and paid sick leaves.

V) Women's Welfare

Women are considered to be directly impacted by flooding particularly in such activities as carrying and looking after loads and children in the event of evacuation, doing clean-up work, and caring for the sick who have contracted flooding-related illnesses. Thus, flood control and drainage improvement works would go a long way in relieving them of physical burdens and emotional stress in the event of flooding. With houses spared from flooding, the women would confine themselves to completing household tasks rather than distressing themselves of how their households would cope with said disasters. Health and repair costs are also not incurred thus the household budget is saved from expenditures that could have likewise been incurred if houses and household members suffer from inundation and disease vectors associated with flooding.

VI) Employment Opportunities

During operation phase, employment opportunities will be available for management, operation and maintenance of drainage system and dredging equipment. Advance notice of hiring should be advertised in the community prior to operation phase. Only competent personnel will be hired.

VII) Local Economy

Benefits to the local economy specific to flood control and drainage improvement works would include the following:

- Continuity of operations in previously inundated commercial and industrial establishments
- Continuity in market activity as transport of good and commodities remains unencumbered while access to services is facilitated by the presence of all-weather roads
- Savings in management costs in the decline of absences and tardiness of workers formerly affected by flooding
- Diversion of household income to other essential needs other than medical expenditures from flood related sickness and diseases
- Lower maintenance cost of vehicles, housing and property

- Enhanced image of the LGU resulting to more investments and increased livability for constituents

(4) Residual Impacts

As far as can be determined, the project will not have any adverse residual impacts. During construction waste, all collected dredged materials from esteros, silt and solid waste from drainage mains can be handled and disposed of at acceptable manner. Relocation of project affected people can be likewise carried out in orderly manner following the agreements that were arrived at and settled with the affected stakeholders. During O&M stage, the project would provide long term benefits to the people living around the project area.

K.2.4 ENVIRONMENTAL MANAGEMENT, MONITORING AND INSTITUTIONAL PLANS

(1) General

The Environmental Management Plan (EMP), the Environmental Monitoring Plan (EMoP) and the Institutional Plan are designed to implement drainage system improvement work project in the core area of Metro Manila in an environment-friendly manner.

The EMP contains the courses of action appropriate for the potential impacts identified and discussed. It contains specific measures that will enhance potential positive impacts, with the purpose of maximizing the beneficial impacts and minimizing the adverse impacts, at different stages of project implementation

The EMoP is a pro-active plan that serves as blue print in overseeing and preventing the occurrence of identified adverse impacts during the construction and operation and maintenance (O&M) phases of the Project. Monitoring action plan is recommended to be undertaken by the Project Proponent and/or concerned stakeholders. The results of the periodic monitoring works shall be used in assessing the project compliance on matters stipulated in this EIS document and the project ECC. Formulation of a "Reporting System" among key personnel of the project implementing agency and among members of the Multi-Partite Monitoring Team (MMT) to be created for the project will provide effective feedback mechanisms to ensure that all important environment related matters are properly monitored and addressed.

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 Project Proponent in relations to the implementation of the project. In turn, preliminary institutional linkages and organizational scheme that will facilitate the task of implementing the EMP on one hand, and in providing the Project Management a means to directly address environmental problems in the project site are recommended. Further presented in this section are the functions of the environmental unit and the responsible officers especially the Environmental Officer (EO) who shall take charge of overall management and supervision of the EMP and EMoP implementation during all phases of the Project.

(2) Environmental Management Plan (EMP)

1) EMP for Pre-Construction Phase Impacts

A. Geologic Consideration (Structural Integrity and Stability)

The engineering design of the drainage improvement works shall comply with the specifications set by local and international standards which would consider local physical and geological setting in the project area. DPWH and its design consultants shall ensure that the design and plans for the project are based on sound engineering merits and practices.

B. Site Clearing

The planners and engineering design team of the project have considered in the design that damage to private properties and existing vegetation in the project area shall be critically avoided during site clearing and preparation. For example, DPWH and its contractor will ensure that trees planted along the island (where maintenance holes are located) shall be handled with utmost care during declogging of Buendia Outfall. During dredging of the esteros, damage to private properties that are not part of the project and compensated by the project would be avoided.

C. Relocation of Affected Communities

Displacement of communities is inevitable in this project. Extensive coordination and consultation with the families to be affected were done. During the consultations and workshop with the stakeholders, the relocation site and its facilities as well as the possible livelihood and income support and opportunities were discussed. Concerns discussed on the consultations with the stakeholders were considered in the design and preparation of the Resettlement Action Plan (RAP) and Social Development Plan (SDP). Public acceptance for the project although displacement of people is involved is widely gaining support and approval.

D. Public Acceptance of the Project

For project involving displacement of people and their habitat, thorough public consultation to address their issues and concerns to gain public acceptance is imperative. For this project, series of consultative workshops was undertaken in anticipation of potential opposition and objection from project affected people. To date, the project proponent has successfully involved the project affected people and key stakeholders in planning the project especially in matters that would require serious discussions and considerations like demolition of encroaching structures and the subsequent relocation of the affected people.

- Small group consultative meetings and Focus Group Discussions (FGD) with Barangay Captains of affected barangays;
- Social Development Planning Workshop held on 15 January 2005 at Max's Restaurant Function Room, EGI Bldg., Taft Avenue corner Buendia Ave., Pasay City

Likewise, during the conduct of the Master Planning and Feasibility Study for the project, series of workshops and seminars have been carried out to inform the concern stakeholders about the project and promote participatory planning for the project.

- First Consultative Workshop on 10 March 2004 at Philippines Trade Training Center
- Technical Seminar on 19 May 2004 at Bayview Park Hotel
- Second Consultative Workshop on 21 May 2004 at the Philippines Trade Training Center
- Third Consultative Workshop on 22 July 2004 at the Philippines Trade Training Center
- Cluster Workshop for Affected Barangays on 23 July 2004 at Bayview Park Hotel

Further, proof of social acceptability in the form of barangay endorsements have been secured by the Project Proponent.

2) EMP for Construction Phase Impacts

Based on the impact assessment presented in *Clause K.2.3*, the following construction phase impacts are considered important in this EIA study and thus, demand important management attention.

A. Impacts on the Physico-Chemical 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, the following must be observed:

- a) Avoid fuel spills and lubricant leaks.
- b) 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. 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.

II) Disposal of Dredged Materials from Esteros and Drainage Channels

In formulating appropriate EMP for dredged materials, the Project proponent has undertaken the following approach:

- Characterization of the material to be dredged as to contamination by heavy metals and other persistent pollutants;
- Estimation of the volume of material to be disposed; and
- Selection of the best possible method for disposal

As shown in the baseline characterization of the sediment (dredged materials from esteros and drainage channels), the sediment does not contain levels of deleterious chemicals such as toxic and hazardous heavy metals that would warrant special treatment and disposal of these dredged materials. In this case, the dredged materials can be dumped in appropriate dumping area for construction spoils without further treating the dredged materials.

The estimated volume of dredged materials from esteros/creeks is placed at 139,000 m³ while declogging of drainage mains is expected to yield 20,000m³ of silt and solid waste. When engaging government accredited contractors for the project, the Project Proponent may opt to require the interested contractor to find the appropriate disposal area for these materials as part of their scope of services. In this case, the Project Proponent's responsibility will be lessened and they will just need to check and monitor if the transport and disposal of these dredged and silt materials complies with their internal requirements and that of the DENR requirements.

III) Effect on Water Quality and Quantity

During construction phase, rain run-off and soil erosion may result to deterioration of

water quality of the receiving body of water. In order to minimize the soil erosion due to excavation, bracing and shoring will be provided. Waste materials should be properly collected and dumped at the proper dumpsite for disposal. During rainy season, excess excavated materials shall be immediately hauled away from the construction site. These materials may be permanently disposed of in areas that would require backfilling.

Direct discharge of the domestic wastewater that generally come from the activities of construction workers on-site can be avoided by installing portalets or temporary sanitation facilities in various strategic places in the construction area. 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 domestic wastewater and domestic solid wastes in the project site.

IV) Air Quality and Atmosphere

Dust generation may be one of the major issues during construction stage in the immediate area due to soil/road disturbance and strong winds. To mitigate this impact, regular sprinkling of water in the exposed areas and immediate rehabilitation of the exposed working area will significantly address the problem. If water is scarce or not available, a tarpaulin or any soil cover must be provided for soil pile. The excavation and backfilling activities must be scheduled properly.

Other source of air pollution such as the emission of gaseous pollutants from heavy equipment can be minimized by ensuring that this heavy equipment are regularly maintained and operated.

V) Noise/Sonic Environment

Although noise impact cannot be mitigated, but it can be lessen if the activity is scheduled during daytime only. All construction activities will be suspended during the nighttime to minimize public nuisance. Impacts of noise to construction workers could be mitigated by adopting a personal safeguard such as using earplugs and earmuffs. The use of noise suppressors (mufflers) in equipment and vehicles is also necessary.

VI) Disposal of Solid Waste from Esteros and Drainage Mains

Temporary storage and transport of dredged materials that may contain large percentage of solid waste materials must be considered in the construction plan. Strict adherence to the provisions of RA 9003 or the ecological solid waste management act should be observed to ensure proper storage, transport and disposal of the dredged materials. In case of contracting out the disposal of the dredged materials and solid waste from esteros and drainage mains, the Project Proponent must see to it that the collection and transport of these materials are properly carried out by the contractor. Likewise, the disposal site for the dredged materials or collected solid waste from esteros must have relevant DENR permits and clearances.

VII) Effect of Odors

During dredging along the esteros of Tripa de Gallina and Sunog Apog, dredged materials may generate foul odor that could irritate the nearby communities. Proper construction techniques, management of foul smelling dredged materials and spoils must be employed. If necessary, application of odor reducers should be employed.

The odor reducer that will be used should be environment friendly and must also be environmentally acceptable.

VIII) Effect on Aesthetics

To minimize undesirable visual impacts that affect the aesthetics of the project area, the Project Proponent will ensure that construction debris and other construction materials would not create nuisance or become eyesores. Mitigating measures should include solid waste management activities such as setting-up of buffer strips for equipment and stockpiles and the regular clean-up and clearing activities on a daily basis that would be incorporated and closely monitored in the work plan of the Contractor. Collection and disposal of debris and solid waste would be coordinated with truck collection schedules enforced by the City Government. Similar to the traffic management plan (TMP), the solid waste management plans to be developed jointly by the Construction Supervision and Contractor should be disseminated to the City Government. In addition, the construction site will be maintained as orderly and clean as possible.

B. Impact on the Socio-Economic Environment

I) Population Dynamics

The proponent may exercise the option of sourcing workers from its unemployed labor force as a cost-saving and unemployment-reducing measure or may opt to hire workers from outside especially those with specializations not found within the area.

In light with potential increase in population during construction phase, it should be ensured that the stock of housing units is adequate to meet shelter needs of the incoming migrant population.

As much as possible, the proponent should hire female non-technical and technical workers appropriate for their qualifications to ensure gender equality and equal job opportunities for qualified male and female workers in the area.

II) Employment and Income

It should be stressed that the Project Proponent may impose special conditions in hiring to absorb the unemployed in the area. This condition may be imposed in the bidding documents as contractors have been found out to mobilize their own construction teams, thus their own labor force. If this happens, then employment generation within the area may not be fully realized under the Project. Advanced notice of hiring should be advertised in the community prior to construction phase.

The self-employed in the area that operate small businesses such as carinderias, eateries or itinerant vending activities could benefit by selling their wares and services on site. The demand for construction materials and other material requirements could also drive the local construction industry and thus boost growth of the local economy.

III) Dependency Burden

Prioritization and hiring of local labor force to ensure direct benefits of the proposed project would increase local household income, thereby, enhancing the ability to support children and elderly dependents. A possible improvement would be on the school allowances given to children as well as the budget allocated for education, health care and nutrition. Especially for local workers, transportation savings generated from not needing to travel to more remote workplaces may be channeled as additional budget

for the needs of young and elderly dependents.

IV) Housing Characteristics and Utilities

Prioritization and hiring of local labor force to ensure direct benefits of the proposed project. Temporary increase in household income to local labor force may perhaps cover for minor improvements such as repair and maintenance of dilapidated sections of their housing units.

V) Occupational Health and Public Safety

To prevent accidents and hazards that may occur on site thus risking both skilled and unskilled workers and possibly outsiders too, the project proponent must ensure adherence to Department of Labor and Employment (DOLE) Occupational Safety and Health Hazard Standards with particular emphasis on the following:

1. Personal protective equipment (Rule 1040) which specify the use and types of eye and face protection, respiratory protection, hand and arm protection, safety belt life lines and safety nets and safety shoes.
2. Personal protective equipment, and minimum space requirements for gas, electric welding and cutting operations (Rule 1100)
3. Fire protection and control rule (Rule 1940)
4. Notification and record keeping requirements (Rule 1050)

The Project Proponent recognizes that the success of construction depend on the capability and safety mindedness of its construction workers, among others. Hence, provision of a healthy and safe working environment must be one major concern of the Proponent and the contractor. Workers are to be supervised by a qualified supervisor. Worker safety is to be priority of the work supervisor. The supervisor of construction should be trained in First Aid and emergency procedures. To ensure that the above will be followed, this will be included in the General and/or Special Conditions of Contract for engineering works.

VI) Effect on Local Planning, Coordination and Economic Growth

To maintain good working relationships among the proponent, the contractor, DENR and other concerned local and national agencies, periodic coordination meetings will be held. A news bulletin published monthly would be appropriate to keep the public updated of the progress of implementation.

The proponent and the municipal government of all cities involve should strictly adhere to the approved land use and zoning plan for the area surrounding the project site. This plan should be strictly implemented to avoid land use conflicts in the future. The land use and zoning plan will also prevent the creation of undesirable housing clusters in the vicinity of the project. Further, the land use plan is necessary to promote cohesive and pro-active planning with the end view of further improving the economic conditions in the core area of metro manila and the related cities in general.

VII) Vehicular Traffic and Public Safety

One construction project management strategy which can alleviate the extent of the transient effect in the congestion of traffic is by segmental closure of work areas. It is also necessary to adopt a comprehensive Traffic Management Plan (TMP) to manage traffic conditions in the project area in cooperation with the LGU and the public, inclusive of information and education campaign to educate the whole populace of the

affected community about the need to undertake construction works especially its importance to infrastructure improvement for Metro Manila. The following considerations should form part of the TMP:

- Hauling of construction materials and movement would be significant since there would be heavy traffic in the project route especially that these routes are regularly plied by public transport and pedestrians. As such, traffic and safety risks would have to be undertaken in strict consideration during construction supervision. The TMP should include guidelines on the rationalization of construction schedules to manage construction during daytime and periods of peak traffic, and the use of appropriate signage, lighting and warning devices for approaching traffic. Posting of traffic-related advisory must be a component of the traffic management scheme.
- For earth-moving activities especially along the project area, markers with warning signs against entry and unwanted activity near the construction site shall be installed. These markers aim to prevent accidents caused by moving machineries.

The TMP should ensure overall road safety along the affected roads and manageability of heavy traffic and transport flows. From a social point of view, the TMP would have to include the following measures:

- *Allowing still the free flow of traffic and transport*, from the avoidance of construction works being simultaneously undertaken at both sides of the road to provide additional space for traffic flows and prevent vehicle build-up and accidents resulting from negotiating tight routes;
- *Prevention of accidental trespassing of the public in the construction site*, through the establishment of a buffer strip for equipment and stockpile of construction materials a few meters away from the road line and in an area blocked from public entry;
- *Avoidance of unregulated traffic building causing undue disturbance and delays in transaction of the public*, through the placement of warning signals for incoming traffic at strategic locations before approaching construction areas; and preferably, the assignment of traffic aides at both ends of construction area to regulate 2-way traffic and transport flow;
- *Avoidance of road accidents and other mishaps costing lives and undue health costs*, through the provision of lights and signs at the construction site and for safety, bounding of work areas with neon strips and the daily clearing of road debris and closure of manholes and other excavations when not in use.

3) EMP for the Operation Phase Impacts

The project is an infrastructure project that was designed to improve and enhance the existing environmental condition in the project area particularly to abate and mitigate flooding problems. In the section of impact assessment during operation phase, most of the impacts identified are positive. In this case, enhancement of those positive impacts could be attained by properly instituting diligent operation and maintenance (O & M) of the installed flood control and drainage structures.

Among those positive impacts that were identified with corresponding enhancement measures are as follows:

Impact	Enhancement/Mitigation Measures
Physico-Chemical Related	<ul style="list-style-type: none"> ▪ Concerted efforts among local people, NGOs and concerned government agencies to regulate disposal of domestic solid wastes and wastewaters into the river and drainage channels, (a) to prevent water pollution, (b) to maintain cleanliness and sanitation in the area, (c) prevent clogging of the waterways, and (d) protect public health and safety.
Socio Economic Related Impacts <ul style="list-style-type: none"> ▪ Public Health and Safety ▪ Local Economy, Labor and Employment ▪ Land Values ▪ People' Living Condition ▪ Vehicular Traffic 	<ul style="list-style-type: none"> ▪ The key mitigation measure is the sound and effective operation and maintenance of all the flood control and drainage improvement structures. This may include regular desiltation and/or dredging to increase discharge capacity of esteros and canals. ▪ Flood forecasting and warning during rainy or flood season to forewarn people of impending floods (especially in times where there is structural defects in any of the installed flood control and drainage structures). ▪ Disaster and flood preparedness program involving multi-agency participation.

4) Summary of the Environmental Management Plan

The proposed Environmental Management Plan for the Pre-Construction, Construction and Operation/Maintenance Phases of the *Proposed Drainage Improvement in the Core Area of Metropolitan Manila Project* is presented in *Table K.2.11*.

5) Contingency Plans

Contingency plan in dealing with structural failures of the flood control and drainage structures must be implemented by the Project Proponent. Likewise, contingency program or disaster preparedness program related to flooding must be designed and implemented by the Project Proponent to minimize property and human damages.

Table K.2.11 Environmental Management Plan (EMP) (1/4)

Project Phases and Area of Concern	Impact Description	Mitigation Program	Cost	Schedule	Institutional Plan	Guarantees
PRE-CONSTRUCTION PHASE						
Geologic consideration (structural integrity and stability)	Project benefits impaired	<ul style="list-style-type: none"> Incorporation of geological considerations in detailed design 	Covered by the contract cost of the Technical Consultant	During planning and detailed engineering design	DPWH/ Technical Consultant	Include in Master Plan, Feasibility Study and Detailed Engineering Design for the project
Vegetation loss during surveying	Loss of natural vegetation;	<ul style="list-style-type: none"> Removal only of epigeal portion (retaining the roots) of vegetation to allow natural regeneration Depends on selected site; minimal since area is relatively developed (only insects /small animals will be displaced) 	Minimal	During surveying and site clearing activities	DPWH/ Technical Consultant/ Contractor	Include in Master Plan and Feasibility Study for the project
Relocation of affected Communities	Loss/ damage to properties of affected households	<ul style="list-style-type: none"> Public Consultations and preparation of applicable RAP and SDP for the affected community Just compensation for the affected families 	> to be based on actual cost (estimates is not final)	During Planning Stage and site clearing	DPWH/ LGUs	Public Consultation Reports, Proof of Social Acceptability from Barangays, Homeowners Association and City Hall
Public acceptance of the project	Public participation and cooperation	<ul style="list-style-type: none"> Public hearing and consultations should be conducted to address the concerns of the stakeholders 	Covered by the contract cost of the Technical Consultant	During planning stage or pre-construction phase	DPWH/ Technical Consultant/ LGUs/Other concerned government agencies	Public Consultation Reports, Proof of Social Acceptability from Barangays, Homeowners Association and City Hall

Table K.2.11 Environmental Management Plan (EMP) (2/4)

Project Phases and Area of Concern	Impact Description	Mitigation Program	Cost	Institutional Plan	Schedule	Guarantees
CONSTRUCTION PHASE						
1) Threat of environmental hazards	Soil and water pollution	Adherence to RA 6969/Good Housekeeping/ Adherence to sound engineering practices	Covered by the contract cost of the contractor	DPWH/ Contractor	During the entire period of the construction phase	Included in the conditions of civil works contract
2) Disposal of dredged materials from esteros and drainage channels	Soil and water pollution; health hazard	Adherence to RA 6969/Good Housekeeping/ Adherence to sound engineering practices	Covered by the contract cost of the contractor	DPWH/ Contractor	During the entire period of the construction phase	Included in the conditions of civil works contract
3) Effect on water quality and quantity	Surface and groundwater pollution	Provision of Portalets/No direct discharge of domestic wastewater	>200,000	DPWH/ Contractor	During the entire period of the construction phase	Included in the conditions of civil works contract
4) Effect on air quality	Dust generation and emission of gaseous pollutants	Proper maintenance of heavy equipment; regular sprinkling of water to exposed areas (when applicable)	>100,000	DPWH/ Contractor	During the entire period of the construction phase	Included in the conditions of civil works contract
5) Noise/sonic environment	Unavoidable noise increase generated from different construction equipment	Suspend construction activities during nighttime; use of mufflers for heavy equipment and vehicles	>100,000	DPWH/ Contractor	During the entire period of the construction phase	Included in the conditions of civil works contract
6) Disposal of solid waste from esteros and drainage mains	Threat of environmental pollution (soil and water pollution)	Strict adherence to the provisions of RA 9003 or Ecological Solid Waste Management Act	Covered by the contract cost of the contractor	DPWH/ Contractor/ LGUs	During the entire period of the construction and operation phase	Included in the conditions of civil works contract
7) Effect of odors	Air pollution; odor nuisance and irritation to nearby communities	Employ proper construction technique, management of spoils and application of odor reducers	Covered by the contract cost of the contractor	DPWH/ Contractor	During the entire period of the construction and operation phase	Included in the conditions of civil works contract

Table K.2.11 Environmental Management Plan (EMP) (3/4)

Project Phases and Area of Concern	Impact Description	Mitigation Program	Cost	Institutional Plan	Schedule	Guarantees
CONSTRUCTION PHASE						
1) Effect on aesthetics	Visual eyesores	Maintenance of the orderliness and cleanliness at the construction site	>1 M	DPWH/ LGUs	During the entire period of the construction and operation phase	Included in the conditions of civil works contract
2) Population Dynamics	Potential increase of population during construction phase	Prioritize local labor; ensure adequate stock of housing units for shelter needs	Covered by the contract cost of the Contractor	DPWH/ Contractor	Prior to construction phase	Site Inspection Report
3) Employment and income opportunities during construction phase	Economic benefits; but may not be fully realized because of imposed bidding conditions	Advanced notice of hiring should be advertised in the community	>100,000	DPWH/ Contractor	Prior to construction phase	Data of hired personnel
4) Occupational health and public safety	Occurrence of work-related accidents	Compliance with DOLE's regulations on Occupational Safety and Health Hazard Standards	>500,000	DPWH/ Contractor	During the entire period of the construction phase	Included in the conditions of civil works contract
5) Vehicular traffic and public safety	Traffic congestion and road accidents	Adopt a comprehensive Traffic Management Plan (TMP); install signages and warning devices at the construction site	>500,000	DPWH/ LGUs	During the entire period of the construction phase	Included in the conditions of civil works contract

Table K.2.11 Environmental Management Plan (EMP) (4/4)

Project Phases and Area of Concern	Impact Description	Mitigation Program	Cost	Institutional Plan	Schedule	Guarantees
OPERATION AND MAINTENANCE (O & M) PHASE						
1) Physico-Chemical Related Impacts	Direct disposal of domestic solid wastes and wastewater into rivers and drainage channels, which can cause water pollution, clogging of waterways and affect public health and safety.	Concerted efforts among local people, NGOs and concerned government agencies to regulate disposal of domestic solid wastes and wastewaters into the river and drainage channels, (a) to prevent water pollution, (b) to maintain cleanliness and sanitation in the area, (c) prevent clogging of the waterways, and (d) protect public health and safety.	>1,000,000	DPWH/ MMDA/ LGUs	During the entire period of the operation and maintenance (O&M) phase	Include in Master Plan and Feasibility Study for the project; ECC conditionality
2) Public Health and Safety	Project benefits will be impaired	The key mitigation measure is the sound and effective operation and maintenance of all the flood control and drainage improvement structures. This may include regular desiltation and/or dredging to increase discharge capacity of esteros and canals. Flood forecasting and warning during rainy or flood season to forewarn people of impending floods (especially in times where there is structural defects in any of the installed flood control and drainage structures). Disaster and flood preparedness program involving multi-agency participation.	>5,000,000	DPWH/ MMDA/ LGUs	During the entire period of the operation and maintenance (O&M) phase	Include in Master Plan and Feasibility Study for the project; ECC conditionality
3) Local Economy, Labor and Employment,						
4) Land Values, People' Living Condition,						
5) Vehicular Traffic						

(3) Environmental Monitoring Plan

There is a need to institutionalize a Monitoring Program for the proposed improvement drainage project that would serve as a blue print in overseeing and preventing the occurrence of adverse impacts during the construction and operation phases of the Project. The monitoring works should be undertaken by a multi-partite monitoring team (MMT) to be created especially for the project. Members of the MMT created by DENR and project proponent will come from various interested groups such as non-government organizations (NGOs), people's organizations (POs), academe, and the like. The project proponent should allocate an operating budget to mobilize and support the team. The results of the monitoring initiative will be used by the Project Proponent in gauging performance with respect to compliance of the project with the EMP and ECC conditions. Included as part of the monitoring plan is the formulation of a "Reporting System" within the organization and among the members of the MMT.

During construction phase, the following environmental and socio-economic parameters must be diligently monitored by the project proponent and MMT members:

Physico-chemical Environment	Test Parameters	Frequency
- Water quality	6 water samples to be tested for conventional parameters (pH, DO, salinity, BOD, COD, TDS, TSS, pH, color, oil & grease, PO ₄ ³⁻ , Total N, Cr ⁶⁺ , Total Coliform, and Surfactants) based on Class C water	The need for water sampling will be done depending on the physical observation of the surface water bodies (i.e. turbidity, abnormal discoloration)
- Air quality	Fugitive dust during earthmoving and Total Suspended Particulate (TSP), offensive odors, and fumes from vehicle emissions-CO ₂ and NO ₂	Monitor air quality once a fortnight for 8 to 24 hours over the construction period, where necessary
- Sediment quality and quantity	Parameters to be analyzed are color, odor, As, Hg, Pb, total CN ⁻ , Cr ⁶⁺ & Cd.	The need for sediment sampling will be done depending on the physical observation of the bottom sediment (i.e. odor, abnormal discoloration)
Socio-economic parameters		
- Number of actual relocated project affected people	Number of remaining families and houses/shanties in esteros compared with number of actual relocated families	Prior and during construction phase
- Number of local workers (living in the project area/ hired for the project)	Ratio of hired workers (local residents vs migrant workers)	During hiring period

Table K.2.12 present the proposed monitoring plan for the proposed DICAMM project.

Table K.2.12 Environmental Monitoring Plan (EMoP) (1/3)

Project Phase / Area of Concern	Parameter	Procedure	Location	Frequency	Responsibility	Cost (P)
A. CONSTRUCTION PHASE						
1) Water Quality	6 water samples to be tested for conventional parameters (pH, DO, salinity, BOD, COD, TDS, TSS, pH, color, oil & grease, PO ₄ ³⁻ , Total N, Cr ⁶⁺ , Total Coliform, and Surfactants) based on Class C water	Collection of water samples from Esteros and drainage mains and laboratory analysis	At selected points or sections of esterose and drainage mains	The need for water sampling will be done depending on the physical observation of the surface water bodies (i.e. turbidity, abnormal discoloration) / Quarterly	Project Proponent/ Contractor	>200,000.00 per monitoring
2) Air Quality	Fugitive dust during earthmoving and Suspended Particulate (TSP), offensive odors, and fumes from vehicle emissions-CO ₂ and NO ₂	Statistical data using the Staplex high-volume sampler for STP and using the Air Chek Gas Sampler for CO ₂ and SO ₂	At selected observation station in the project site	Twice a year	Project Proponent/ Contractor	>100,000.00 per sampling
3) Sediment Quality and Quantity	Parameters to be analyzed are color, odor, As, Hg, Pb, total CN, Cr ⁶⁺ & Cd.	Esterose sediment and laboratory analysis	At selected points or sections of esterose and drainage mains	The need for sediment sampling will be done depending on the physical observation of the bottom sediment (i.e. odor, abnormal discoloration)	Project Proponent/ Contractor	P200,000.00 per monitoring

Table K.2.12 Environmental Monitoring Plan (EMoP) (2/3)

Project Phase / Area of Concern	Parameter	Procedure	Location	Frequency	Responsibility	Cost (P)
A. CONSTRUCTION PHASE						
4) Solid Waste Generation	Volume of solid wastes from Esteros and the construction workers; Checking on the proper disposal and collection of solid wastes in adherence to RA 9003	Visual observation; Statistical data on solid wastes	Construction site	Daily	Project Proponent/ Contractor	Part of the Contractor's Contract
5) No. of actual relocated project affected people	Houses/shanties built on the estero	Statistical data affected families/ households	Estero de Tripa de Gallina	Prior to construction	Project Proponent/ Contractor/ LGUs/other concerned agencies	>1M
6) No. of local workers (living in the project area / hired for the project)	Ratio of hired workers (local residents vs migrant workers)	Statistical data on hired workers	Hiring offices	During hiring period	Project Proponent/ Contractor	Part of the Contractor's Contract
7) Occupational Health and Safety	Job related accidents/sickness	Statistical data on job related accidents and sickness	Construction site	Daily	Project Proponent/ Contractor	Part of the Contractor's Contract
8) Vehicular Traffic and Public Safety	Traffic volume (all kinds of vehicles); project and traffic related accidents	Statistical data/ count of passing vehicles per hour and related accidents	Construction site	Daily	Project Proponent/ Contractor/MMD A	Part of the Contractor's Contract

Table K.2.12 Environmental Monitoring Plan (EMoP) (3/3)

Project Phase / Area of Concern	Parameter	Procedure	Location	Frequency	Responsibility	Cost (P)
B. OPERATION AND MAINTENANCE (O&M) PHASE						
1) Water Quality	6 water samples to be tested for conventional parameters (pH, DO, salinity, BOD, COD, TDS, TSS, pH, color, oil & grease, PO ₄ ³⁻ , Total N, Cr ⁶⁺ , Total Coliform, and Surfactants) based on Class C water	Estero water sampling and laboratory analysis	Same sampling stations identified during the pre-construction phase	Semi-annual	Monitoring Team in collaboration with PMU	P200,000.00 per monitoring
2) Offensive Odor	Foul stinky odor	Physical observation and sense of smell	Along drainage route	As required	Monitoring Team in collaboration with PMU/ LGUs	Cost should be allocated by DPWH
3) Sediment Quality and Quantity	Parameters to be analyzed are color, odor, As, Hg, Pb, total CN ⁻ , Cr ⁶⁺ & Cd.	Sediment/Sludge sampling and laboratory analysis	Same sampling stations identified during the pre-construction phase; STPs and septic tanks	Semi-annual	Monitoring Team in collaboration with PMU	P300,000.00 per monitoring
4) Solid Waste Generation	Volume of solid wastes from esteros; Checking on the proper disposal and collection of solid wastes in adherence to RA 9003	Spot checking / Visual observation	Along the drainage route and its vicinity	As required	Monitoring Team in collaboration with PMU/ LGUs	Part of the regular O&M funds of the LGU, in addition to the EMF
5) Flooding	Depth of flood	Spot checking/ statistical data on depth of flood	Vicinity of the project area	As required	Monitoring Team in collaboration with PMU	Part of the regular O&M funds, in addition to the EMF
6) Informal Settlers	Number of shanties/squatters proliferated in drainage channels	Statistical data on number of squatters	in the drainage channels	Daily	Monitoring Team in collaboration with PMU	Part of the regular O&M funds of DPWH, in addition to the EMF
7) Public Health	Project related illnesses such as water-borne diseases	Statistical data on water-borne diseases outbreak	Within the vicinity of the Project Area (Workers and nearby residents)	Daily	Monitoring Team in collaboration with PMU	Part of the regular O&M funds, in addition to the EMF

(4) Institutional Plan

1) The Role of Environmental Officer (EO)

The role of the EO to ensure implementation of pollution-control related plans and programs of the project proponent is very important. The EO in coordination with the project management will be responsible in formulating detailed strategy and plan of action that will respond to the requirements of the EMP and future needs relevant to the protection of the environment. The EO position handles the overall management and planning of activities that will respond to environment-related issues and concerns that may arise during the construction and operation stages of the proposed project.

The EO shall be tasked to represent the Project Proponent in coordinating with the DENR Regional, Provincial and Municipal Offices on matters related to environmental concerns. This is in compliance with DAO 26, Series of 1991 that requires the appointment/designation of an Environmental Officer.

Specifically, the following are some of the responsibilities of the Environmental Officer:

1. Coordinate with DENR-EMB Regional Office on the environmental aspects of the construction and operation activities of the project;
2. Ensure that all installed drainage improvement infrastructures are functional;
3. Monitor and maintain records regarding environmental compliance of the proposed project; and
4. Monitor all activities relative to compliance to all stipulations stated in the Environmental Compliance Certificate (ECC).

2) Improvement Plan for O&M

Part of the responsibility of the flood control section of DPWH was transferred to MMDA in August 2002. Now MMDA is responsible for O&M of drainage system in the core area and LGUs are responsible for laterals along the secondary roads. It is necessary for O&M activities of drainage channels to involve barangay communities under LGUs and to improve the coordination between MMDA and LGUs.

3) Training

Training programs for operation and maintenance of the drainage project are offered in local and international private institutions. Both the key staff of the Project Proponent who will be assigned as carry takers for the project and the concerned stakeholders should undergo continual training. The training program may contribute in:

- a) Preparing the project proponent's staff and project stakeholders to conditions and facilities specific to the drainage system and solid waste management; and,
- b) Providing the staff and the stakeholders with sufficient training and education about various functions in the operation and maintenance of the drainage system including the rehabilitated pumping stations.

4) Improvement of O&M Organization and Activities

In order to support and sustain the recovered drainage system in the core area of Metropolitan Manila, O/M system is to be strengthened. It is proposed to set up an overall O/M system with the following principle:

- 1) A coordination committee consisting of MMDA, LGUs, DPWH and others is to be organized.
- 2) An overall O/M system is to be established in various fields regarding the

improvement of drainage facilities: channels, pumping stations, solid waste management, control of illegal social activities, and execution of Information, Education and Communication campaign (IEC).

3) Responsibility for O/M activities is to be as follows.

MMDA

- Trunk, secondary, tertiary channels and laterals
- Drainage pumping stations
- Solid waste management along drainage channel
- Control of illegal activity
- Information, Education and Communication (IEC)

LGUs

- Laterals along local road
- Solid waste collection management along drainage channel
- Information, Education and Communication (IEC) Campaign
- Barangay participation for O & M activities
- Resettlement

Under the direction of the committee, one drainage basin or combined basins integrating drainage channels and drainage pumping stations are operated and maintained principally by one divisional office in MMDA. In this regard, reorganization of the present division offices is proposed. For smooth and effective O & M, a guideline for comprehensive drainage improvement will be prepared in the subsequent works in feasibility study. Detailed community participated maintenance measures including solid waste collection, control of illegal activities, information, education and communication campaign, etc., will be finalized in the subsequent works. Required institutional aspects and improvement of funding system will be discussed and established for urgent matters through discussions in the above coordination committee.

5) O&M Support Measures and Tools

In addition to the above, improvement for various systems to support and to sustain the above comprehensive O & M system is proposed. They as follows:

- Document management system;
- Empowerment of pump diagnosis system;
- Manpower resources development
- Establishing additional rain and water level measurement equipment

(5) Social Development Plan (SDP)

The social development plan for this project should be made responsive to the real needs of the relocates, host community or stakeholders in relation to the implementation of the DICAMM project. The SDP's objective is to integrate the socio-economic, cultural and physical needs of the concerned stakeholders with emphasis on long-term requirements of the project. It should be pointed out that the project would require displacement thus requiring a comprehensive resettlement action plans. Thus in the proposed SDP, it hinges not only on directly providing settlement for the project stakeholders but also it will enhance the quality and capability of relocates to cope up with the various challenges on staying on their new settlement areas.

Based on stakeholders' consultations, the required SDP should be focused on providing and

strengthening the relocates capability to adapt in their new environment and provide opportunities for employment. The Project proponent in coordination with the host LGUs, other government agencies like TESDA and private agencies (business organization) will create technical or vocational training center that would specifically specialized on providing training and orientation to strengthen and enhance the employment opportunities of the relocatees.

(6) Information, Education and Communication Plan

Based on public consultations and barangay wide dialogue among project proponent, the LGUs and the EIS Consultant, most of the concerned stakeholders are aware of the proposed project. Their level of awareness shows that sooner or later, most of them, the project affected people, would be resettled to pave way for the construction and eventual operation of the proposed drainage improvement project.

For this project, massive has already been made through the initiatives of the project proponent. Periodic meeting and consultations among project proponent, local officials, and project affected people and other local stakeholders have been done in order to orient each one on the status of the project implementation.

(7) Proposed Environmental Guarantee and Monitoring Funds

The project will be required by EMB-DENR to set up an EGF and monitoring fund for the proposed project. It is suggested that this issue be tackled as post ECC since the project proponent is a government entity. In most cases where the project proponent is a government entity, adjustments on the costing of the EGF and EMF may be needed base on actual capability of the concerned government agency like the DPWH. Considerations of the existing government regulations (i.e. COA requirements) on the allocations of EGF and EMF are also important.

ANNEX K.1

RESULTS OF WATER AND SEDIMENT QUALITY SURVEY

DURING IEE

ANNEX-K.1 RESULTS OF WATER AND SEDIMENT QUALITY SURVEY

A.K.1.1 WATER QUALITY

The DENR-NCR conducts quarterly monitoring of the water quality of the major rivers in Metro Manila but the esteros/creeks are not included in the monitoring. Furthermore, the esteros/creeks have no existing classification.

Table A.K.1.1 below summarizes the results of water quality. These were compared with the threshold limits for fresh surface waters as specified in DAO 34 s. of 1990, the Revised Water Uses and Classification and Water Quality Criteria for Conventional and Other Pollutants Contributing to Aesthetics and Oxygen Demand for Freshwaters.

Table A.K.1.1 Results of Analysis of Water Quality of Esteros

Parameter	Unit	DENR Standard		Sampling Site				
		Class C	Class D	1	2	3	4	5
Temperature**	°C	3° rise	3° rise	27.5	27.6	27.6	29.1	28.2
pH (on site)	-	6.5-8.5	6.5-9.0	7.04	7.06	6.89	7.03	7.02
DO (minimum)**	mg/L	5.0	3.0	1.8	1.9	0.9	2.2	1.4
Electric Conductivity **	µS/cm	--	--	471	386	451	463	488
BOD ₅	mg/L	10	15	54	38	40	72	128
COD	mg/L	--	--	254	145	76	96.0	133.0
Total Coliform	MPN/100mL	5,000	5,000	16x10 ⁶	16x10 ⁶	16x10 ⁶	16x10 ⁶	16x10 ⁶
Total Phosphate	mg/L	5.0	--	5.22	5.51	3.73	7.70	6.69
Total Nitrogen	mg/L	5.0	--	18.0	18.48	17.64	15.60	18.96

Sampling Sites:

- 1 – Estero de Maypajo
- 2 – Estero de San Miguel
- 3 – Estero de Paco
- 4 – Estero de Tripa Gallina (near Puyat Ave & Marconi St.)
- 5 – Estero de Tripa Gallina (near Gen. J. Lacuña St.)

Legend: -- No standards specified

** On site analysis

Note: Colored cell indicate that sample did not meet the DENR standards

With BOD₅ concentrations ranging from 38 to 128mg/L, all samples exceeded the maximum limits of 10 mg/L for Class C and 15 mg/L for Class D. All samples also exceeded the total coliform threshold value of 5000 MPN/100ml for Class C and D by a very wide margin. Samples analyzed have concentrations of 16,000,000 MPN/100mL. The DO concentration in all sites is at critical level, falling below the minimum 3 mg/L required for Class D. The low DO levels indicate that the esteros have lost their capacity for aerobic decomposition. This would explain the foul odor of waters. The high Phosphorous and Nitrogen levels also indicate high nutrient load, indicating that the esteros exhibit eutrophic condition.

Ocular inspection of the esteros would correlate the above findings. The esteros are filled with garbage, have highly turbid and almost blackish water, and stinky smell. Apparently, the esteros' main function has been reduced to being waste receptacles. Informal settlers and encroachments are evident in the banks of all the esteros.

A.K.1.2 SEDIMENT QUALITY

To aid in the analysis, the results was compared DAO 92-29 (October 2004) or the IRR of RA 6969 (Toxic, Hazardous Waste) whether it meet the requirements for the TCLP extract standards prior to the disposal sludge, soil and sediments.

Assessment of the quality of the sediment becomes necessary in view of the proposed dredging activity. This may be used as guide for deciding on the manner by which the dredged materials will be temporarily stored, transported and finally disposed of.

Table A.K.1.1 below summarizes the comparison of the results of sediment analysis and DAO 92-29.

Table A.K.1.2 Results of Sediment Analysis

Parameter	Unit	Site Sample Number					Procedural Manual Title III DAO 92-29 (October 2004)
		1	2	3	4	5	Classification of Hazardous Waste
Temperature	°C	-			-	-	---
Arsenic		0.0263	<0.0001	0.0648	0.0268	0.0928	> 5.0 mg/L
Barium	mg/L	1.610	0.619	0.703	2.100	1.590	> 100 mg/L
Cadmium	mg/L	0.0608	0.0491	0.0334	0.0403	0.0422	> 5.0 mg/L
Chromium	mg/L	0.0432	0.0724	0.0085	0.0127	0.0192	> 5.0 mg/L
Lead	mg/L	0.2582	0.1487	0.2700	0.3087	0.4107	> 5.0 mg/L
Total Mercury	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	> 1.0 mg/L
Selenium	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	> 1.0 mg/L
Copper	mg/L	<0.0001	<0.0001	<0.0001	0.0022	<0.0001	--
Nickel	mg/L	1.887	0.3488	0.3893	1.598	0.4294	--
Tin	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	--
Zinc	mg/L	7.62	5.80	9.13	36.93	16.60	--
Fluoride	mg/L	0.4	0.3	0.40	nd	nd	--
Cyanide	mg/L	nd	nd	0.025	0.029	0.0030	--
Chromium Hexavalent	mg/L	0.0319	0.0151	0.0291	0.0375	0.0207	--
Formaldehyde	µ/g	4.75	<1.0	1.0	7.51	1.18	--
Organophosphate	mg/L	nd	nd	nd	nd	nd	--
Alkyl Mercury	mg/L	nd	nd	nd	nd	nd	--
Hydrogen Sulfide	mg/L	Positive	Positive	Positive	Positive	Positive	--
Ignition Loss	%	9.83	5.44	13.12	14.07	8.86	--

Note: nd – Not Detected

ppm – parts per million

µ/g – mhos per grams

Sampling Sites:

1 – Estero de Maypajo

4 - Estero de Tripa Gallina (near Puyat Ave & Marconi St.)

2 – Estero de San Miguel

5 - Estero de Tripa Gallina (near Gen. J. Lacuña St.)

3 – Estero de Paco

Disposal issues are the primary consideration in determining the types and amount of hazardous substance contents of the bottom sediments. Thus, DAO 92-29 (October 2004) was used as reference.

The concentrations of all hazardous substances are within the standards of DAO 92-29. It would be noted that the samples tested positive for Hydrogen Sulfide, a toxic compound characterized by its rotten egg odor, which probably also contribute to the stinky smell of the esteros.

A.K.1.3 CONCLUSION

The water quality test results indicate that organic matters pollute the esteros, with BOD₅ levels falling within the range of untreated domestic wastewater. Organic contamination is evident from the high levels of coliform organisms, high BOD₅, low Dissolved Oxygen concentrations, high COD, and high nutrient loadings. Most conventional pollutants exceeded the prescribed limits for all classes of water, showing that the esteros are in very poor and unhealthful condition and no longer support most of the beneficial uses described in DAO 34 which are contact recreation, agriculture and the like.

The condition of the water bodies can be generalized as unsafe. It is highly inadvisable for any person to be in direct contact with the waters as these contain microorganisms. This condition poses high risk of water-borne diseases. Overflow of water from these creeks during flooding events therefore also poses health hazards.

All the sediment sampling results indicates that all heavy metals, which were mentioned on the above *Table A.K.1.2*, are within the standards of DAO 92-29. This indicates that the bottom sediment when disposed of either through landfill or through an appropriate disposal method at sea do not pose hazards of ground water contamination due to possible leaching of the hazardous substances. However, monitoring or additional analyses of the sediment quality, especially those from Tripa de Gallina and Estero de Maypajo may be necessary to confirm the results of the above analysis and decide on appropriate measures to take in future before project implementation.

ANNEX K.2

RESULTS OF WATER POLLUTION SOURCES SURVEY

DURING IEE

ANNEX-K.2 RESULTS OF WATER POLLUTION SOURCES SURVEY

A.K.2.1 WATER POLLUTION SOURCES

Pollution of the esteros/creeks and rivers in the core area could be attributed to a great extent to unabated disposal of many types of wastes directly into these water bodies and partly to pollution loads from surface runoff. Pollution sources include the settlements and establishments along the periphery of esteros/creeks, factories or commercial establishments that dispose their wastewater into the drainage channels and esteros, and surface runoff that carries with it silt and debris.

The periphery of esteros and creeks are blighted areas occupied by informal settlements. In many cases even the water channels are occupied by informal settlements. Where informal settlements abound, the esteros/ creeks are filled with garbage. Likewise, the channels double as septic tanks of informal settlements. Pollution caused by garbage and sewage accounts for the high BOD while pollution caused by chemical discharges account for the high COD values. Both pollutants use up oxygen for decomposition and may have greatly accounted for the depletion of dissolved oxygen.

In the study area, over 2000 structures have already been identified as occupying the water channels, and probably more are located within the prescribed 3-meter easement, which are now mostly occupied. The people occupying these areas are the most probable sources of the garbage in channels, although some of the garbage could have been carried by floodwaters.

As part of the study, attempt was also made to identify factories or commercial establishments along the esteros as they are also suspected sources of pollution, despite the existence of DENR regulatory and monitoring mechanisms. *Table A.K.2.1* lists of possible wastewater pollution parameters for selected types of industries.

The list of commercial establishments/manufacturing industries located along or near the esteros can be found in *Table A.K.2.2* to *Table A.K.2.6*. The locations of these establishments are as indicated in the maps in *Figure A.K.2.1* to *Figure A.K.2.5*.

Table A.K.2.1 Possible Wastewater Pollution Parameters for Selected Types of Industries

Type of Industry		Possible Wastewater Pollution Parameters
1	Beverage Industry	BOD5, pH, Suspended Solids, Settleable Solids, Total Diss. Solids, Oil and Grease, Color, Total Coliform, Toxic Materials, Temperature, Turbidity, Foam
2	Cement, Concrete, Lime and Gypsum	pH, Suspended Solids, Dissolved Solids, Temperature
3	Dairy Product Processing	BOD5, COD, pH, TOC, Suspended Solids, Chloride, Nitrate, Phosphorus, Color, Toxic materials, Temperature, Turbidity
4	Ferroalloy Manufacturing	Suspended solids, hexavalent chromium, oil and grease, phenols, phosphates
5	Fertilizer Industry (Nitrogen)	Chloride, Chromium, Dissolved Solids, Nitrate, Suspended Solids
6	Phosphate Fertilizer Industry	pH, Total Suspended Solids, total solids, chlorides, sulfates, COD, temperature
7	Inorganic Chemicals, Alkalies and Chlorine Industry	BOD5, COD, TOD, pH, Total Suspended Solids, Total Solids, Total Dissolved Solids, Chromium, Iron, Arsenic, Mercury, Lead, Fluoride, Cyanide, Chlorides, Sulfates, Silicates, Phosphorus, Temperature, Phenols, Chlor. Benzoids & polynuclear aromatics
8	Leather Tanning and Finishing Industry	BOD5, COD, Total Suspended Solids, pH, Color, Total Coliforms
9	Livestock Industry	BOD5, COD, Total Suspended Solids, pH, color, total coliforms
10	Meat, fish and fruit canning	BOD5, COD, TOC, Suspended Solids, pH, Total Dissolved Solids, Phosphorus, Color, Fecal Coliform, Temperature
11	Meat Products Industry	BOD5, COD, Suspended Solids, Settleable Solids, Oil and Grease, Total Coliform, Toxic Materials
12	Gasoline/Petroleum Dealers	Oil and Grease, BOD5, COD, alkalinity, mineral acid, volatile organic compounds, alkaline wastewater
13	Pharmaceutical Industry	COD, BOD5, TSS, Cyanide, Ammonia, Volatile Organic Compounds
14	Distillery	BOD5, Polychlorinated Biphenyls (PCB), TSS, COD, TSS, formaldehyde, Calcium, Magnesium, Alkalinity,

Source: Standard Handbook of Environmental Engineering by Robert A. Corbitt and other various sources (internet, lecture notes, workshop handouts, etc.)

Table A.K.2.2 Commercial Establishments/Industries that Possibly Contribute to Water Pollution of Creeks/Esteros in the Core Area of Metropolitan Manila
Makati Area

No.	Establishments	Address	Type of Establishments	Type of Industry	River / Estero	BOD ₅	pH	Suspended Solids	Settleable Solids	Oil & Grease	Dissolved Solids	Temp.	COD	Hexavalent Chromium	Phenols	Phosphate	Chloride	Chromium	Nitrate	TSS	Total Solids	Sulfates	Color	Total Coliform	Toxic Materials	Alkalinity	Mineral Acid	Volatile Organic Compounds	Alkaline Wastewater	Cyanide	Ammonia	Polychlorinated Biphenyls (PCB)	Formaldehyde	Ca	Mg		
47	Manila Peninsula Hotel	Ayala Ave., Urdaneta	Restaurants And Hotels	O	Narra Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
48	Manila Water Company	Victoria St., Magallanes	Sanitary And Similar Services	---	Maricaban Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
49	Markes Agro-Chemical Enterprise Inc.	South Superhighway,	Manufacture of other chemical products	---	Tripa de Gallina	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
50	Marsman & Co., Inc.	2246 Pasong Tamo St.,	Business Services	---	Narra Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
51	Mead Johnson Phils., Inc.	2309 Pasong Tamo Ext., Dasmariñas	Manufacture of drugs medicines	m	Maricaban Creek	•	---	---	---	---	---	---	•	---	---	---	---	---	---	---	---	---	---	---	---	---	•	---	•	•	---	---	---	---			
52	Meat Processing & Deli Products Mfg. Plant	7454 Yakal St., San Antonio	Not Confirmed	---	Narra Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
53	Medical Plaza Makati Condominium Corp.	Amorsolo St., Legaspi Village, San Lorenzo	Other business services, n.e.c.	---	Narra Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
54	Microwave System Inc.	Pasong Tamo St.,	Electrical appliances and supplies	---	Narra Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
55	Mouawad Manila Lapidary Inc.	7481 Bagtikan St., San Antonio	Art goods, marble products, painting and artist' supplies, retailing	---	Narra Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
56	National Lead Co. Phils. Inc.	2848 Pasong Tamo Ext.,	Other Manufacturing Industries	---	Narra Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
57	New World Renaissance Hotel	Makati Ave., San Lorenzo	Restaurants And Hotels	O	Narra Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
58	New Zealand Creamery, Inc.	Camia St., Guadalupe Viejo	Food manufacturing Industry	c	Narra Creek	•	•	•	•	---	•	---	•	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
59	Newborn Food Product, Inc	2442 Arsonvel St., San Isidro	Food manufacturing Industry	c	Tripa de Gallina	•	•	•	•	---	•	---	•	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
60	Oceanic Pharamcal Inc.	Pasong Tamo St.,	Manufacture of other chemical products	---	Narra Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
61	Pasong Tamo Carport Center	2130 Pasong Tamo St.,	Transportation Services	O	Narra Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
62	Petron Mega Plaza (Megaworld Proprs. & Holdings)	Gil Puyat St., Bel-Air	Hotels, motels and other lodging places	O	Narra Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
63	Petron Motorists Holiday	Makati Ave., Bel-Air	Gasoline stations	I	Narra Creek	•	---	---	---	•	---	---	•	---	---	---	---	---	---	---	---	---	---	---	---	•	•	•	•	---	---	---	---	---	---		
64	One Lafayette Square (Megaworld Proprs.)	Sedeno St., Bel-Air	Hotels, motels and other lodging places, n.e.c.	O	Narra Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
65	Ponte Salcedo Condominium	Valero St., Bel-Air	Hotels, motels and other lodging places	O	Narra Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
66	Primetown Property Group, Inc.	St. Paul, San Antonio	Hotels, motels and other lodging places	O	Narra Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
67	Pryce Center Condominium Corporation	Bagtikan St., San Antonio	Hotels, motels and other lodging places, n.e.c.	O	Narra Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
68	Raytheon Phils., Inc.	2100 Pasong Tamo St.,	Not Confirmed	---	Tripa de Gallina	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
69	Redox Technology Inc.	Pasong Tamo Ext.,	Manufacture of electrical apparatus and supplies not elsewhere classified	---	Narra Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
70	Sara Lee (Phils.) Inc.	2287 Pasong Tamo Ext.,	Manufacture of chemical products not elsewhere classified	---	Narra Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
71	Scentral Laboratories, Inc.	Bakawan St., San Antonio	Not Confirmed	---	Narra Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
72	Sinclair Philippines Inc.	7433 Yakal St., San Antonio	Manufacture of chemical products not elsewhere classified	---	Narra Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
73	The Peninsula Manila Hotel	Ayala Ave., Urdaneta	Restaurants And Hotels	O	Narra Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
74	The Salcedo Park (Megaworld Proprs. & Holdings)	Sen. G. Puyat Ave.,	Hotels, motels and other lodging places, n.e.c.	O	Narra Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
75	Tiara Oriental Hotel	7248 Malugay St., San Antonio	Hotels, motels and other lodging places	O	Narra Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
76	Total Petroleum Phis., Corp. Service Station	Kamagong St., San Antonio	Not Confirmed	O	Narra Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
77	Travellers Inn	7880 Makati Ave.,	Hotels, motels and other lodging places, n.e.c.	O	Narra Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
78	Two Lafayette Square (Megaworld Proprs. & Salcedo Village)	105 Tordesillas St., Salcedo Village	Hotels, motels and other lodging places	O	Narra Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
79	UCPB Properties, Inc. (The Forbes Tower)	Valero St., Bel-Air	Real estate development companies	---	Narra Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
80	Uniwear Garments Mfg. Inc.	Yakal St.,	Manufacture of textiles	---	Narra Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
81	Vassar Industries Incorporated	7272 Malugay St., San Antonio	Manufacture of plastic products not elsewhere classified	---	Narra Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
82	Vermida Realty Dev't. Corp. (Easton Place)	L1B4 Valero St., Bel-Air	Hotels, motels and other lodging places, n.e.c.	O	Narra Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
83	Winkey Garments Industries Inc.	7452 Yakal St.,	Manufacture of textiles	---	Narra Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
84	Worldwide Garments Industries Inc.	Yakal St.,	Manufacture of textiles	---	Narra Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Note:

a - Beverage Industry	h - Leather Tanning and Finishing Industry	O - Domestic Waste
b - Cement, Concrete, Lime and Gypsum	i - Livestock Industry	X - Infectious/Toxic Waste
c - Dairy Product Processing	j - Meat, Fish and Fruit canning	Y - Domestic & Toxic Waste
d - Ferroalloy Manufacturing	k - Meat Products Industry	
e - Fertilizer industry (Nitrogen)	l - Gasoline/Petroleum Dealers	
f - Phosphate Fertilizer Industry	m - Pharmaceutical Industry	
g - Alkalies and Chlorine Industry	n - Distillery	

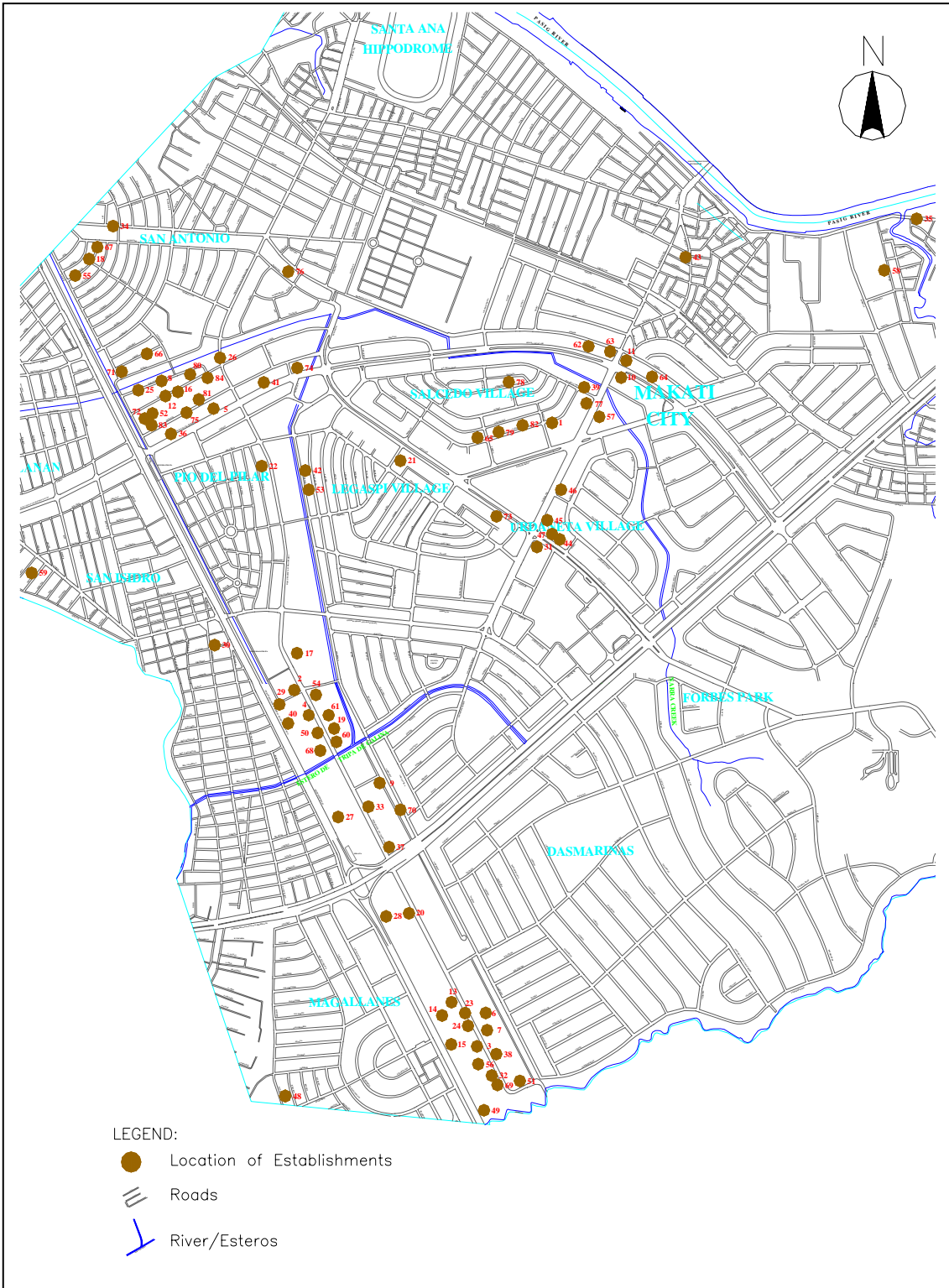


Figure A.K.2.1 Location Map of Establishments along or near Esteros within Makati Area

Table A.K.2.3 Commercial Establishments/Industries that Possibly Contribute to Water Pollution of Creeks/Esteros in the Core Area of Metropolitan Manila

Manila Area

No.	Establishments	Address	Type of Establishments	Type of Industry	River / Estero	BOD ₅	pH	Suspended Solids	Settleable Solids	Oil & Grease	Dissolved Solids	Temp.	COD	Hexavalent Chromium	Phenols	Phosphate	Chloride	Chromium	Nitrate	TSS	Total Solids	Sulfates	Color	Total Coliform	Toxic Materials	Alkalinity	Mineral Acid	Volatile Organic Compounds	Alkaline Wastewater	Cyanide	Ammonia	Polychlorinated Biphenyls (PCB)	Formaldehyde	Ca	Mg		
1	Celestial Waive Building	950 A. Lacson St.	Not Confirmed	---	Estero de Aviles	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2	University of Santo Tomas (UST)	España	Hospital, Medical Dental, Services	X	Estero de Aviles	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
3	UST Research Complex Bldg.	UST Compound, España	Not Confirmed	---	Estero de Aviles	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
4	Wendy's Restaurant	Lacson Ave. cor Loyola St. Sampaloc	Restaurant	O	Estero de Aviles	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5	University of the East (UE)	C.M. Recto	University / School	Y	Estero de Magdalena	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
6	United Doctors Medical Center	# 6 N. Ramirez St., España	Hospital, Medical Dental, Services	X	Estero de Maypajo	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
7	Times Plaza - RHL Prop. & Devt. Corp.	UN Avenue cor. Taft Ave.	Department Store	O	Estero de Paco	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8	Unilever Phil. Inc. - Manila	# 1351 U.N. Ave	Manufacture of soap and cleaning preparations, perfumes, cosmetics and other	---	Estero de Paco	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
9	St. Joseph School	# 2683 J. Luna St., Gagalangin Tondo	University / School	Y	Estero de Vitas	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
10	Southern Sawmill, Inc.	# 1331Dagupan St.	Not Confirmed	---	Estero dela Reina	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
11	W. Jherdebs Devt. Corp. - Manila	# 2651 T. Earnshaw St. Gagalangin Tondo	Cold Storage	---	Estero sunog Apog	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
12	Cine Tandem - Manila	CM Recto Ave. Cor. Severino St.	Not Confirmed	---	Estero de Magdalena	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
13	Stanford Corp.	#2350 Gamban St., Balut	Food manufacturing, n.e.c.	c	Estero de Vitas	●	●	●	●	---	●	---	●	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
14	Tondo Medical Center	Balut	Medical, Dental, Other Health And Veterinary Services	X	Estero de Vitas	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Note:

- a - Beverage Industry
- b - Cement, Concrete, Lime and Gypsum
- c - Dairy Product Processing
- d - Ferroalloy Manufacturing
- e - Fertilizer Industry (Nitrogen)
- f - Phosphate Fertilizer Industry Inorganic Chemicals,
- g - Alkalies and Chlorine Industry
- h - Leather Tanning and Finishing Industry
- i - Livestock Industry
- j - Meat, Fish and Fruit canning
- k - Meat Products Industry
- l - Gasoline/Petroleum Dealers
- m - Pharmaceutical Industry
- n - Distillery
- O - Domestic Waste
- X - Infectious/Toxic Waste
- Y - Domestic & Toxic Waste

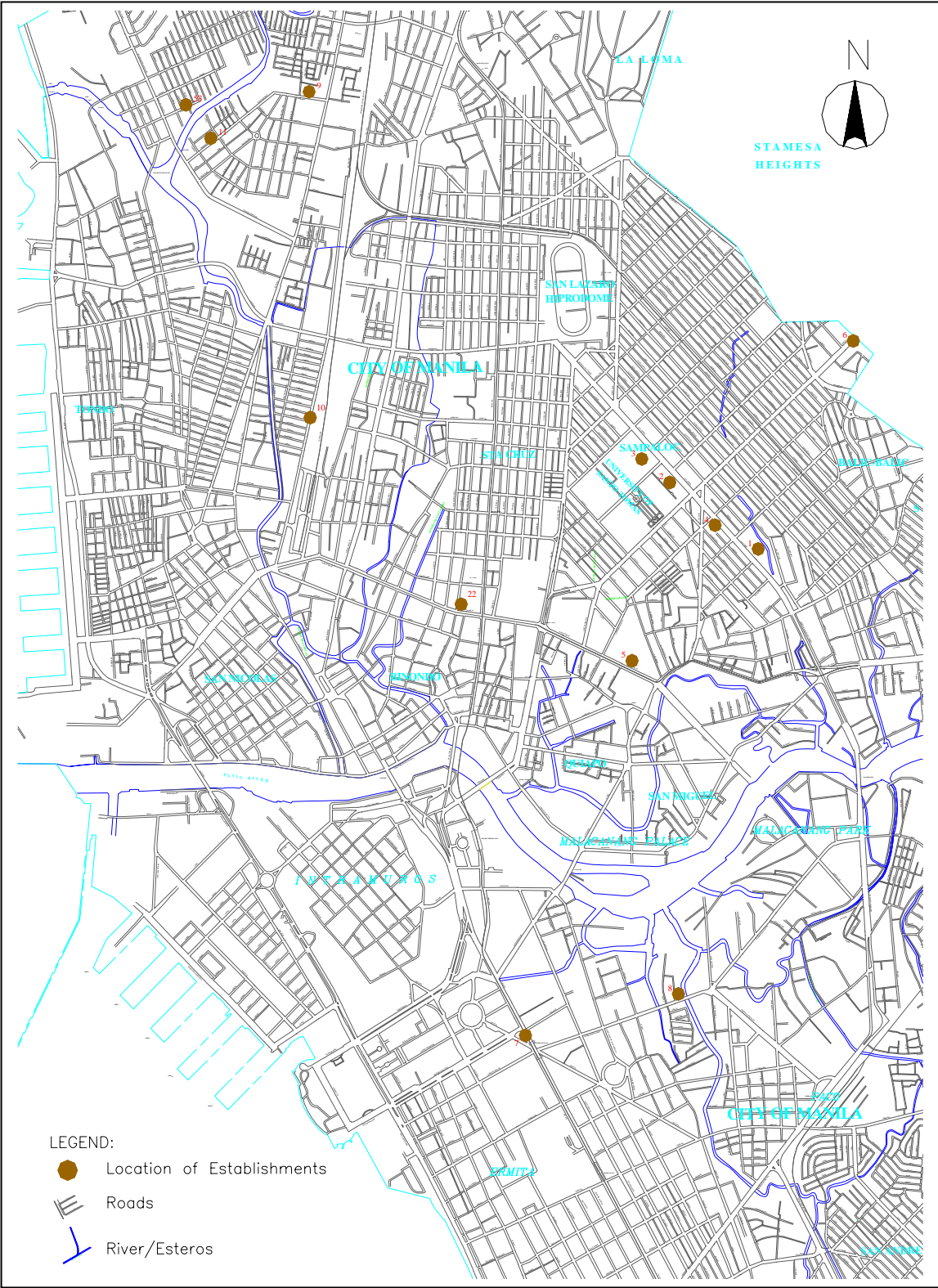


Fig. A.K.2.2 Location Map of Establishments along or near Esteros within Manila Area

**Table A.K.2.4 Commercial Establishments/Industries that Possibly Contribute to Water Pollution of Creeks/Esteros in the Core Area of Metropolitan Manila
Pasay Area**

No.	Establishments	Address	Type of Establishments	Type of Industry	River / Estero	BOD ₅	pH	Suspended Solids	Settleable Solids	Oil & Grease	Dissolved Solids	Temp.	COD	Hexavalent Chromium	Phenols	Phosphate	Chloride	Chromium	Nitrate	TSS	Total Solids	Sulfates	Color	Total Coliform	Toxic Materials	Alkalinity	Mineral Acid	Volatile Organic Compounds	Alkaline Wastewater	Cyanide	Ammonia	Polychlorinated Biphenyls (PCB)	Formaldehyde	Ca	Mg		
2	Power Generation of the Phils. Inc.	NAIA Eng'g Compound	Not Confirmed	---	Maricaban Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
3	KIA Motor Sales Corp.	# 2316 Aurora Blvd., Maricaban	Motor repair shop for vehicles, including overhauling	---	Tripa de gallina	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
4	Mahal Kita Drive-Inn - ALC Group of Corp.	# 2929 cor Taft Ave.	Hotels, motels and other lodging places	O	Tripa de gallina	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5	Rotonda Economy Hotel	# 2921 Taft Ave.	Hotel	O	Tripa de gallina	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
6	Victory Liner, Inc. - Pasay	EDSA	Operation and maintenance of passenger terminals including equipment	O	Tripa de gallina	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
7	Callex - (Autofixer Gasoline Station) Malibay	#1035 EDSA, Malibay	Gasoline stations	I	Tripa de gallina	■	---	---	---	■	---	---	■	---	---	---	---	---	---	---	---	---	---	---	●	●	●	●	---	---	---	---	---	---	---		
8	Callex - (Excel Station) Taft	#2222 Taft Ave.	Gasoline stations	I	Tripa de gallina	■	---	---	---	■	---	---	■	---	---	---	---	---	---	---	---	---	---	---	●	●	●	●	---	---	---	---	---	---	---		
9	EGI Rufino Plaza (Hotel & Comm. Complex)	Taft Ave. cor. Gil Puyat St.	Hotels, motels and other lodging places	O	Tripa de gallina	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
10	Jam Group of Co. (Bus Terminal)	#2160 corner Gil Puyat St., Taft Ave.	Operation and maintenance of passenger terminals including equipment	O	Tripa de gallina	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
11	JB Lines/Bicol Express	#2240 Aurora Blvd., Tramo St.	Operation and maintenance of passenger terminals including equipment	O	Tripa de gallina	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
12	Jollibee - Spring Cinema Bldg.	Spring Cinema Bldg., Libertad St. cor. Burgos St.	Restaurants, cafes and other eating and drinking places	O	Tripa de gallina	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
13	Kemwerke, Inc.	#233-AC, De Guzman St., Malibay	Manufacture of industrial chemicals	---	Tripa de gallina	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
14	New Winston Lodge - ALC Group of Corp.	#2224 Aurora Blvd., (Old Tramo) cor. EDSA	Hotels, motels and other lodging places	O	Tripa de gallina	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
15	Pangasinan Five Star Bus Co. Corp. (Terminal)	#2220 Tramo St., (Aurora Blvd.)	Operation and maintenance of passenger terminals including equipment	O	Tripa de gallina	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
16	Philips Foods Corp.	#622 Apelo Cruz St., Malibay	Food manufacturing, n.e.c.	c	Tripa de gallina	■	●	●	●	---	●	---	●	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
17	Samuya Food Mfg., Inc./Rodon Mfg. Corp.	#2451 Lakandula St., Sta. Clara	Not Confirmed	---	Tripa de gallina	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
18	Shell - Aurora Blvd./Andrews St., Pasay	Aurora Blvd. Cor. Andrews St.	Gasoline stations	I	Tripa de gallina	■	---	---	---	■	---	---	■	---	---	---	---	---	---	---	---	---	---	---	●	●	●	●	---	---	---	---	---	---	---	---	
19	Shell - M. Dela Cruz	#625 EDSA Ave. cor. M. Dela Cruz, Malibay	Gasoline stations	I	Tripa de gallina	■	---	---	---	■	---	---	■	---	---	---	---	---	---	---	---	---	---	---	●	●	●	●	---	---	---	---	---	---	---	---	
20	Total (TPPC) - Pasay	EDSA, Malibay	Gasoline stations	I	Tripa de gallina	■	---	---	---	■	---	---	■	---	---	---	---	---	---	---	---	---	---	---	●	●	●	●	---	---	---	---	---	---	---	---	

Note:

a - Beverage Industry	h - Leather Tanning and Finishing Industry	O - Domestic Waste
b - Cement, Concrete, Lime and Gypsum	i - Livestock Industry	X - Infectious/Toxic Waste
c - Dairy Product Processing	j - Meat, Fish and Fruit canning	Y - Domestic & Toxic Waste
d - Ferroalloy Manufacturing	k - Meat Products Industry	
e - Fertilizer industry (Nitrogen)	l - Gasoline/Petroleum Dealers	
f - Phosphate Fertilizer Industry	m - Pharmaceutical Industry	
g - Inorganic Chemicals, Alkalies and Chlorine Industry	n - Distillery	

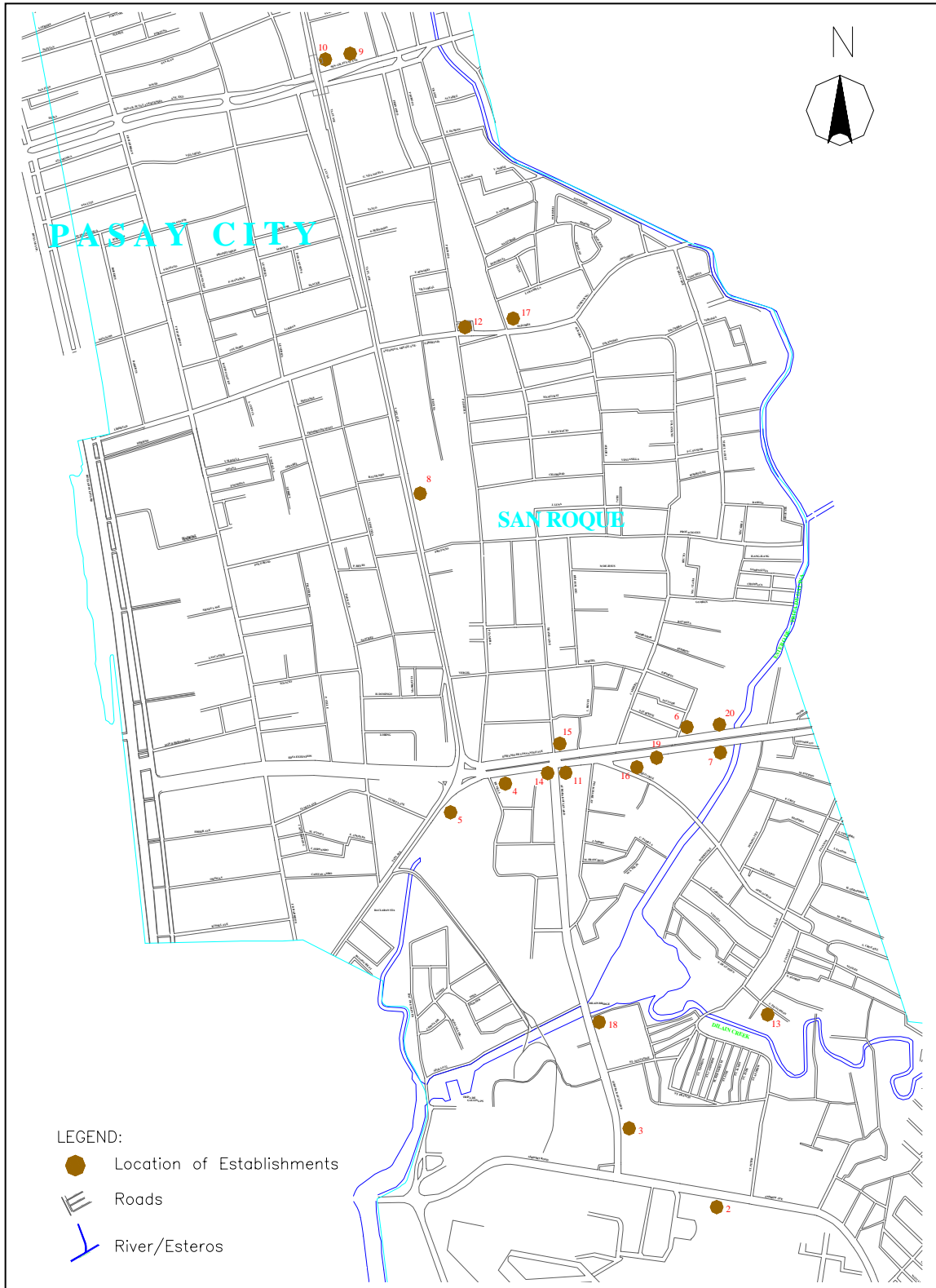


Fig. A.K.2.3 Location Map of Establishments along or near Esteros within Pasay Area

**Table A.K.2.5 Commercial Establishments/Industries that Possibly Contribute to Water Pollution of Creeks/Esteros in the Core Area of Metropolitan Manila
Caloocan Area**

No.	Establishments	Address	Type of Establishments	Type of Industry	River / Estero	BOD ₅	pH	Suspended Solids	Settleable Solids	Oil & Grease	Dissolved Solids	Temp.	COD	Hexavalent Chromium	Phenols	Phosphate	Chloride	Chromium	Nitrate	TSS	Total Solids	Sulfates	Color	Total Coliform	Toxic Materials	Alkalinity	Mineral Acid	Volatile Organic Compounds	Alkaline Wastewater	Cyanide	Ammonia	Polychlorinated Biphenyls (PCB)	Formaldehyde	Ca	Mg		
1	Orient Pearl Restaurant	Del Mundo St. cor. 10th Ave.	Restaurant	O	Casili Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
2	Alliance Foundry Shop Eng'g. Inc.	# 135 T. Teodoro St.	Basic Metal Industries	d	Casili Creek	---	---	●	---	●	---	---	---	●	●	●	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
3	Amigo Plastic Industries	# 162 9th St., 10 Ave.	Manufacture of plastic	---	Casili Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
4	Buffalo Steel Corp.	#276 J. Teodoro St., 8th Ave.	Basic Metal Industries	d	Casili Creek	---	---	●	---	●	---	---	---	●	●	●	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5	Callex - (9th Ave. Serv. Station)	9th Ave. cor. Rizal Ave. Ext.	Gasoline Station	l	Casili Creek	●	---	---	---	●	---	---	●	---	---	---	---	---	---	---	---	---	---	---	●	●	●	●	---	---	---	---	---	---	---		
6	Dai-ichi Plastics	#23 D. Aquino St.	Manufacture of plastic	---	Casili Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
7	Foodworld Mfg. Corp.	292-294 8th Ave.	Beverage Manufacturing	a	Casili Creek	●	●	●	●	●	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
8	Gold Star Foundry, Inc.	#219 J. Teodoro St. 7th Ave.	Basic Metal Industries	d	Casili Creek	---	---	●	---	●	---	---	---	●	●	●	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
9	Kimbee Machinery & Foundry Co. Inc.	#239 J. Teodoro St. cor. 9th Ave.	Basic Metal Industries	d	Casili Creek	---	---	●	---	●	---	---	---	●	●	●	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
10	Technical Off-set Press Inc.	#111-D Aquino St., cor 6th Ave.	Not confirmed	---	Casili Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
11	Advanced Plastics, Inc.	#1 Kamantique St., 10 Ave.	Manufacture of plastic	---	Estero de Maypajo	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
12	De Luxe Steel Mfg.	#205 4th Ave. St. cor. 9th Ave.	Other Manufacturing Industries	d	Estero de Maypajo	---	---	●	---	●	---	---	---	●	●	●	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
13	Ever Gotesco Grand Central	Rizal Ave. extn.	Department Store	---	Estero de Maypajo	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
14	Global Brush Manufacturing	#20 5th St., 6th Ave.	Not confirmed	---	Estero de Maypajo	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
15	Globe Distillery	#87 3rd Ave.	Distillery	n	Estero de Maypajo	●	---	---	---	---	---	---	●	---	---	---	---	---	---	---	---	---	---	---	●	---	---	---	---	---	---	---	●	●	●		
16	Hercules Lead Mfg.	#50-G 7th Ave.	Lead Manufacture	d	Estero de Maypajo	---	---	●	---	●	---	---	---	●	●	●	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
17	Hope Adhesive	Cordero St., 2nd Ave.	Not confirmed	---	Estero de Maypajo	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
18	Howard tower - Manolith Const. & Dev't. Corp.	6th Ave., Rizal Ext.	Not confirmed	---	Estero de Maypajo	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
19	Irish Intl. Plastic Corp.	7th St.	Plastic Manufacture	---	Estero de Maypajo	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
20	Jade Tower - Crystal Jade Realty Dev't. Corp.	2nd Ave. cor. J. Teodoro St., #41 Zone	Hotel	O	Estero de Maypajo	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
21	Jetti Supply Distribution Inc.	A. Mabini St., Brgy. 10	Gasoline Station	l	Estero de Maypajo	●	---	---	---	●	---	---	●	---	---	---	---	---	---	---	---	---	---	---	●	●	●	●	---	---	---	---	---	---	---	---	
22	Jollibee (10th Ave.) A. Mabini	10th Ave. cor. A. Mabini St.	Restaurant	O	Estero de Maypajo	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
23	Jollibee - Kalookan LRT	#689 Rizal Ave. Extn.	Restaurant	O	Estero de Maypajo	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
24	Jollibee / Chowking / Greenwich - EGC	Rizal Ave. extn.	Restaurant	O	Estero de Maypajo	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
25	Malabon Candy Co. Inc.	#197 C. Cordero St., 5th Ave.	Candy Factory	c	Estero de Maypajo	●	●	●	●	---	●	---	●	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
26	Milan Plastic Products Corp.	#36 7th St. 7th Ave.	Plastic Manufacture	---	Estero de Maypajo	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
27	New Moses Enterprises	#99 4th St., 9th Ave.	Basic Metal Industries	d	Estero de Maypajo	---	---	●	---	●	---	---	---	●	●	●	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
28	New Prosperity Plastic	#144-A 9th St., 9th Ave.	Plastic Manufacture	---	Estero de Maypajo	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
29	Petron - Grace Park	# 146 Rizal Ave. Extn.	Gasoline Station	l	Estero de Maypajo	●	---	---	---	●	---	---	●	---	---	---	---	---	---	---	---	---	---	---	●	●	●	●	---	---	---	---	---	---	---	---	
30	Phil. Tiles Corp.	#150 4th Ave.	Not confirmed	---	Estero de Maypajo	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
31	Playtech Co.	#158 P. Sevilla St., bet 5th & 6th Ave.	Not confirmed	---	Estero de Maypajo	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
32	Rainbow Dyeing Service	#135 St. 6th Ave.	Dyeing Services	---	Estero de Maypajo	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
33	RB Steel Inds., Inc.	111-113 St., 8th Ave.	Basic Metal Industries	d	Estero de Maypajo	---	---	●	---	●	---	---	---	●	●	●	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
34	Regal Metal Craft Corp.	#139-141 A. Del Mundo st., cor 2nd Ave.	Basic Metal Industries	d	Estero de Maypajo	---	---	●	---	●	---	---	---	●	●	●	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
35	Shell - (Centennial Service Station Grace Park)	#402 8th Ave. cor. Rizal Ave.	Gasoline Station	l	Estero de Maypajo	●	---	---	---	●	---	---	●	---	---	---	---	---	---	---	---	---	---	---	●	●	●	●	---	---	---	---	---	---	---	---	
36	TY Metal Products	#160 L. Nadurata St., bet. 6th & 7th Ave.	Basic Metal Industries	d	Estero de Maypajo	---	---	●	---	●	---	---	---	●	●	●	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	

Note:

a - Beverage Industry	h - Leather Tanning and Finishing Industry	O - Domestic Waste
b - Cement, Concrete, Lime and Gypsum	i - Livestock Industry	X - Infectious/Toxic Waste
c - Dairy Product Processing	j - Meat, Fish and Fruit canning	Y - Domestic & Toxic Waste
d - Ferroalloy Manufacturing	k - Meat Products Industry	
e - Fertilizer industry (Nitrogen)	l - Gasoline/Petroleum Dealers	
f - Phosphate Fertilizer Industry	m - Pharmaceutical Industry	
g - Inorganic Chemicals, Alkalies and Chlorine Industry	n - Distillery	

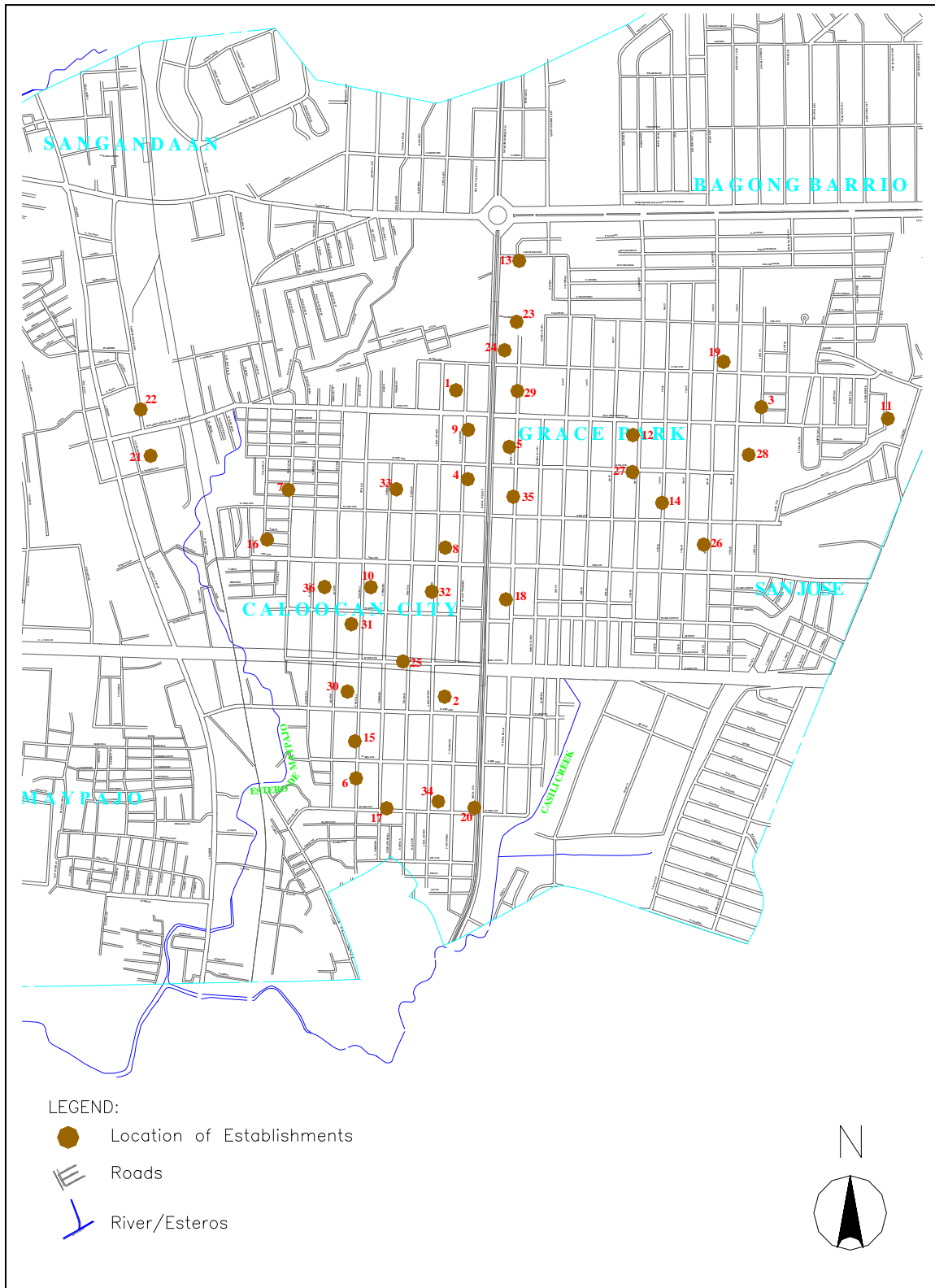


Fig. A.K.2.4 Location Map of Establishments along or near Esteros within Calocan Area

Table A.K.2.6 Commercial Establishments/Industries that Possibly Contribute to Water Pollution of Creeks/Esteros in the Core Area of Metropolitan Manila Quezon City Area

No.	Establishments	Address	Type of Establishments	Type of Industry	River / Estero	BOD ₅	pH	Suspended Solids	Settleable Solids	Oil & Grease	Dissolved Solids	Temp.	COD	Hexavalent Chromium	Phenols	Phosphate	Chloride	Chromium	Nitrate	TSS	Total Solids	Sulfates	Color	Total Coliform	Toxic Materials	Alkalinity	Mineral Acid	Volatile Organic Compounds	Alkaline Wastewater	Cyanide	Ammonia	Polychlorinated Biphenyls (PCB)	Formaldehyde	Ca	Mg	
1	Island Metal Mfg. Corp.	#62 Howmart Rd., Baesa	Basic Metal Industries	d	Diliman Creek	---	---	●	---	●	---	---	---	●	●	●	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2	Island Wood Mouldings	#132 5th Ave.	Not Confirmed	---	Diliman Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
3	Ivex Industrial	Manchester Ind'l. Subd., Sauyo, Novaliches	Not Confirmed	---	Dario Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
4	Jac Liner, Inc.	#2 Mapagmahal St.	Operation and maintenance of passenger terminals including equipment	O	Diliman Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5	Jacinto Iron & Steel Sheets Corp.	Km. 21 Quirino Highway, Pasong Putik	Basic Metal Industries	d	Dario Creek	---	---	●	---	●	---	---	---	●	●	●	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
6	JEBB Enterprises	Manchester Ind'l. Subd. Sauyo Rd.	Basic Metal Industries	d	Dario Creek	---	---	●	---	●	---	---	---	●	●	●	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
7	Jollibee - (Estolano Bldg.) EDSA/Aurora	G/F J. Estolano Bldg., EDSA cor. Aurora Blvd.	Restaurants, cafes and other eating and drinking places	O	Diliman Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
8	Jollibee - Anonas/Kamias	Kamias Rd. Cor. Anonas St., Sikatuna Village	Restaurants, cafes and other eating and drinking places	O	Diliman Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
9	Jollibee - Aurora/Anonas	Anonas St. cor. Aurora Blvd.	Restaurants, cafes and other eating and drinking places	O	Diliman Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
10	Jollibee - Congressional/EDSA	EDSA cor. Congressional Ave., Diliman	Restaurants, cafes and other eating and drinking places	O	Culiat River	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
11	Jollibee - Diamond Bldg.	Diamond Bldg., Aurora Blvd. Cor. Araneta Ave.	Restaurants, cafes and other eating and drinking places	O	Diliman Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
12	Jollibee - East Ave./V. Luna	PHMA Bldg., East Ave. cor. V. Luna Rd.	Restaurants, cafes and other eating and drinking places	O	Diliman Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
13	Jollibee - EDSA /Kamias	L1B1 EDSA cor. Kamias Rd., Piñahan	Restaurants, cafes and other eating and drinking places	O	Diliman Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
14	Jollibee - Muñoz/EDSA	Roosevelt Ave. cor. EDSA, Muñoz	Restaurants, cafes and other eating and drinking places	O	Culiat River	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
15	Jollibee - Nova Susano	Susano Comm'l. Complex, Quirino Highway	Restaurants, cafes and other eating and drinking places	O	Dario Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
16	Jollibee - Nova-Quirino	#938 Quirino Highway	Restaurants, cafes and other eating and drinking places	O	Dario creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
17	Jollibee - Quezon Theater	G/F Quezon Theater Bldg., Araneta Center	Restaurants, cafes and other eating and drinking places	O	Diliman Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
18	Jollibee - Sta. Quiteria	Quirino Highway cor. Tandang Sora Ave., Sta. Quiteria	Restaurants, cafes and other eating and drinking places	O	Dario Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
19	Jollibee - TandangSora/Visayas	Tandang Sora Ave. cor. Visayas Ave., Pasong Tamo	Restaurants, cafes and other eating and drinking places	O	Pasong Tamo River	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
20	Kentex Mfg. Corp.	Talipapa	Not Confirmed	---	Dario Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
21	Kentucky Fried Chicken (KFC) - Cubao	P. Tuazon St.	Restaurants, cafes and other eating and drinking places	O	Diliman Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
22	Kentucky Fried Chicken (KFC) - East Ave.	East Ave.	Restaurants, cafes and other eating and drinking places	O	Diliman Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
23	Kimlee Transformer, Inc.	Metro Fabric Compd., 685 Tandang Sora	Not Confirmed	---	Dario Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
24	Kolmann Corp.	#325 Quirino Highway, Baesa	Not Confirmed	---	Dario Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
25	Limech Garments Mfg. Corp.	#28 Arte Rd., Sauyo	Manufacture of textiles	---	Dario Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
26	Magnolia Nestle Corp.(Magnolia Dairy Prod.)	#710 Aurora Blvd., Kaunlaran	Food manufacturing, n.e.c.	c & a	Diliman Creek	●	●	●	●	●	●	---	●	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
27	Metro-Pack Corp.	#1129 Quirino Highway	Not Confirmed	---	Dario Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
28	Mix Plant, Inc.	#14 Visayas Ave. Extn., Proj. 6	Manufacture of bakery products	---	Culiat River	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
29	Molave Court	#389 Quirino Highway	Hotels, motels and other lodging places	O	Dario Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
30	Montessori Child Learning Center	#116 Visayas Ave.	Educational Services	O	Culiat River	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
31	Nestle Phils., Inc. - (ICCPD) QC	#710 Aurora Blvd. cor. Hemady St., Kaunlaran	Manufacture of dairy products, except milk	c & a	Diliman Creek	●	●	●	●	●	●	---	●	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
32	New United Foundry Mfg. Corp.	#595 Quirino Highway, Bagbag	Not Confirmed	---	Dario Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
33	Partas Trans Co., Inc.	#816 Aurora Blvd., cor. T. Bernardo St.	Operation and maintenance of passenger terminals including equipment	O	Diliman Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
34	Petrochem Corp.	#101 Mother Ignacia Ave., South Triangle	Not Confirmed	---	Diliman Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
35	Petron - #57 Mindanao Ave., QC	#57 Mindanao Ave.	Gasoline stations	I	Culiat River	●	---	---	---	●	---	---	●	---	---	---	---	---	---	---	---	---	---	---	●	●	●	●	---	---	---	---	---	---	---	---
36	Petron - (Corral) Piñahan, QC	East Ave. cor. NIA Rd., Piñahan	Gasoline stations	I	Diliman Creek	●	---	---	---	●	---	---	●	---	---	---	---	---	---	---	---	---	---	---	●	●	●	●	---	---	---	---	---	---	---	---
37	Petron - (Toyota) Aurora Blvd., Cubao	#926 Aurora Blvd., Cubao	Gasoline stations	I	Diliman Creek	●	---	---	---	●	---	---	●	---	---	---	---	---	---	---	---	---	---	---	●	●	●	●	---	---	---	---	---	---	---	---
38	Petron - RG Service Station	Visayas Ave., cor. Congressional St.	Gasoline stations	I	Pasong Tamo Creek	●	---	---	---	●	---	---	●	---	---	---	---	---	---	---	---	---	---	---	●	●	●	●	---	---	---	---	---	---	---	---
39	Phil. Childrens Medical Center	Quezon Blvd. Ext. cor. Agham St., Pag-Asa	Not Confirmed	---	Marblo Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	

Table A.K.2.6 Commercial Establishments/Industries that Possibly Contribute to Water Pollution of Creeks/Esteros in the Core Area of Metropolitan Manila Quezon City Area

No.	Establishments	Address	Type of Establishments	Type of Industry	River / Estero	BOD ₅	pH	Suspended Solids	Settleable Solids	Oil & Grease	Dissolved Solids	Temp.	COD	Hexavalent Chromium	Phenols	Phosphate	Chloride	Chromium	Nitrate	TSS	Total Solids	Sulfates	Color	Total Coliform	Toxic Materials	Alkalinity	Mineral Acid	Volatile Organic Compounds	Alkaline Wastewater	Cyanide	Ammonia	Polychlorinated Biphenyls (PCB)	Formaldehyde	Ca	Mg		
40	PolyAgro Products Corp.	#710-716 Quirino Highway	Not Confirmed	---	Dario Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
41	Progressive Labs.	#149 Dangay St., Project 7	Manufacture of drugs medicines	m	Culiat Creek	•	---	---	---	---	---	---	•	---	---	---	---	---	---	•	---	---	---	---	---	---	•	•	•	---	---	---	---	---	---		
42	Quezon City Medical Center (QCMC)	#960 Aurora Blvd.	Medical, Dental, Other Health And Veterinary Services	X	Diliman Creek	---	---	---	---	---	X	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
43	Ramcar Center Bldg.	#80 Rocas Ave.	Hotels, motels and other lodging places, n.e.c.	O	Diliman Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
44	RBL Livestock	#614 Celina Dr., Quirino Highway	Hog raising	i	Dario Creek	•	•	---	---	---	---	---	•	---	---	---	---	---	---	•	---	•	•	---	---	---	---	---	---	---	---	---	---	---	---		
45	Regalia Park Towers - The Regalia Group Corp.	#150 P. Tuazon St.	Hotels, motels and other lodging places, n.e.c.	O	Diliman Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
46	Richardson Steel Corp.	#668 Quirino Highway, Bagbag	Basic Metal Industries	d	Dario Creek	---	---	•	---	•	---	---	---	•	•	•	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
47	Robinsons Place (Novaliches) - Robinson Land	Pasong Putik, Quirino Highway	Restaurants And Hotels	O	Dario Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
48	Roosevelt Mfg. Corp.	#3 Don C. Manuel St., Kaingin Rd.	Not Confirmed	---	San Francisco Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
49	SeaOil - EDSA/South Triangle, Diliman	#843-845 EDSA South Triangle, Diliman	Gasoline stations	l	Diliman Creek	•	---	---	---	•	---	---	•	---	---	---	---	---	---	---	---	---	---	---	•	•	•	•	---	---	---	---	---	---	---		
50	SeaOil - Gulod, Novaliches	L481 B787 Quirino Highway	Not Confirmed	---	Dario Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
51	SeaOil - Quirino Highway/Salvia St.	Quirino Highway cor. Salvia St.	Not Confirmed	---	Dario Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
52	SeaOil - Tuazon/EDSA (Cubao)	L15-C2A No. 574, EDSA cor. P. Tuazon Blvd., Socorro	Gasoline stations	l	Diliman Creek	•	---	---	---	•	---	---	•	---	---	---	---	---	---	---	---	---	---	---	•	•	•	•	---	---	---	---	---	---	---		
53	Shell - (Diwal) Mindanao Ave.	Mindanao Ave.	Gasoline stations	l	Culiat River	•	---	---	---	•	---	---	•	---	---	---	---	---	---	---	---	---	---	---	•	•	•	•	---	---	---	---	---	---	---	---	
54	Shell - (East Gate) Bahay Toro	Congressional Ave., Bahay Toro	Gasoline stations	l	Pasong Tamo Creek	•	---	---	---	•	---	---	•	---	---	---	---	---	---	---	---	---	---	---	•	•	•	•	---	---	---	---	---	---	---	---	
55	Shell - (Optima) Mindanao Ave., Novaliches	Mindanao Ave., Novaliches	Gasoline stations	l	Dario Creek	•	---	---	---	•	---	---	•	---	---	---	---	---	---	---	---	---	---	---	•	•	•	•	---	---	---	---	---	---	---	---	
56	Shell - (Speedwheel) Bignay/Bonifacio	A. Bonifacio St. cor. Bignay St.	Gasoline stations	l	Diliman Creek	•	---	---	---	•	---	---	•	---	---	---	---	---	---	---	---	---	---	---	•	•	•	•	---	---	---	---	---	---	---	---	
57	Shell - Quirino Ave./Tandang Sora	#372 Quirino Ave. cor. Tandang Sora Ave.	Gasoline stations	l	Dario Creek	•	---	---	---	•	---	---	•	---	---	---	---	---	---	---	---	---	---	---	•	•	•	•	---	---	---	---	---	---	---	---	
58	Shell - Regalado	Regalado Ave., Pasong Putik	Gasoline stations	l	Dario Creek	•	---	---	---	•	---	---	•	---	---	---	---	---	---	---	---	---	---	---	•	•	•	•	---	---	---	---	---	---	---	---	
59	SNC Industries, Inc. - Novaliches	#36 Tandang Sora Ave.	Manufacture of structural concrete products	b	Pasong Tamo Creek	---	•	•	---	---	•	•	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
60	St. Paul College	Aurora Blvd.	Educational Services	---	Diliman Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
61	Stantex Colour Inds., Inc.	#685-B Tandang Sora Ave.	Not Confirmed	---	Pasong Tamo Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
62	Stanwood Inds. Corp.	#121 Kaingin St., Kangkong, Balintawak	Not Confirmed	---	San Francisco Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
63	Stonehill Steel Corp.	#69-75 Quirino Highway, Balintawak	Not Confirmed	---	Dario Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
64	Suarez Metaplas Industries, Inc.	#130 20th Ave.	Not Confirmed	---	Diliman Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
65	Sunny Steam Laundry, Inc.	#660 Tandang Sora Ave., Sangandaan	Laundries, laundry services, and cleaning and dyeing plants	---	Dario Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
66	Sycwin Coating & Wires, Inc. - 1-A V. Ventura	1-A V. Ventura, Balingasa, Balintawak	Manufacture of paints, varnishes and lacquers	---	San Francisco Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
67	Times Paint Corp.	#24 Quirino Highway, Balintawak	Manufacture of paints, varnishes and lacquers	---	Dario Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
68	Total (TPPC) - Bagumbayan, QC	L12 B2 Calle Industria cor. Economia Sts., Bagumbayan	Gasoline stations	l		•	---	---	---	•	---	---	•	---	---	---	---	---	---	---	---	---	---	---	•	•	•	•	---	---	---	---	---	---	---	---	
69	Total (TPPC) - Pasong Putik	Quirino Highway	Gasoline stations	l	Dario Creek	•	---	---	---	•	---	---	•	---	---	---	---	---	---	---	---	---	---	---	•	•	•	•	---	---	---	---	---	---	---	---	
70	Tritan Bus Co.	Kamias Rd.	Operation and maintenance of passenger terminals including equipment	O	Diliman Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
71	UERM Medical Center	Aurora Blvd.	Medical, Dental, Other Health And Veterinary Services	X	Diliman Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
72	Uni-Luck Food Products	#94-C Quirino Highway	Not Confirmed	---	Dario Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
73	United Color Laundry & Dyeing Services	#4 Real St., Real Village I, Project 8	Laundries, laundry services, and cleaning and dyeing plants	---	Culiat Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
74	United Fancy Plywood, Inc.	#422 Quirino Highway, Talipapa	Sawmills and planning mills	---	Dario Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
75	United Foundry & Mfg. Corp.	#595 Quirino Highway, Bagbag	Basic Metal Industries	d	Dario Creek	---	---	•	---	•	---	---	---	•	•	•	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
76	Universal Steel Smelting Co., Inc.	#28 Quirino Highway, Balintawak	Not Confirmed	---	Dario Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
77	Uniware Ceramic Industrial Corp.	Five Star Compd., P. Dela Cruz St., So. Gilna Kaybiga	Not Confirmed	---	Dario Creek	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Note:

a - Beverage Industry	e - Fertilizer industry (Nitrogen)	i - Livestock Industry	m - Pharmaceutical Industry	X - Infectious/Toxic Waste
b - Cement, Concrete, Lime and Gypsum	f - Phosphate Fertilizer Industry	j - Meat, Fish and Fruit canning	n - Distillery	Y - Domestic & Toxic Waste
c - Dairy Product Processing	g - Inorganic Chemicals, Alkalies and Chlorine Industry	k - Meat Products Industry	O - Domestic Waste	
d - Ferroalloy Manufacturing	h - Leather Tanning and Finishing Industry	l - Gasoline/Petroleum Dealers		

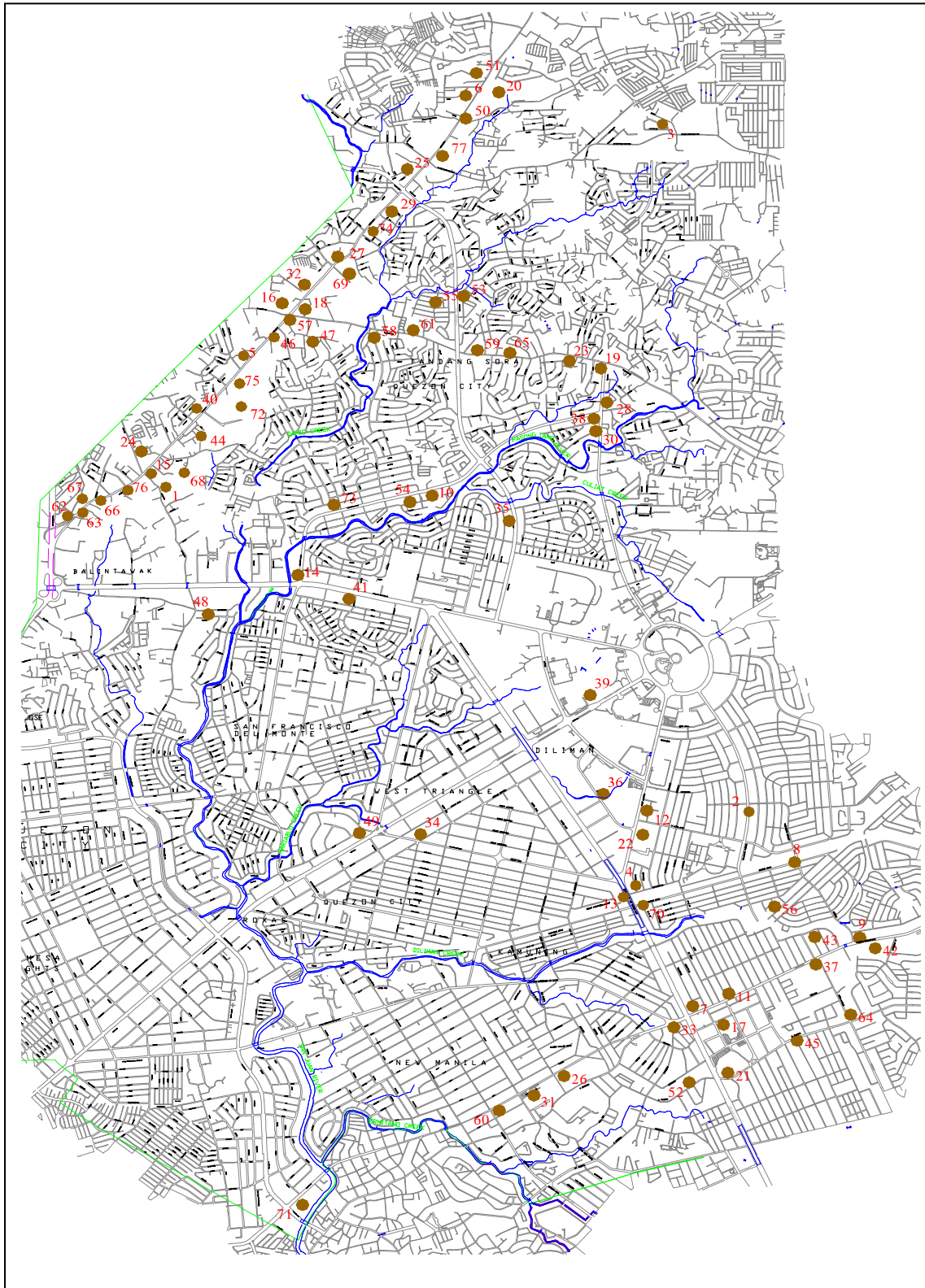


Fig. A.K.2.5 Location Map of Establishments along or near Esteros within Quezon City Area

ANNEX K.3

RESULT OF FIRST LEVEL SCOPING SESSION

DURING EIA STUDY

**MINUTES OF THE FIRST LEVEL SCOPING SESSION
DRAINAGE IMPROVEMENT IN THE CORE AREA OF METRO MANILA
(DICAMM)**

Friday, 12 November 2004

1. Attendance

- 1.1 EMB-NCR
 - Maria Teresa Chavez
 - Eugenia L. Lagmay
 - Florencio Diwa, Jr.
- 1.2 DPWH
 - Jesus Averilla
 - Nonelon B. Florez, Jr.
 - Aquilina T. Decilos
- 1.3 JICA Study Team
 - Dr. Akinori Sato
 - Ms. Sanoe Yamada
 - Ryosaku Nagata
 - Dr. Felixberto H. Roquia, Jr.
- 1.4 EIA Review Committee Members
 - Engr. Antonio C. Kaimo
 - Nestor T. Castro
- 1.5 Woodfields Consultants, Inc.
 - Dr. Delfin C. San Pedro, EIA Team Leader
 - Eduardo P. Sundiang
 - Justina Ma. Sarah Hermoso

2. Proceedings

- 2.1 Date / Venue
 - This First Level Scoping Session for DICAMM Project was held on 11 November 2004 (Thursday) in the Office of Director Sixto Tolentino of the EMB-NCR.
- 2.2 With Mrs. Ma. Teresa Chavez presiding in behalf of Director Tolentino, the session started at 10:30 a.m. with each of the participants introducing themselves to the group.
- 2.3 Ms. Aquilina T. Decilos of DPWH started the session with her power- point brief presentation of the Project.
- 2.4 Dr. Akinori Sato's presentation came next. His power-point presentation on the DICAMM project has the following topic highlights:
 - The JICA Study
 - Present Conditions and Problem
 - Basic Concepts of Drainage Improvements
 - Priority Projects

Dr. Sato elaborated on his presentation the various project activities to be undertaken on each phases of the proposed project from the Master Planning stage up to the Feasibility stage. For the priority projects, specific project activities in the core area of Metro Manila were enumerated i.e., dredging of

esteros, declogging and maintenance of drainage channels/canals, construction of new interceptors, etc. Along his presentation, he cited further the possible impacts that these activities could generate.

3. Reaction from the Reviewers

3.1 Technical Issues

3.1.1 Disposal of Dredged Materials

- Engr. Antonio C. Kaimo's concern is on the possible place for disposal of dredged materials.
- Engr. Kaimo thought of the need for coordinating with MMDA
- Ms. Lina Decilos of DPWH mentioned also the efforts of DPWH in looking for possible disposal site.
- The discussions on this issue pointed to the need for giving consideration to the volume and quality of the dredged materials.

3.1.2 Engr. Kaimo made a query also on the need for coordinating on the relation or role of MMDA as regards to the resettlement activities.

3.1.3 Resolving the issue on how to address the construction problem if and when the facilities of utility companies would be found in the drainage canal lines:

- Dr. Sato and Engr. Nagata pointed out that the plan is to "by-pass" those pipes or lines that could obstruct the drainage canal construction by "re-shaping" the by-pass pipes. In any case, the suggestion is to relate and coordinate with utility companies concerned (e.g. MWSS).

3.1.4 Septic tank/sewer lines that inter-connect with drainage canals

- Engr. Kaimo wanted to know if the problem was considered in the design of the drainage canal.
- Dr. Sato replied that the Project concern is confined only to drainage, i.e. declogging. Rehabilitation is the main concern for the moment.

4. Social / Perception Survey

4.1 Relocation Site

- Mr. Nestor T. Castro wanted to know if relocation site(s) are available. The reply of DPWH is that the sites are not yet known.

4.2 Relocation Activities

- Dr. Delfin C. San Pedro, pointed out that even without the project, the possibility of relocation activity is there, considering that this is an LGU initiative. The project could hasten though the process of relocation.

Further to this issue on relocation, Ms. Sanoë Yamada of JICA Study Team shared with the session participants the information that except for officials concerned from City of Makati (Social Welfare Department and the respective Chairmen from Barangay Palanan and San Isidro) who believe that resettlement of the informal settlers is a concern of the national government agency, for instance the MMDA, because the management of esteros like Estero de Tripa de Gallina is in charge of MMDA; those of Pasay City, particularly the Housing Board, has started to prepare a lot in Silang, Cavite under the Community Mortgage Plan(CMP) and with the National House Mortgage Finance Corporation and NHA as the originator.

She further added that an NGO is helping in the preparation of the relocation site in Cavite and has introduced the prospective settlers to the site.

So far, 80 families from Barangay 46 and 30 families from barangay 54 have expressed their interest to transfer or relocate.

The situations in other barangays are not known at this time. However, conditions in the Priority area as regard to informal settlers have been inspected by the staff from DPWH and from the social affairs of the study team.

To date, the barangays affected by the priority project as a whole are 121 in total. Of this number, five barangays in Pasay City (e.g. Barangays 43, 46, 51, 54, & 62) and two barangays in Makati City (e.g. Barangays Palanan & San Isidro) shall be directly affected by dredging activity. According to actual counting conducted by each Barangay Chairman of the directly affected barangays along Estero de Tripa de Gallina as of July 2004, the total number of informal settlers who are subject to relocation is 771 families, the details of which are as follows:

<u>Pasay City</u>	Total: 366 families	<u>Makati City</u>	Total: 405 families
Brgy. 43	85 families	Brgy. Palanan	120 families
Brgy. 46	106 families	Brgy. San Isidro	285 families
Brgy. 51	118 families		
Brgy. 54	57 families		
Brgy. 62	0		

4.3 Relocation Plans Preparation

- There is one to be prepared by the study; Social Development Plan and RAP will help address this issue.

5. Social Acceptability / Public Participation

- 5.1 Dr. Roquia relayed the initiatives of the DPWH through the JICA Study Team in as far as public participation is concerned. He cited for instance the various consultative workshops held with the different Barangay Leaders concerned. He further made mentioned of the Barangay meetings conducted wherein sustainability and public role as the main theme of the agenda.

Dr. Roquia cited the JICA Study team's activities for the enhancement of Public Participation. Four workshops have been done wherein the LGU, Government, Non-government Organization and People's Organization have actively participated. The first (1st) workshop was on the identification of the problems, concerns and recommendation in relation to the drainage and solid waste situation in their cities; the second (2nd) workshop was on the focused on the structural, non-structural and supporting measures for the DICAMM project; the third (3rd) workshop dealt with a S.W.O.T. analysis of the focal points of concern on Solid Waste Management, Pollution, Beautification and Greening and Information, Education and Communication; and, the fourth (4th) workshop elicited from the participants their City Guidelines for the Operation and Maintenance of the DICAMM Projects. In like manner, the identified barangays were also invited to two (2) barangay cluster workshops,

the 1st workshop made the participants to do a S.W.O.T. analysis of their recent situation of focal points of concern on Solid Waste Management, Pollution, Beautification and Greening and Information, Education and Communication; the 2nd workshop included only the barangays within the identified tentative priority areas of the study numbering 121. After presentation of the present's state of DICAMM Project and its final objective, the barangays were grouped according to the specific projects to be done in their area to formulate their guidelines in the operation and maintenance of the project to assure the sustainability of the project.

Mr. Castro still reminded the group, the Consultants in particular on the need to undertake the second level scoping session as part of the EIA system.

Dr. San Pedro gave the assurance since this is part of the procedural requirement for an ECC application.

6. EIA Scoping Checklist Form

Being no more questions and queries from the EIA Review Committee members and EMB, the group proceeded to the filling up of the scoping checklist form. Accomplished checklist form with signatures is shown in Attachment 2.

7. Schedule of the Scoping Session, Second Level

Before breaking up, the participant decided on the following schedules:

There will be two (2) sessions to be held on 28 November 2004:

- 9-12 AM for the group from the North of Manila
- 2-5 PM for the group from South of Manila

More detailed information about the logistics and other arrangements i.e., venues, list of participants, etc. will be provided by DPWH and the EIA Study Team to EMB as soon as there are available.

8. Sites Visit

Site visits will be on 29 November 2004.

9. The meeting adjourned at 12 noon.

Attachments:

- 1 - Attendance Sheet
- 2 - Accomplished First Level Scoping Form Checklist

Prepared by:

Delfin C. San Pedro, Ph. D.
EIA Study Team Leader
Woodfields Consultants, Inc.



Republic of the Philippines
 Department of Environmental and Natural Resources
ENVIRONMENTAL MANAGEMENT BUREAU
NATIONAL CAPITAL REGION
 5th Floor #29 Hizon Bldg. Quezon Ave., Quezon City
 Tel. Nos. 781-0482/83, 781-0484/85, 781-0471, 781-0497, 749-9828/29
 Telefax. 781-0497, 781-0482, 781-0485

ATTENDANCE SHEET
1st Level Scoping Meeting
11 November 2004, 9:30 AM

Name of Proponent : DPWH
 Type of Project : Proposed Drainage Improvement in the Core Area of Metro Manila
 Project Location : Quezon City, Manila, Caloocan City, Pasay City and Makati City

NAME	OFFICE	TEL/FAX	SIGNATURE
NESTOR T. CASTRO	EMARL	(0917) 52915 92005	
SONIC YAMADA	JICA		
Kiyosaki Nagata	JICA		
Ed. SUNDIARAN	CONCORDIANS	92005	
IRMA SAMPAYAN	WCI	92005	
ANTONIO C. KALINAG	EMARL	0941-3964 0918-387577	
JESUS O. AVERILLA	DPWH	304-3841/4...	
Glisela Poejua	JICA		
NONELON B. FLORES, JR.	DPWH- ESSO	304-32-87	
Akinori Sato	JICA Study Team		
EUGENIA L. LEMAY	DENR EMB NCR	785-04-88	
ARULLINAT DEZILLOS	DPWH	304 3841	
Justina Ma. Sarah Hermoso	WCI	931-1154	
Florencio Diwa, Jr.	EMB-NCR	781-04	
Ma. Teresa Chavez	EMB-NCR	- do -	

SCOPE AND COVERAGE

Name of Proponent : PPWH
 Address : _____
 Name of Proposed Project : DRAINAGE IMPROVEMENT ROAD
 Proposed Location : _____
 EIS Preparer : GEORGELO CASANTINI, "C"
 Date : NOVEMBER 11, 2022

"MUST" Criteria	Yes	No	Remarks
Communication of Results			
a) Table of Contents	✓		
b) Presentation of Executive Summary in EIS which should include the following:			
• brief description of the project including Project Cost	✓		
• brief description of the data gathering: scope, duration/period, team, methodology (indicate whether data is primary or secondary)	✓		
• brief description of the project environment (focus on main conclusions and their basis)	✓		
• tabulated summary and discussion of major impacts, main mitigating measures, main components of the Environmental Management Plan	✓		w/ costg
• tabulated summary of the Environmental Monitoring Plan	✓		w/ costg
c) Scoping Report	✓		
• Validation Letter from EMB	✓		
d) Process Documentation Summary	✓		
e) Summary of Proof of Social Acceptability	✓		
1.0 Project Description			
1.1 Basic Project Information Statement of the official name of the project, address, telephone/fax number and project officer responsible/liable for the EIS	✓		

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"MUST" Criteria	Yes	No	Remarks
1.2 Project Location			
1.2.1 Identification of barangay, municipality/city, provincial and regional location of the project	✓		
1.2.2 Presentation of maps of the following scale: national - 1:250,000; regional - 1: 100,000; provincial - 1:50,000; land use map 1:50,000 vicinity map/location map 1:10,000; showing title, legend, scale, project location and political boundaries; delineation of areas of primary and secondary impact areas	✓		
1.3 Project Rationale	✓		
1.4 Alternatives	✓		
1.5 Description of Project Phases			
1.5.1 Pre-Operational/Construction Phase	✓		SPECIFIC ACTIVITY
1.5.2 Operational Phase	✓		W/ COSTS
1.5.3 Abandonment Phase	✓		
2.0 Baseline Environmental Conditions			
2.1 Land	✓		
2.2 Water	✓		
2.3 Air	✓		
2.4 People	✓		
2.5 Future Environmental Conditions without the Project	✓		
2.6 Future Environmental Conditions with the Project	✓		
3.0 Impact (and Risk) Assessment (if required)			
3.1 Impact Identification	✓		
3.2 Impact Prediction and Evaluation	✓		
3.3 Impacts Mitigation/Enhancement Plan	✓		
3.4 Unavoidable and Residual Impacts (if any)	✓		
4.0 Environmental (Risk) Management Plan			Contingency Measure Plan
4.1 Mitigation/Enhancement Measures/Plan (Impacts/Risks)			
4.1.1 Construction Contractor's Program	✓		
4.1.2 Social Development Program	✓		FOR SPECIFIC ACTIVITY and AREA
4.1.3 Contingency Response Plan	✓		
4.1.4 Abandonment Plan	✓		
4.2 Environmental Monitoring Plan	✓		W/ COSTS
4.3 Institutional Plan	✓		
4.4 Information Education Communication Plan	✓		
Bibliography	✓		
Attachments or Annexes			
a) Presentation of List of EIS Preparers with specified field of expertise	✓		
b) Submission of original Sworn Accountability	✓		

Handwritten signature or initials

Statements of key EIS Consultants	✓		
c) Submission of original Sworn Accountability Statement of EIS Proponent	✓		
d) Summary of Proof of Social Acceptability			
• Municipal/Barangay resolution endorsing the project	✓		MEMORIAL
• Endorsement letter of local NGOs/POs	✓		
• Signed contract between proponent and contractor(s) incorporating the mitigation and enhancement measures in the scope of work (if applicable)	✓		POST-ECC COMMITTEE
• Draft Integrated MOA on Multi-partite monitoring team and Environmental Guarantee Funds (indicating proposed amounts and breakdown of estimated costs)	✓		
e) Scoping Report			
f) Other Maps (scale of 1:60,000) and Figures (where applicable)			
Land and Project-Related Maps			
• Topographic Map	✓		
• Physical Plan Map	✓		
• Site Development Map showing project site lay out	✓		
• Process Flow Chart			x
• Drainage Map	✓		
• Slope Analysis Map			x
• Elevation Map			x
• Soils and Land Management Unit Map			x
• Soil Fertility Map			x
• Land Use (and Vegetation) Map	✓		
• Existing and Projected Soil Erosion Map			x
• Existing and Projected Sheet Erosion Map			x
• Potential Sedimentation Source Map			x
• Laboratory Results of Soil Sample Analysis	✓		PHOTOS MATERIALS
Hazard and Geologic-Related Maps, Figures and other Annexes			
• Regional/General Geologic Map	✓		
• Geologic Cross-Sections	✓		
• Sequence Stratigraphic Column of Rock Units	✓		
• Geomorphological Map	✓		
• g factor Contour Map for Rocks	✓		
• g factor Contour Map for Medium Soils	✓		
• Seismicity Maps	✓		

• Differential Settling Hazard Map			
• Flood Frequency and Rating Curves			
• Natural Hazard Map			
• Bathymetric and Morphostructural Map	✓	✓	✓ AVAILABLE
• Results of Petrographic and Mineragraphic Analyses		✓	
• Results of Geochemical Analyses of Rock Samples		✓	
Meteorological and Oceanographic Maps, Figures and Tables			
• Monthly Average Rainfall of the Area	✓		
• Climatological Normals/Extremes	✓		
• Wind Rose Diagrams		✓	
• Frequency of Tropical Cyclones		✓	
• Predicted Tides	✓		
• 24-Hour Tidal Cycles	✓		
• Rainfall Means, Standard Deviation and Amount for a Monthly Period equalled or exceeded at given probability levels	✓		
• Characteristics of the Surface Current Flowing	✓		✓ RUN-OFF
• Surface Current System	✓		
Hydrologic Maps, Figures and Tables			
• Regional Hydrogeologic Map	✓		
• Streamflow Measurements	✓		✓ AVAILABLE
• Mean Monthly Flow Data	✓		
• Flood Peaks and Volumes	✓		
• Summary of Spring and Well Inventory		✓	
• Water Supply and Demand Projections		✓	
• Stormwater Flow Estimates	✓		
Water Quality Assessment (pH, Temp, BOD, COD, SS, Color, Oil and Grease, Heavy Metals, etc.			
• Physico-Chemical Characteristics of Wells and Springs		✓	
• Physico-Chemical Characteristics of Inland Surface Waters	✓		
• Physico-Chemical Characteristics of Coastal Waters	✓		✓ BUNNIA CUTFALL
• Bacteriological Characteristics of Inland Surface Waters	✓		
• Bacteriological Characteristics of Coastal Waters	✓		✓ BUNNIA CUTFALL
• Sampling Site Map	✓		
Air/Noise Quality Assessment			
• Ambient Air Quality (TSP, Sox1, Nox1)	✓		

✓

✓

PM10, etc.) 24-Hour Sampling	✓		
• Noise Levels	✓		
• Sampling Station Map	✓		
• Air Dispersion Diagrams/sophlet		X	
Vegetation, Wildlife and Insect Profile			
• Flora and Fauna Species Inventory or Survey	✓		INVENTORY OF TREES
• Summary of Endemicity/Conservation Status			
• Summary of Abundance, Frequency and Distribution		X	
• Site Observation Map			
• Transect Walk			
• Forest Stand and Stock Tables			
Coastal and Marine Environment Assessment			
• Densities of Seagrasses		X	
• Densities of Seaweeds		X	
• Above-ground biomass of Seagrasses		X	
• Population of Planktonic and Benthic Algae		X	
• Benthic Fauna Population or Density of Benthic Organisms		X	
• Abundance and Distribution of Hard/Soft Coral Genera		X	
• List of Fish Species/Estimated Biomass	✓		
• Ranks and Proportion of Commercially and Non-commercially important Indicator Species		X	
• Seabottom Cover Map Showing Coral & Seagrass Beds		X	
• Sampling Site Map	✓		NAME OF ESTAB/CONS
Socio-Economic and Cultural Environment			
• Settlement Map or Population	✓		BY BARANGAY
• Distribution Map	✓		
• Relocation Site Map	✓		
• Population to be Directly	✓		
• Affected by the project	✓		
• Population by Barangay	✓		
• Population Growth Rate	✓		
• Number of Households and Household size by Barangay	✓		
• Land Area and Population Density by Barangay	✓		
• Population by Sex Composition	✓		
• Literacy of Household Population	✓		
• Household Population by Highest Educational Attainment	✓		

TRM

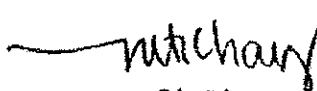
• Highest Population by Employment Status	✓		
• Main Sources of Income	✓		
• Household Profile based on results of the Survey	✓		
• Public Perception Survey	✓		
• Women (/s) Vulnerable Groups	✓	✓	
Human Health			
• Morbidity and Mortality Rates (Infants and Adults) from Direct Impact Areas	✓		
• 5-Year Trend in Morbidity and Mortality	✓		
• Notifiable Diseases in the Area including Endemic Diseases	✓		
• Local Health Resources (Gov't. & Private)	✓		
• Environmental Health and Sanitation Profile: water supply, human excreta management and disposal systems and food hygiene.	✓		
• Identification of Health Hazards in each stage of the development project	✓		
OTHER PERMITS or CLEARANCE			
• Land Title/Proof of Land Jurisdiction/Occupancy Ownership of Land Acquisition	✓	(IF APPLICABLE)	
• DAR Conversion Permit/DAR Exemption		X	
• DA Certificate of Viability for Conversion		X	
• PAWB Endorsement		X	
• Zoning Viability/Locational Clearance		X	
• NWRB Water Use Permit/Certificate of Water Availability		X	
• SEC Registration		X	
• Financial Statement for the last 5 years		X	
• MOA for Review Fund	✓		
• Diskette/Video/Photographs	✓		

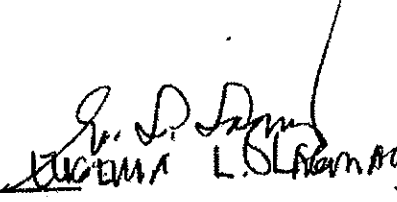
OTHERS: DILIGENCE MANAGEMENT PLAN; TRAFFIC MANAGEMENT PLAN
HEALTH & SAFETY PLAN

Attested by:

[Handwritten Signature]


Noted by:

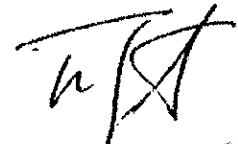

MARIA TERESA CHAVEZ
 EIA Case Handler


EUZEMA L. BLAZQUEZ

Chief, Environmental Impact Assessment Division

Concurred by:

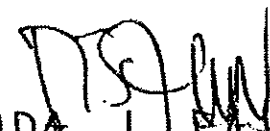

ANTONIO E. RAMIREZ
 Signature over Printed Name
 Member, EIARC

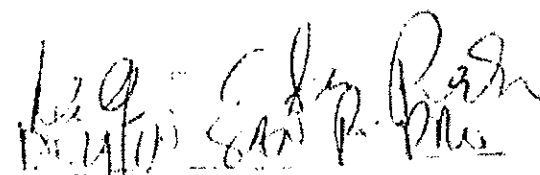

NESTOR T. CASTRO
 Signature over Printed Name
 Member, EIARC

Signature over Printed Name
Member, EIARC

Signature over Printed Name
Member, EIARC

Conforme:

for: 
BELINDA I. PIZARRO
 Project Proponent


EUZEMA L. BLAZQUEZ
 EIS Preparer