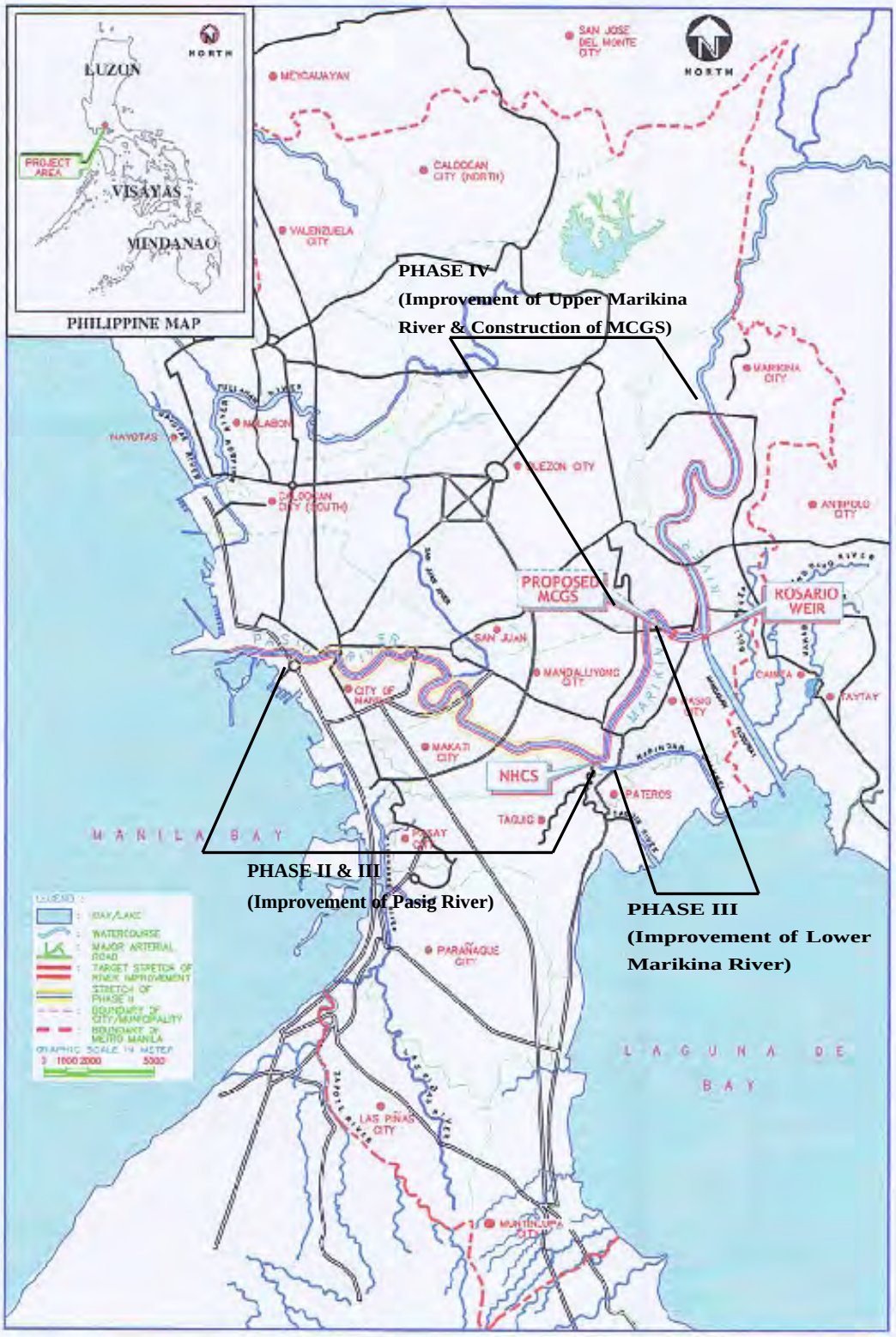
3. EIS (Review Report)

PASIG-MARIKINA RIVER CHANNEL
IMPROVEMENT PROJECT
(PHASE III)

SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

IN ACCORDANCE WITH
JICA GUIDELINES FOR ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

OCTOBER 2011



Project Location Map

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ABBREVIATIONS

ADB	-	Asian Development Bank
As	-	Arsenic
BOD	-	Biochemical Oxygen Demand
CCEP	-	Construction Contractor's Environmental Program
Cd	-	Cadmium
Cl^-	-	Chloride
CLUP	-	Comprehensive Land Use Plan
CN	-	Cyanide
CNC	-	Certificate of Non-Coverage
COD	-	Chemical Oxygen Demand
Cr^{+6}	-	Hexavalent Chromium
Cu	-	Copper
DAO	-	DENR Administrative Order
D/D	-	Detailed Design
DENR	-	Department of Environment and Natural Resources
DO	-	Dissolved Oxygen
DOH	-	Department of Health
DPWH	-	Department of Public Works and Highways
DSWD	-	Department of Social Welfare and Development
EC	-	Electric Conductivity
ECA	-	Environmentally Critical Area
ECC	-	Environmental Compliance Certificate
ECP	-	Environmentally Critical Project
EIA	-	Environmental Impact Assessment
EIS	-	Environmental Impact Statement
EMB	-	Environmental Management Bureau
EMP	-	Environmental Management Plan
ESSO	-	Environmental Social Services Office, DPWH
FPIC	-	Free and Prior Informed Consent
H_g	-	Mercury
HH	-	Household
ICC	-	Indigenous Cultural Communities
ICP	-	Information Campaign and Publicity
IEC	-	Information Education and Campaign/Communication
IEE	-	Initial Environmental Examination
IP	-	Indigenous People
IS	-	Informal Settler
JICA	-	Japan International Cooperation Agency
LGU	-	Local Government Unit
LIAC	-	Local Inter-Agency Committee
LLDA	-	Laguna Lake Development Authority
mg/L	-	milligram per liter
ml	-	milliliter
MCGS	-	Marikina Control Gate Structure
MMDA	-	Metro Manila Development Authority
MMT	-	Multipartite Monitoring Team
MPN	-	Most Probable Number
M/P	-	Master Plan

NAPC	-	National Anti-Poverty Commission
NCIP	-	National Commission of Indigenous People
NCR	-	National Capital Region
NEPC	-	National Environmental Protection Council
NGO	-	Non-Government Organization
NIPAS	-	National Integrated Protected Area
NO_2	-	Nitrogen Dioxide
NO_3	-	Nitrate
NPCC	-	National Pollution Control Commission
NTU	-	Nephelometric Turbidity Unit
PAF	-	Project Affected Families
PAP		Project Affected People/Person
Pb	-	Lead
PD	-	Presidential Decree
PDR	-	Project Description Report
PEISS	-	Philippine Environmental Impact Statement System
PM10	-	Particulate matter with diameter of not less than 10 microns
PMO-MFCP I	-	Project Management Office for Major Flood Control I
PMRIP	-	Pasig-Marikina River Channel Improvement Project
PO_4	-	Phosphate
PRRC	-	Pasig River Rehabilitation Commission
RA	-	Republic Act
SAPROF	-	Special Assistance for Project Formation, JBIC
SO_2	-	Sulfur Dioxide
TC	-	Total Coliform
TDS	-	Total Dissolved Solids
TOR	-	Terms of Reference
TSP	-	Total Suspended Particulates
TSS	-	Total Suspended Solids
UP	-	University of the Philippines
µg/NCM	-	Micro gram per normal cubic meter
µS/cm	-	microsiemens per centimeter

MEASUREMENT UNITS

(Length)

mm	:	millimeter(s)
cm	:	centimeter(s)
m	:	meter(s)
km	:	kilometer(s)

(Area)

mm^2	:	square millimeter(s)
cm^2	:	square centimeter(s)
m^2	:	square meter(s)
km^2	:	square kilometer(s)
ha	:	hectare(s)

(Weight)

g, gr	:	gram(s)
kg	:	kilogram(s)
ton	:	ton(s)

(Time)

s, sec	:	second(s)
min	:	minute(s)
h, hr	:	hour(s)
d, dy	:	day(s)
y, yr	:	year(s)

(Volume)

cm^3	:	cubic centimeter(s)
m^3	:	cubic meter(s)
l, ltr	:	liter(s)
mcm	:	million cubic meter(s)

(Speed/Velocity)

cm/s	:	centimeter per second
m/s	:	meter per second
km/h	:	kilometer per hour

CHAPTER 1 INTRODUCTION

1.1 Purpose of Review and Supplemental Study

Environmental Impact Statement in June 1998 (hereafter "EIS(1998)") and Environmental Compliance Certificate (hereafter "ECC") for the Pasig Marikina River Channel Improvement Project (hereafter "the Project" or "PMRCIP") are reviewed and supplemented to comply with JICA Guidelines for Environmental and Social Considerations (revised in April 2010 and hereafter "JICA Guidelines") for the proposed implementation of Phase III of the PMRCIP.

1.2 Scope of Work

The EIS(1998) and ECC are reviewed and primary supplemental baseline study is performed in the JICA Preparatory Study for the Phase III of the Project. The review and supplemental study is conducted focusing on following:

(1) Validity of ECC,
(2) Compatibility of the EIS(1998) with current Philippines' regulatory requirements,
(3) Compatibility of the EIS(1998) with JICA Guidelines,
(4) Validity of primarily appropriateness of the EIS(1998) for the Phase III, and
(5) Providing supplemental information in accordance with JICA Guidelines for EIS(1998), if necessary, for implementation of Phase III:

- Baseline status of environment and society of concerned area
- Philippines' legal and policy framework
- Environmental impact assessment
- Alternatives
- Mitigation measures
- Environmental monitoring plan
- Financial arrangement

1.3 General Description of the Project

The Pasig-Marikina-San Juan River System, of which total catchment area is 635 km^2, runs through the center of Metro Manila and flows out to the Manila Bay. Its main tributaries, the San Juan River and Napindan River, join the main stream at about 7.1 km and 17.1 km upstream from the Pasig River mouth, respectively. The three largest waterways contribute largely to the flooding in the metropolis brought about by the riverbank overflow of floodwaters. Metro Manila, which encompasses 16 cities and 1 municipality having a total projected population of over 11 million, is the economic, political and cultural center of the Philippines.

However, even though the completion of Mangahan Floodway, flood damages along the Pasig-Marikina River have been frequently experienced in last 25 years between 1986 and 2010; 1986, 1988, 1995, 1998, 1999, 2000, 2002, 2004 and 2009. Especially, Tropical Storm 'Ondoy' brought a heavy rain and caused devastating flood disasters in Metro Manila, its surrounding area and Laguna Lake area on September 26, 2009. The heavy rainfall of 453 mm/day observed at Science Garden in Quezon City brought a huge volume of flood discharge along the Pasig-Marikina River, resulting in the death/missing of about 500 people and causing massive damages.

To cope with such existing flood problems in Metro Manila, the necessity of river channel improvement of Pasig-Marikina River has been studied. The Department of Public Works and Highways (DPWH) conducted a updated Master Plan (M/P) for flood control and drainage improvement in Metro Manila and a Feasibility Study (F/S) on the channel improvement of the Pasig-Marikina River from January 1988 to March 1990, under a technical assistance from the Japan International Cooperation Agency (JICA), called "The Study on Flood Control and

Drainage Project in Metro Manila".

Based on the F/S, the "Pasig-Marikina River Channel Improvement Project" from river mouth to Marikina Bridge (29.7 km long) is being proposed for the implementation in the following four phases: Phase I (Detailed Design), Phase II (Channel Improvement of the Pasig River), Phase III (Channel Improvement for the Lower Marikina River) and Phase IV (Channel Improvement for the Upper Marikina River)

The Phase I of Detailed Design (D/D) was carried out from October 2000 to March 2002 through the Japanese ODA assistance. The Phase II has been requested for financing under the 26th JICA Yen Loan Package with STEP (Special Term Economic Partnership). The construction of Phase II Project has commenced in July 2009 targeting the completion of the Project by June 2012.

Since the tremendous damages were brought to Metro Manila by Tropical Storm 'Ondoy' in September 2009, it is urgently required to complete the whole scheme of the PMRCIP to protect Metro Manila against the further flood disaster. Following the ongoing Phase II, it is proposed to implement the Phase III which is the Lower Marikina River Channel Improvement Works in total of 5.4 km upstream from the junction with the Pasig River. Also, heavily deteriorated bank sections in the Pasig River due to the recent floods including 'Ondoy' is proposed to be included in the Phase III Project. These sections are not covered by the ongoing Phase II. Construction area of Phase III Project is administratively in the cities of Manila, Mandaluyong, Makati and Pasig in Metro Manila.

Major works of the Phase III Project are summarized as follow:

(1) Construction of Revetments supported by Steel Sheet Piles and Reinforced Concrete River Wall along the Pasig River (about 9.9 km long in total on both banks)

(2) Dredging of Lower Marikina River Channel (about 5.4 km long; 612,000 m^3)

(3) Earth Dikes/Concrete River Walls along the Lower Marikina River (4 location; about 2.15 km long in total)

(4) Boundary Bank along Lower Marikina River (about 7.1 km in total)

(5) Bridge Pier Protection Work at 4 existing Bridges along Lower Marikina River (by Stone Riprap)

The Pasig-Marikina River flows in the center of Metro Manila which is a capital of the Republic of the Philippines. Both banks of the river channel are currently the urban area and occupied with residential houses, factories, offices, roads, etc.

To increase the flow capacity of river channel for flood control, measures of widening, deepening, heightening of river wall, short-cut of channel were alternatively studied. Among the alternative measures, to avoid and minimize the social problem such as land acquisition and resettlement, the adopted flood control measure is to rehabilitate/construct the river walls and revetments on the existing river walls and to deepen the existing channel by dredging, without land acquisition for widening the channel.

Moreover, to minimize the negative impacts during project construction, the access to the sites and required works are planned to be basically done from the river channel using boats/barges.

CHAPTER 2 REVIEW OF ECC AND EIS(1998)

2.1 Validity of ECC

An EIS for the Pasig-Marikina River Channel Improvement Project was conducted in 1998. An Environmental Compliance Certificate (ECC-98-NCR-301-9807-128-120) was granted on December 15, 1998 to the Project Proponent (DPWH) based on the submitted EIS (refer to ANNEX-1 showing copy of ECC). Ten years after the ECC was issued, when the Phase II commenced for construction, the validity of the ECC was confirmed by Department of Environment and Natural Resources - Environmental Management Bureau (DENR-EMB) on March 7, 2008.

Once a project is implemented, the ECC remains valid and applicable for the life time of the Project, if the Project contents were not changed. The conditions and commitments stated in the ECC are permanently relieved from compliance only upon validation of the EMB of the successful implementation of the Abandonment/Rehabilitation/Decommissioning Plan. The ECC automatically expires if a project has not been implemented within five (5) years from ECC issuance, or if the ECC was not requested for extension within three (3) months from the expiration of its validity.

2.2 Compatibility of EIS(1998) with PEISS (2007) Requirements

The EIS(1998) has some lacks of information such as Social Development Framework; Information Education Campaign (IEC) Framework; Emergency Response Policy and Generic Guidelines; Environmental Monitoring Plan; Self-Monitoring Plan; Multi-sectoral Monitoring Framework; Environmental Guarantee and Monitoring Fund Commitment; and attached documents of Impact Assessment and Environmental Management Plan (EMP) Supportive Information.

However, these missing parts of EIS document are included in two supplemental documents/reports which were prepared, when the Phase II had entered to the construction phase. These two items are (1) Construction Contractor's Environmental Program (CCEP) and (2) Environmental Monitoring and Management Reports (to be submitted quarterly and semi-annual). Hence the gaps between the EIS(1998) and PEISS (2007) are eliminated throughout actual construction phase. The EIS(1998) along with supplemental reposts satisfies PEISS (2007) requirements.

2.3 Compatibility of EIS(1998) with JICA Guidelines

The EIS(1998) lacks some requirements given by the JICA Guidelines revised in April 2010 as well as the World Bank O.P. 4.01 Annex B.

- The following items of JICA Guidelines are lacking in the EIS(1998):

  i) Legal Framework of Environmental and Social Considerations;
  ii) Some important criteria to describe social and environmental state; and
  iii) Involuntary relocation.

- The following items which are thought to be important were not discussed in scoping session of the EIS(1998):

  i) Water-related diseases,
  ii) Poor and indigenous peoples,
  iii) Historical and religious sites,
  iv) Gender and land use,

v) Loss of bond of community,
vi) Construction area safety,
vii) Conflict of interests,
viii) Inequity of wealth, and
ix) Accidents.

However, overall contents of the EIS(1998) were basically appropriated based on the JICA Guidelines and the WB O.P.4.01. It is not necessary that the EIS(1998) be completely revised.

2.3.1 Overall Comparisons between EIS(1998) and JICA Guidelines

The following Table 2.1 shows overall comparison results for environmental items to be assessed between the EIS(1998) and the JICA Guidelines.

Table 2.1 Overall Comparisons between EIS(1998) and JICA Guidelines

Phase of the Project / JICA Guideline Items			EIS(98)*	Phase II**	Need to consider for Phase III	Method in this Review/ Supplemental Study	Remarks
Social Environment:	1	Involuntary Resettlement	Y	Yes	✓	◎	
	2	Local Economy such as Employment and Livelihood, etc	Housing/Influx of squatter: +/-	Influx of outside labor and their families	✓	○	
	3	Land Use and Utilization of Local Resources	Housing/Influx of squatter: +/-	Influx of outside labor and their families Increase of demand for housing and associated utilities (water supply, toilet, etc.) of outside construction crew	✓	○	
	4	Social Institutions such as Social Infrastructure and Local Decision - making Institutions	N/A	N/A	✓	○	
	5	Existing Social Infrastructures and Services	N/A	Impairment of river navigation	✓	○	
	6	Poor, Indigenous and Ethnic people	N/A	N/A	✓	◎	(1)
	7	Misdistribution of Benefits and Damage	N/A	N/A	✓	○	
	8	Cultural heritage, historical and religious sites	N/A	N/A	✓	◎	
	9	Recreational Area	N/A	N/A			
	10	Local Conflicts of Interest	Housing/Influx of squatter: +/-	Influx of outside labor and their families	✓	○	
	11	Water Usage or Water Rights and Communal Rights	Fisheries: +/-	N/A	✓	◎	
	12	Sanitation	Public health: +/-	Yes	✓	○	
	13	Hazards (risk), Infectious Diseases such as HIV/AIDS	Public health: +/-	N/A	✓	○	
	14	Gender	N/A	N/A			(2)
Natural Environment	15	Topography and Geographical Features	N/A	N/A	✓	○	
	16	Soil Erosion	N/A	N/A	✓	○	
	17	Groundwater	+/-	N/A	✓	○	
	18	Hydrological Situation	N/A	N/A	✓	○	
	19	Coastal zone	N/A	N/A	✓	○	
	20	Flora, Fauna and Biodiversity	+/-	N/A	✓	○	
	21	Meteorology	N/A	N/A	✓	○	

	22	Landscape	Aesthetics: +/-	N/A	✓	○	
	23	Global Warming	N/A	N/A	✓	○	
	24	Protected Area	N/A	N/A			
Pollution	25	Air Pollution	+/-	Yes	✓	○	※
	26	Water Pollution	+/-	Yes	✓	○	※
	27	Soil Contamination	+/-	N/A	✓	○	※
	28	Solid Wastes (including dredged material)	Disposal of dredged material: Y	N/A	✓	○	※
	29	Noise and Vibration	+/-	Yes	✓	○	※
	30	Ground Subsidence	N/A	N/A	✓	○	※
	31	Offensive Odor	Y	N/A	✓	○	※
	32	Bottom Sediment	N/A	N/A	✓	○	※
	33	Accidents	Public health: +/-	N/A	✓	○	

*EIS(1998) did not use JICA's method to evaluate the impact using A,B,C, and D.
**Phase II did not weight impact but merely noted its possibility.

+/-; Minor impact, N/A: Not discussed, Y: A need of concern was mentioned in discussion but not kept in Scoping matrix.

○: Secondary data, general information, literature/published data
◎: Data collected from primary sources or by actual measurements

Remark※: Data from primary sources or by actual measurements are needed just before construction starts.
Remark (1): "Poor, Indigenous and Ethnic people" is one of new items of concern of JICA Guidelines (2010).
Remark (2):"Gender" is one of new items of concern of JICA Guidelines (2010).

2.3.2 Public Consultation and Scoping

The JICA Guidelines require that "Consultations with relevant stakeholders, such as local residents, should take place if necessary throughout the preparation and implementation stages of a project. Holding consultations is highly desirable, especially when the items to be considered in the EIA are being selected (in scoping session), and when the draft report is being prepared (Appendix 2 of JICA Guidelines)".

(1) Public Consultations

The scoping of the Project was done through several consultation meetings in 1998 when EIS(1998) was prepared.

a) 1st Consultation

An initial scoping session was held with DPWH-NCR office in February 26, 1998, prior to the scoping session which was opened to other stakeholders. The initial scoping session was carried out by DPWH, JBIC SAPROF Study Team, and representatives of DENR-NCR EIA division. The purpose of the initial scoping session was to obtain DENR's concerns which must be addressed in the EIS. A scoping matrix being prepared by JBIC SAPROF Study Team was used as a base of the discussion.

b) 2nd Consultation

The second scoping session was held on February 27, 2008 with concerned government agencies, LGUs, and NGOs in DPWH Training Room. In this session, various concerns and suggestions were given to the DPWH and SAPROF Team. The participants were from DPWH, SAPROF Team, MMDA, NGOs and other interest groups.

c) Other Meetings

In addition to the two aforementioned consultation meetings, a KICK-OFF MEETING (February 11, 1998), a STEERING COMMITTEE MEETING (April 20, 1998), and a SEMINAR (May 10, 1998) were held, mostly for government agencies and other interest groups.

Most of the concerns of all of the above meetings were regarding social and environmental impacts via dredging activities, affects on Laguna Lake and Manila Bay by operation of MCGS, and informal settlers situating along the Project sites (the Pasig-Marikina River

and Mangahan Floodway). Through the scoping session, a scoping matrix was formed for major concerns that were raised by the attendances.

As DAO 96-37 ordered, and as the DENR emphasized in the initial scoping meeting public participation, obtaining full support from the public is very critical to carrying out the Project successfully. However, names of Barangay captains and ordinary persons who live in the areas where the Project takes place and might be relocated for the Project were not listed on the attendance sheets.

Although two consultation meetings were held (which was the minimum number of meetings required by the World Bank's standard), none of them were about the EIS Final Report.

(2) Scoping

Both the possible positive and negative significant environmental impacts were identified through the scoping sessions. Agreed-upon items of concern with possible negative impacts were (1) dredging activities, (2) construction of the river improvement works along the banks (construction of revetments and river walls), (3) construction of the MCGS, (4) operation of the MCGS, and (5) operation of the Rosario Weir.

(3) Information Disclosure

DAO 2003-30, Section 5.3 defines a public hearing as part of EIS review, i.e. information disclosure. For those who did not participate in public hearings and scoping sessions, DAO 97-24 assures the provision of "public access to all official data or information". However, the general public faces difficulty in accessing EIS Reports because DAO 97-24 Section 3.1.5 treats some of these reports as "Confidential" and forbids the their review.

There is weak evidence in the EIS(1998) regarding the social and environmental concern were disclosed properly and adequately in accordance with JICA guidelines:

(1) An information dissemination meeting was held at the Bayview Hotel in Manila in 1998. Most of the people who attended the meeting were those of the government agencies, LGUs, ADB, and SAPROF. No residents of areas affected by the project were included.

(2) The EIS (1998) was written in English which is a official language of the Philippines. Since most of the people living in the Project affected Area use either non-English (52% Households in directly affected area use only Tagalog) or a mixture of some English (48% use mixture of Tagalog or Filipino and non-standard English) with native tongue, it is deemed to be not easily accessible to the information in the EIS.

2.3.3 Summary of Current Baseline Status of Natural and Social Environment

The followings are the summary results for current baseline status of main environmental items found out during this supplemental study.

(1) Natural Environment (Secondary Data)

- Chromium, copper, mercury, nickel, and zinc are highest in the sediment samples taken at Vargas Bridge in the lower Marikina River. However, these values are lower than reference values such as natural sediment quality of State of Washington and mostly satisfy environment values of Canada and the Netherlands.
- No rare, protected, nor endanger species are reported in the project-affected area.
- Noise and air pollution from construction machinery/equipment seem to be no higher than back ground levels in the project-affected area..
- Spatially and temporally, water quality in the middle of the Pasig River tends to be poorer than that of the Marikina River and the lower Pasig River.

- The pollutants of most concern are BOD, Total Coliform, and Oil and Grease, which are originated usually from daily-life living activities.
- Pollution levels of the heavy metals in the river mostly equally distributed. Cadmium and Chromium tend to exceed Class C water standard level.

(2) Social environment (Interview and Secondary Data)

- Large numbers of Project Affected Peoples (PAPs) who are informal settlers and needed to be relocated.
- LGUs are not measuring up to their Land Use Plan (CLUP); uncontrolled land use is still practiced. The land use plan is very incompatible and its execution is relaxed.
- Pasig City, which is located along the lower Marikina River, is transitioning from a manufacturing- and industry-oriented city to a commerce- and business-oriented city.
- An insignificant amount of agricultural land and no fisheries exist in the project affected area.
- No PAPs depend their incomes and living on the river.
- No socially, historically, culturally or religiously significant sites are located in the project directly affected area.
- No vulnerable indigenous people groups exist.
- Most of residents in the project affected area along the Lower Marikina River are not aware of Phase III Project.
- Gender issues seem less likely to be caused by the construction work.
- PAPs are less sick than the national average.

CHAPTER 3 CURRENT LEGAL FRAMEWORK FOR ENVIRONMENTAL AND SOCIAL CONSIDERATIONS IN THE PHILIPPINES

3.1 Overall Legal Framework

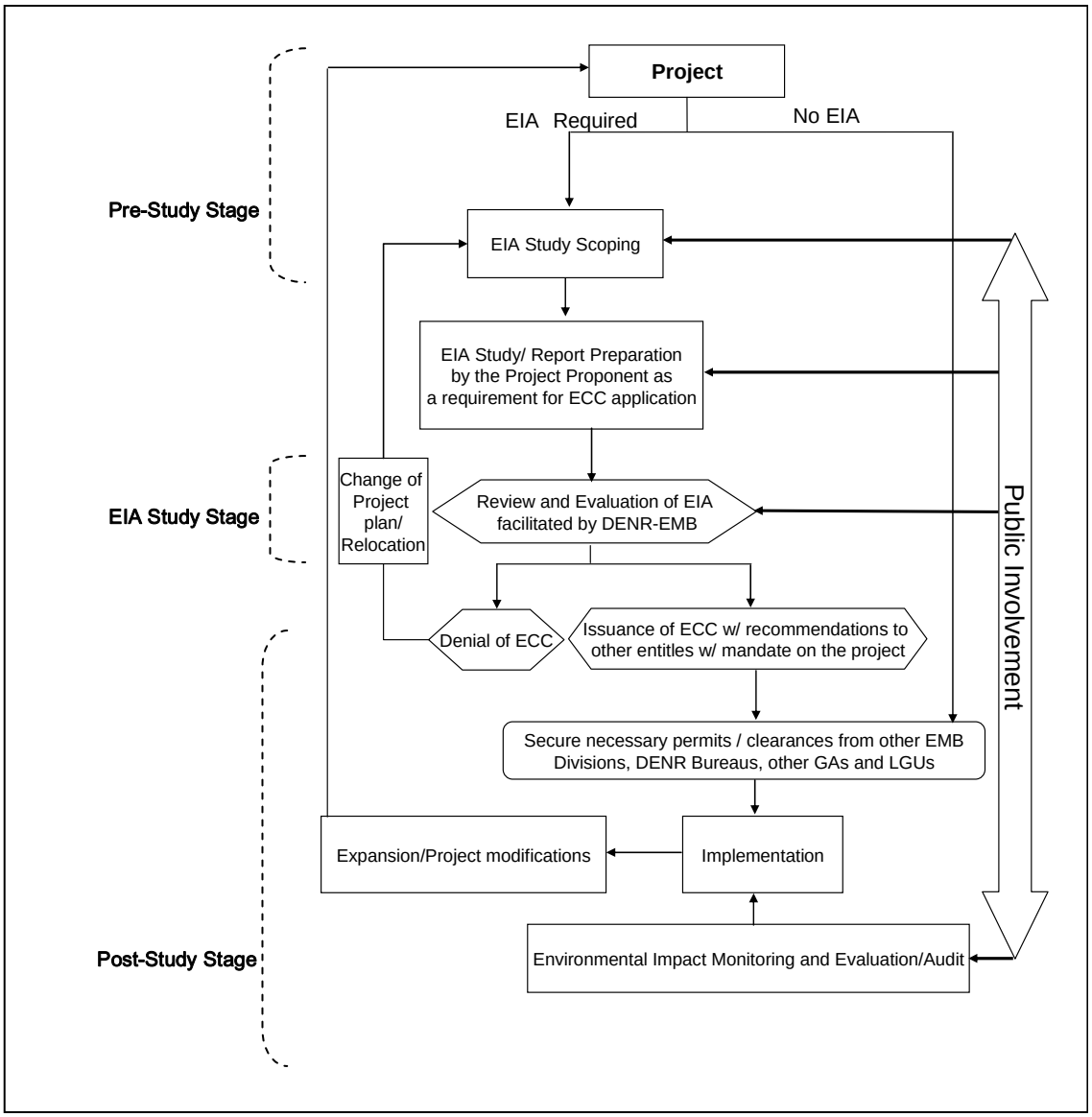
In the Philippines, any private or public projects or activities which are envisaged to potentially have a negative impact on the environment are subject to EIA by Philippine Environmental Impact Statement System (PEISS). The EIA is the preliminary analysis of the potential impacts of the project on the environment. Aware of the possible negative effects of the implementation of industrial and other activities, the Philippine Government has instituted measures to encourage the use of EIA as a planning and decision making tool.

PEISS is a set of laws, regulations, administrative orders and guidelines concerned with Environmental Impact Assessment. The following are some of the most important of these laws and guidelines:

- Environmental Impact Statement System (EISS), Presidential Decree No. 1586 (1978): An act establishing and centralizing the Environmental Impact Statement (EIS) System under the National Environmental Protection Council (NEPC), which merged with the National Pollution Control Commission (NPCC) in June 1987 to become the Environmental Management Bureau (EMB).
- Presidential Proclamation No. 2146 (1981) and No. 803 (1996): It proclaims Environmentally Critical Projects (ECPs) to have significant impact on the quality of environment and Environmentally Critical Areas (ECAs) as environmentally fragile areas within the scope of the EIS System.
- DAO 96-37 revised to become DAO 92-21: Devolved responsibility for EIS to the EMB-Regional Office and further strengthened the PEISS. Placed emphasis on promoting maximum public participation in EIA process to validate the social acceptability of the Project.
- DENR Administrative Order No. 30 Series of 2003 (DAO 03-30), Revised Procedural Manual (2007): Provides for implementation of rules and regulations of Presidential Decree No. 1586, establishing PEISS. Also, provided detailed definitions of technical terms and detailed information regarding procedures, related laws and regulations.

3.2 Procedures

The procedures of EIA can be grouped into the following stages as shown in the following diagram: (1) pre-study stage (screening and scoping), (2) EIA study stage and (3) post-study stage (review, decision-making and monitoring).



Source: Revised Procedural Manual for DENR Administrative Order No. 30 Series of 2003 (DAO 03-30)(2007)

Figure 3.1 Summary Flowchart of EIA Process

3.3 Projects Covered by PEISS

Projects which have been originally declared to be Environmentally Critical Projects (ECPs) or projects in Environmentally Critical Areas (ECAs) are assumed to have significant impact on the quality of the environment and to be subject to PEISS. The four (4) ECP project types and twelve (12) ECA categories have been declared through Proclamation No. 2146 (1981) and Proclamation No. 803 (1996), as summarized below.

Table 3.1 Summary of Environmentally Critical Projects (ECPs)

Main Categories	Sub Category
A. Golf Course Project	Golf course projects/complex
B. Heavy Industries	Iron and Steel Metals Non-ferrous Metal Industries Petroleum and Petrochemical Industries Smelting Plants
C. Resource Extractive Industries	Fishery Projects (fishery-related dikes and fishpond development projects) Forestry Projects Major mining and quarrying projects
D. Infrastructure Projects	Major Dams Major Reclamation Projects Major Power Plants (Proc No. 2146 declared types: fossil-fueled, nuclear fueled, hydroelectric or geothermal)

Source: Revised Procedural Manual for DENR Administrative Order No. 30 Series of 2003 (DAO 03-30)(2007)

Table 3.2 Summary of Environmentally Critical Areas (ECAs)

ECA Categories	Examples
A. Areas declared by law to be national parks, watershed reserves, wildlife preserves, and sanctuaries	- Areas of the National Integrated Protected Areas System (NIPAS)
B. Areas set aside as aesthetic, potential tourist spots	- Areas declared and reserved by the Department of Tourism or other authorities for tourism development
C. Areas which constitute the habitat for any endangered or threatened species of indigenous Philippine wildlife (flora and fauna)	- Areas inhabited by indeterminate species, threatened species, rare species, endangered species, such species categorized as Appendix I or II of CITES as well as those listed in the National List of Threatened Fauna
D. Areas of unique historic, archeological, geological, or scientific interests	- National historical landmarks, geological monuments, paleontological and anthropological reservations as designated or determined by the National Historical Institute, National Museum, National Commission for Culture and the Arts, National Commission on Geological Sciences, and other authorities
E. Areas which are traditionally occupied by cultural communities or tribes	- Areas that are occupied or claimed as Certificated Ancestral Domains/Lands by indigenous communities
F. Areas frequently visited and or hard-hit by natural calamities (geologic hazards, floods, typhoons, volcanic activity, etc.	- Areas frequently visited or hard-hit by typhoons - Areas frequently visited or hard-hit by tsunamis - Areas frequently visited or hard-hit by earthquakes - Storm surge-prone areas - **Flood-prone areas** - Areas prone to volcanic activities - Areas located along fault lines or within fault zones - Drought-prone areas
G. Areas with critical slope	- Lands with slope of 50% or more - Alienable and disposable forest lands and unclassified forests
H. Areas classified as prime agricultural lands	- Irrigated and irrigable areas and other areas mapped under the Network of Protected Areas for Agriculture (NPAA) of the Bureau of Soils and Water Management (BSWM)
I. Recharged areas of aquifers	- Areas of sources of water replenishment
J. Water bodies	- Areas that are tapped for domestic purposes - Areas which support wildlife and fishery activities
K. Mangrove Areas	- Tidal areas covered by salt-tolerant, intertidal tree species - Areas declared as mangrove swamp forest reserves
L. Coral Reefs	- Areas characterized by the assemblage of different types of marine plants and organisms - Areas identified by local sources such as PAWB-DENR to be rich in corals.

Source: Revised Procedural Manual for DENR Administrative Order No. 30 Series of 2003 (DAO 03-30)(2007)

The proposed Project belongs to the infrastructure category in the Table 3.1 (ECPs). However, this Project is not included in the sub-category of Table 3.1. On the other hand, in Table 3.2 for ECAs, this Project is included in Category F.

3.4 Responsible Government Institutions for PEISS

Review and supervision of PEISS are conducted by the Environmental Management Bureau (EMB) of Department of Environment and Natural Resources (DENR). The respective organization chart of DENR is shown below:

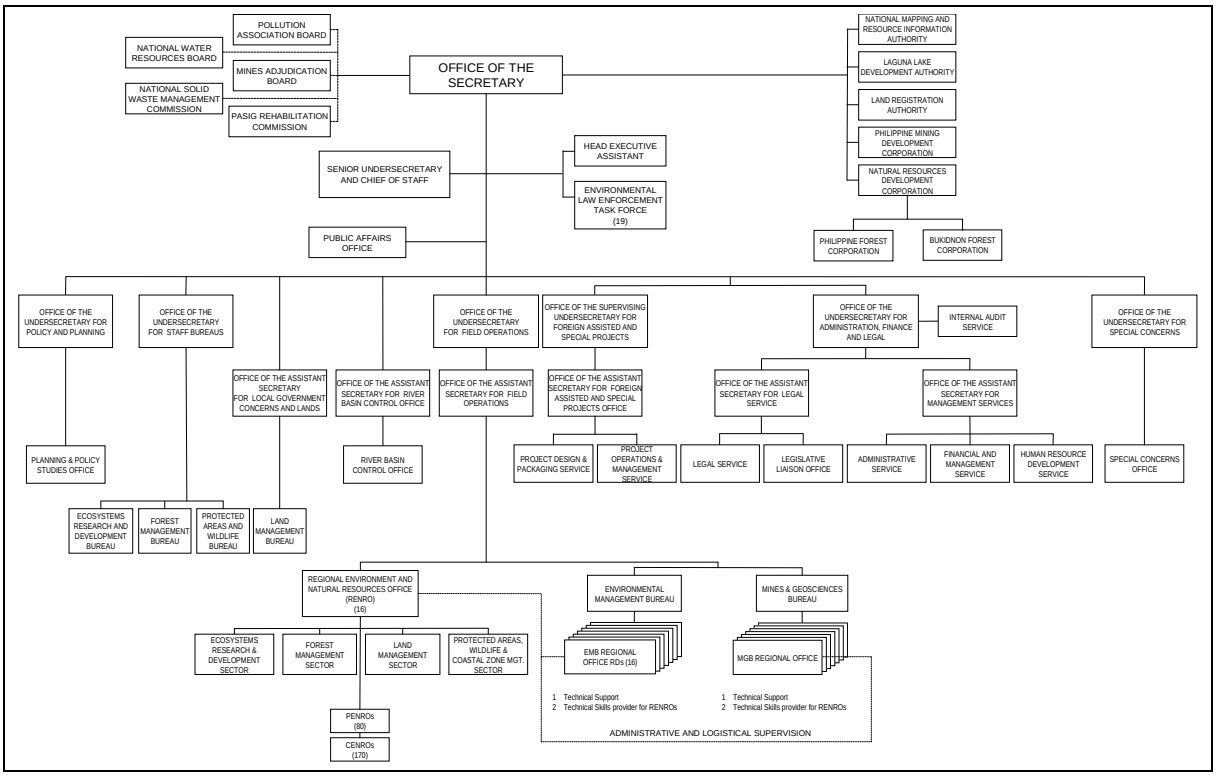


Figure 3.2 Organization Chart of DENR

The DENR is the government entity which is designated to handle issues related to the following five tasks as described in pertinent legislation:

- Assure the availability and sustainability of the country's natural resources through judicious use and systematic restoration or replacement, whenever possible;
- Increase the productivity of natural resources in order to meet the demands for forest, mineral, and land resources of a growing population;
- Enhance the contribution of natural resources for achieving national economic and social development;
- Promote equitable access to natural resources by the different sectors of the population;
- Conserve specific terrestrial and marine areas representative of the Philippine natural and cultural heritage for present and future generations.

Under the framework of PEISS, the EMB is responsible for the issuance of decision making documents such as Environmental Compliance Certificate (ECC), Certificate of Non-Coverage (CNC) and Denial Letter. Also, the EMB Regional Offices in respective regions are primarily responsible for the supervision of development projects and conducting consultation related to such projects.

The following shows the organization chart of EBM:

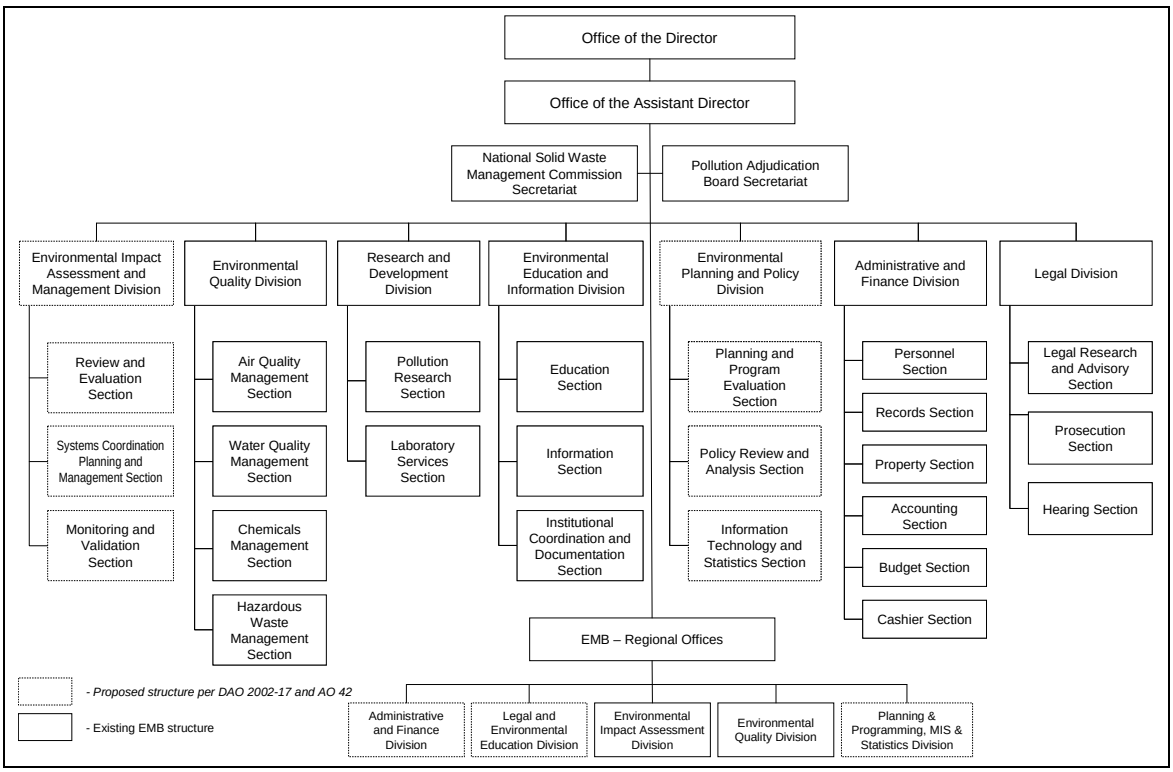


Figure 3.3 Organization Chart of EMB

3.5 Required Documents under PEISS

To help with identifying required documents under PEISS for consultation and decision making by DENR-EMB, projects are classified into five major groups as summarized below.

Table 3.3 Project Groups for EIA under PEISS

Group	Definition
I	Environmentally Critical Projects (ECPs) in both Environmentally Critical Areas (ECAs) and Non-Environmentally Critical Areas (Non-ECAs)
II	**Non-Environmentally Critical Projects in Environmentally Critical Areas**
III	Non-Environmentally Critical Projects in Non-Environmentally Critical Areas.
IV	Co-located projects in either Environmentally Critical Areas (ECAs) or Non-Environmentally Critical Areas (Non-ECAs); A group of single projects, under one (1) or more Proponents/Locators, which are located in a contiguous area and managed by one (1) Administrator, who is also the ECC Applicant (e.g., Economic Zones)
V	Unclassified projects which are not listed in any of the groups above, e.g., projects using new processes/ technologies with uncertain impacts (interim category)

Source: Revised Procedural Manual for DENR Administrative Order No. 30 Series of 2003 (DAO 03-30)(2007)

The Pasig-Marikina River Channel Improvement Project which is not ECP but of ECA is considered to be Group II. The Group II Project is required to submit the following documents to the DENR-EMB:

- Environmental Impact Statement (EIS),
- Initial Environmental Examination Report (IEER),
- Initial Environmental Examination Checklist (IEEC), and

- Project Description Report (PDR).

All documents should be prepared by the project proponent and submitted to the EMB Central Office or the Environmental Impact Assessment Division in respective EMB Regional Office. The outcome of the EIA Process within PEISS administered by the DENR-EMB is the issuance of decision documents. A decision document may either be an ECC, CNC or a Denial Letter, described below. The PDR is important for some of the implementation of Group II and Group III projects, which do not foresee adverse impact, to secure eventual issuance of a CNC.

(1) EIA Proponent

The proponent agency of this Project is the Department of Public Works and Highways (DPWH). The DPWH has the responsibility for preparation and submission of the PEISS. DPWH usually establishes a Project Management Office (PMO) prior to feasibility studies and the PMO prepares the PEISS. Once the project execution starts, PMO has responsibilities for implementation of environmental and social considerations such as land acquisition and resettlement in cooperation with local government units. The Environmental Social Services Office (ESSO), in the Development Planning Division of the DPWH, is responsible for supporting and supervising preparation of PEISS.

(2) Environmental Compliance Certificate (ECC)

An ECC is issued as a certificate of Environmental Compliance Commitment, to which the proponent conforms with after DENR-EMB explains the ECC conditions.

(3) Outline of Required Documents by PEISS

The following is the outline of the EIS according to *Revised Procedural Manual* of DENR Administrative Order No. 30 Series of 2003:

Table 3.4 EIS Outline

Project Fact Sheet
Table of Contents
Executive Summary
1) Brief Project Description
2) Brief Summary of Project's EIA Process
3) Summary of Baseline Characterization
4) Summary of Impact Assessment and Environmental Management Plan
5) Summary of Environmental Monitoring Plan
6) EMF and EGF Commitments
DRAFT MAIN EIS
1. BASIC PROJECT INFORMATION
2. DESCRIPTION OF THE PROJECT'S EIA PROCESS
2.1. Terms of Reference of the EIA Study
2.2. EIA Team
2.3. EIA Study Schedule
2.4. EIA Study Area
2.5. EIA Methodology
2.6. Public Participation
3. PROJECT DESCRIPTION
3.1. Project Location and Area
3.2. Project Rationale
3.3. Project Alternatives
3.4. Project Development Plan, Process/Technology Options and Project Components
3.5. Description of Project Phases (Activities/Environmental Aspects, Associated Wastes and Built-in Pollution Control Measures)
3.5.1. Pre-construction/ Pre-operational phase
3.5.2. Construction/Development phase
3.5.3. Operational phase
3.5.4. Abandonment phase
3.6. Manpower Requirements
3.7. Project Cost
3.8. Project Duration and Schedule
4. BASELINE ENVIRONMENTAL CONDITIONS, IMPACT ASSESSMENT AND MITIGATION
4.1. The Land (Discuss only relevant modules)
4.1.1. Land Use and Classification
4.1.2. Pedology
4.1.3. Geology and Geomorphology

4.1.4. Terrestrial Biology 4.2. The Water (Discuss only relevant modules) 4.2.1. Hydrology & Hydrogeology 4.2.2. Oceanography 4.2.3. Water Quality 4.2.4. Freshwater Biology 4.2.5. Marine Biology 4.3. The Air (Discuss only relevant modules) 4.3.1. Meteorology 4.3.2. Air Quality and Noise 4.4. The People 5. ENVIRONMENTAL RISK ASSESSMENT (WHEN APPLICABLE) 6. ENVIRONMENTAL MANAGEMENT PLAN 6.1. Impacts Management Plan 6.2. Social Development Framework 6.3. IEC Framework 6.4. Emergency Response Policy and Generic Guidelines 6.5. Abandonment /Decommissioning /Rehabilitation Policies and Generic Guidelines 6.6. Environmental Monitoring Plan 6.6.1. Self-Monitoring Plan 6.6.1. Multi-sectoral Monitoring Framework 6.6.1. Environmental Guarantee and Monitoring Fund Commitment 6.7. Institutional Plan for EMP Implementation 7. BIBLIOGRAPHY/REFERENCES 8. ANNEXES 8.1. Scoping Checklist 8.2. Original Sworn Accountability Statement of Proponent 8.3. Original Sworn Accountability Statement of Key EIS Consultants 8.4. Proof of Public Participation 8.5. Baseline Study Support Information 8.6. Impact Assessment and EMP Support Information

Source: Revised Procedural Manual for DENR Administrative Order No. 30 Series of 2003 (DAO 03-30)(2007)

(4) Public Participation in EIA Process

(a) Information, Education and Communication (IEC) and Public Scoping

One of operating principles of the PEISS is to make accurate disclosure of relevant information by Project Proponents and other stake holders in the EIA process. DENR Administrative Order No. 30 Series of 2003 (DAO 03-30) states that Information, Education and Communication (IEC) of Local Government Unit (LGU) is required at the minimum of EIS-based applications as part of the social preparation process at Pre-Scoping. In fact, the IEC serves as a basis for preliminary identification of stakeholders and related issues in preparation for the Public Scoping.

For EIS-based applications, Public Scoping is one of the processes to obtain community inputs prior to the technical scoping of EIA Review Team with the proponent, conducted before signing-off of the Scoping Checklist mentioned, which comprises the final TOR of the EIA Study.

(b) Public Hearing/Consultation

With an aim of disclosure of the EIA findings, Public Hearings shall be implemented for EIS-based applications as well as for Environmental Critical Projects (ECP) for which Public Scoping was undertaken. A wavier of the Public Hearing requested by the Proponent may be granted by the DENR-EMB if there is no mounting opposition or written request for one with valid basis. In such cases, a Public Consultation might be conducted instead.

The notice of Public Hearing shall provide explicit instructions for registration, access to the EIA report, preparation of position papers, and on mechanics regarding how issues may be received before or during the hearing. Prior to Public Hearings or Public Consultations, the proponent is required to give copies of the EIA report and relevant documents to EMB regional offices, LGUs and other stakeholders for a well-informed participation in the hearing/consultation process.

(c) Participation of Indigenous Peoples for decision-making process

In 2006, NCIP Administrative Order No.1, namely, the Free and Prior Informed Consent (FPIC) guidelines, was promulgated by the National Commission of Indigenous People (NCIP). The objective of the guideline is to ensure genuine participation of Indigenous Cultural Communities (ICC) and Indigenous Peoples (IPs) in decision-making as well as to protect the rights of ICCs/IPs in the introduction and implementation of activities that will impact upon their Ancestral Domains/Lands (ADs/ALs).

Also, the guideline details the process for conducting Field Based Investigation (FBI) and obtaining the Certification Precondition from the NCIP attesting that the applicant has complied with the requirements for securing the affected ICC/IP's FCIP. It is required for the EIS (Environment Impact Statement)-based projects which can affect the ADs to follow the FCIP procedures.

NCIP regional office is responsible for receiving applications for the issuance of Certificate Precondition as well as implementing FBI and overseeing the process to obtain the FPIC from the IPs/ICCs.

(5) Laws and Regulations Concerning Environmental Standards

(a) Environment Code (Presidential Decree No. 1152)

Known as the Philippine Environment Code, it launches a comprehensive program on environmental protection and management. It also provides for air, water quality, land use, natural resources and waste management for fisheries and aquatic resources; wildlife; forestry and soil conservation; flood control and natural calamities; energy development; conservation and utilization of surface and ground water and mineral resources.

(b) Water Code (Presidential Decree No. 1067)

A decree instituting a water code which revises and consolidates the laws governing the ownership, appropriation, utilization, exploitation, development, conservation and protection of water resources.

(c) Clean Water Act (Republic Act 9275)

An Act which aims to protect the country's water bodies from pollution from all possible sources (industrial, commercial, agricultural and household activities). It provides for a comprehensive and integrated strategy to prevent and minimize pollution through a multi-sectoral and participatory approach involving all the stakeholders.

(d) Clean Air Act of 1999 (Republic Act No. 8749)

An Act which lays down policies to prevent and control air pollution. The act sets standards for exhaust emission from vehicles, manufacturing plants and so on. All potential sources of air pollution must comply with the provisions of the Act. As such, all emissions must be within the air quality standards set under the law. It also imposes the appropriate punishments for violators of the law.

(e) Ecological Solid Waste Management Act (Republic Act No. 9003 in 2000)

An Act providing for an ecological solid waste management program, creating the necessary institutional mechanisms and incentives, declaring certain acts prohibited, providing penalties, and appropriating funds therefore, and for other purposes.

(f) Pollution Control Law (Presidential Decree No. 984)

An Act that serves as the foundation for managing industrial activities impacting air and water quality. It empowers the DENR to impose ex-parte cease and desist orders

(CDO) on the grounds of immediate threat to life, public health, safety or welfare, or to animal or plant life when wastes or discharges exceed the normal amounts.

(g) Forestry Reform Code (Presidential Decree No. 705)

The Forestry Reform Code of the Philippines recognizes that there is an urgent need for proper classification, management and utilization of the lands of the public domain to maximize their productivity to meet the demands of the increasing population of the Philippines. It surmises that to achieve the above purpose, it is necessary to reassess the multiple uses of forest lands and resources before allowing any utilization to optimize the benefits that can be derived. It also emphasizes not only the utilization, but even more so the protection, rehabilitation and development of forest lands to ensure the continuity of their productive condition.

(h) National Integrated Protected Areas System (Republic Act No. 7586)

An Act that aims to protect and maintain the natural biological and physical diversities of the environment, notably areas with biologically unique features to sustain human life and development as well as plant and animal life. It establishes a comprehensive system of integrated protected areas within the classification of national parks as provided for in the Constitution to secure for the Filipino people of present and future generations the perpetual existence of all native plants and animals. It encompasses (1) outstandingly remarkable areas and biologically important public lands that are habitations of rare and endangered species of plants and animals, (2) bio-geographic zones and (3) related ecosystems, whether terrestrial, wetland or marine.

(6) Laws and Regulations Concerning Solid Waste Management and Disposal

(a) Presidential Decrees (PD) No.825 (1975), PD No.856(1975), and PD No.1152

Presidential Decree (PD) No.825 (1975), PD No.856(1975), and PD No.1152 regulate safe and responsible disposal of solid and liquid wastes, LGU's responsibility on waste management, and treatment methods.

(b) An Act to Control Toxic Substances and Hazardous and Nuclear Wastes, Providing Penalties for Violations thereof , and for their Purposes, Republic Act (RA) 6969 (1990)

(c) MMDA Regulation No.96-009 (August 22, 1996)

Prohibiting littering/dumping/throwing or garbage, rubbish or any kind of waste in open or public places, and requiring all owners, lessees, occupants of residential, commercial establishments, whether private or public to clean and maintain the cleanliness of their frontage and immediate surroundings and providing penalties for violation thereof.

(d) MMDA Regulation No.99-009 (August 22, 1999)

Amending MMDA Regulation No.96-009 in order to differentiate dumping from littering to determine the appropriate imposable penalties thereof and address the problem on how to immediately dispose the junk vehicles which have been causing traffic congestion in many roads in the metropolis.

(e) DAO 36 Series of 2004 (DAO 04-36)

DAO 04-36 is a procedural manual of DAO 92-29, a comprehensive documentation on the legal and technical requirements of hazardous waste management.

CHAPTER 4 SUPPLEMENTAL STUDY

4.1 Scope of Supplemental Study

Thirteen years have passed since the EIS(1998) was prepared. Hence the social and environmental situations in location for the Phase III of the Project are naturally and socially anticipated to change. Such changes might be or might be not affect appropriateness of the environmental impacts and the Environmental Management Plan (EMP) developed in 1998. In order to prepare the way for the next phase of the Project, the important social and environmental criteria have to be identified and their integrity be confirmed according to JICA Guidelines, which also refer to World Bank's O.P. 4.01. Key points of the investigation are as follows:

- Focusing on areas directly impacted by construction works of Phase III, which may cause some possible negative impacts.
- Focusing on the current conditions of social and environmental criteria for which concern should be given according to JICA Guidelines, and
- Updating and adding some information that are used to measure social and environmental impacts during the construction stage of Phase III.

4.2 Physical Environment

4.2.1 Area of Concern

Barangays that are facing directly to the Phase III area of the lower Marikina River are chosen as a directly affected area by the Project. These Barangays are shown within the boundary line in Figure 4.1.

Figure 4.1 Barangays along the Lower Marikina River

For the Pasig River area, study and mitigation measures II has been undertaken under the ongoing construction of Phase II by the DPWH, Consultant and Contractors. The compliance with ECC for Phase II has been monitored and ensured by the established Multiparty Monitoring Team (MMT).

The existing environmental sampling and monitoring locations, including air quality, noise and vibration in the Phase II are shown in Figure 4.2 below:

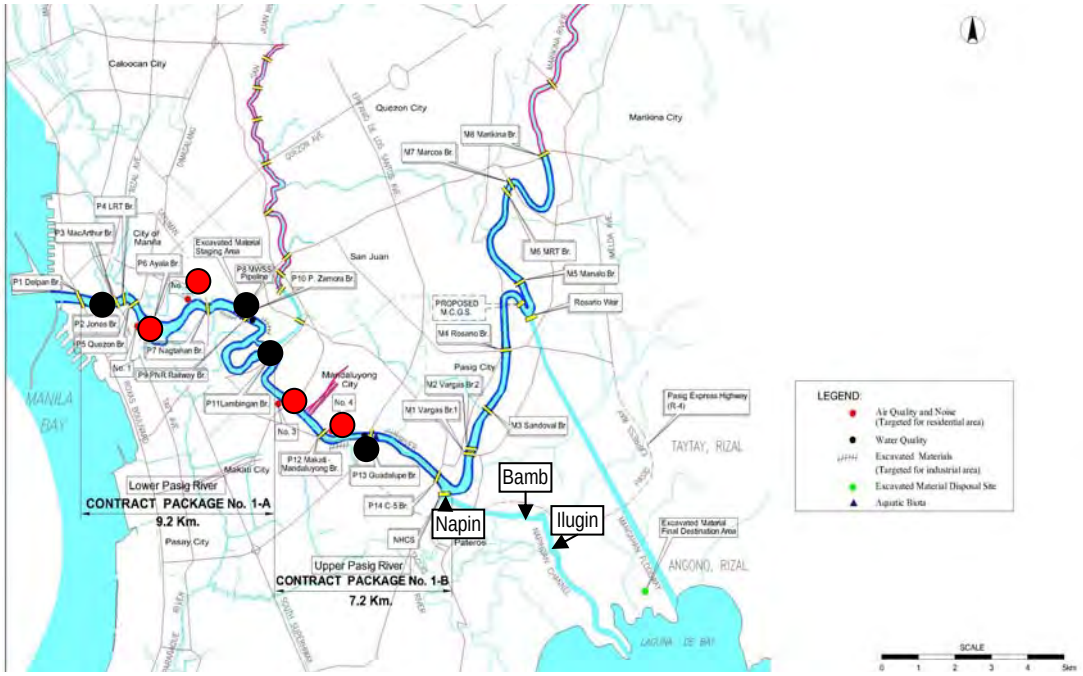


Figure 4.2 Existing Environmental Sampling and Monitoring Locations of Ongoing Construction of Phase II

4.2.2 Air Quality, Noise, and Vibration

Pollution levels of air, noise, and vibration in the ongoing construction sites of Phase II have been monitored from 2009. Construction equipment and traffic are the major causes of air pollution and noise at the construction site. Since the Phases II and III use the almost same or similar equipment, the monitoring results of Phase II can be applicable to assess the impact of proposed Phase III activities.

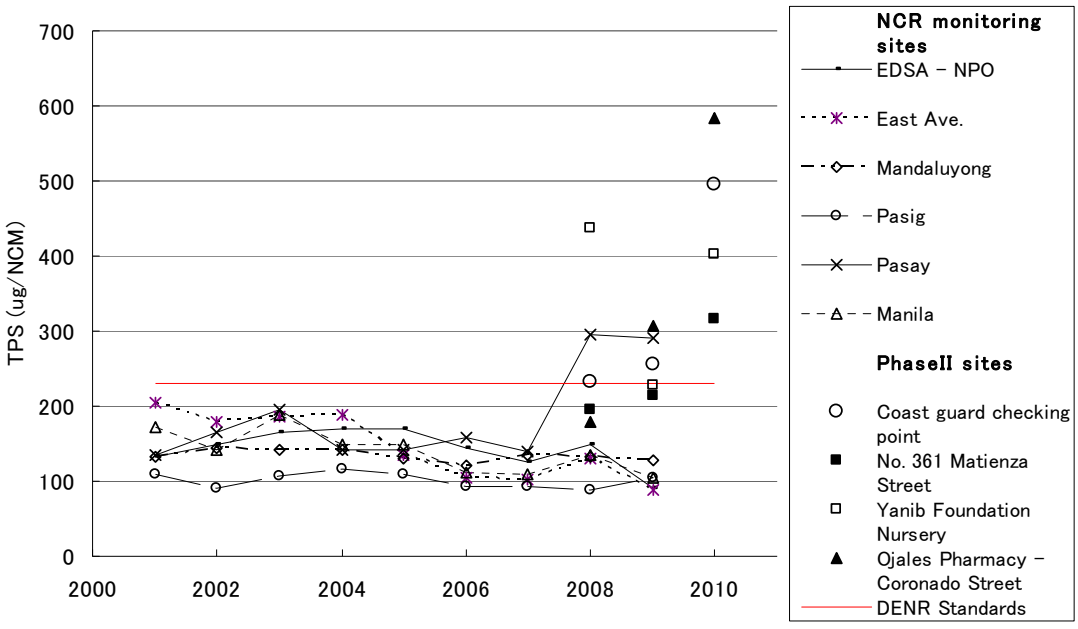
(1) Air Quality

Air pollution levels in residential areas nearby the construction sites are clearly higher than those of NCR monitoring stations. However, it is impossible for one or two pieces of heavy machinery at one construction site to emit substantial amount of pollutants. Although the main cause of the air pollution is most likely caused by daily economic activities, regular monitoring must be performed continuously.

Table 4.1 DENR National Ambient Air Quality Guideline for Criteria Pollutants

Pollutant	Short Term		(a)	Long Term		(b)
	µg/Ncm	ppm	Ave. Time	µg/Ncm	ppm	Ave. Time
Suspended Particulate Matter (e) - TSP PM -10	230 (f) 150 (g)		24 hours 24 hours	90 60	-- --	1 year (c) 1 year (c)
Sulfur Dioxide (S02) (e)	180	0.07	24 hours	80	0.03	1 year
Nitrogen Dioxide (N02)	150	0.08	24 hours	--	--	--
Photochemical Oxidants As Ozone	140 60	0.07 0.03	1 hour 8 hours	-- --	-- --	-- --
Carbon Monoxide	35 mg/Ncm 10 mg/Ncm	30 9	1 hour 8 hours	-- --	-- --	-- --
Lead (d)	1.5	--	3 mo. (d)	1.0	--	1 year

(a) Maximum limits represented by (98%) values not to be exceeded more than once a year.
(b) Arithmetic Mean
(c) Annual Geometric Mean
(d) Evaluation of this guideline is carried out for 24- hours averaging time and averaged over three moving calendar months.
(e) SO_2 and Suspended Particulates are sampled once every 6-days when using the manual method
(f) With mass median diameter less than 25-50 µm.
(g) With mass median less than 10 µm.



Source: Phase II Semi-Annual Monitoring Report No.4 (January –June 2010)

Figure 4.3 Air Quality: TSP Levels in the Area

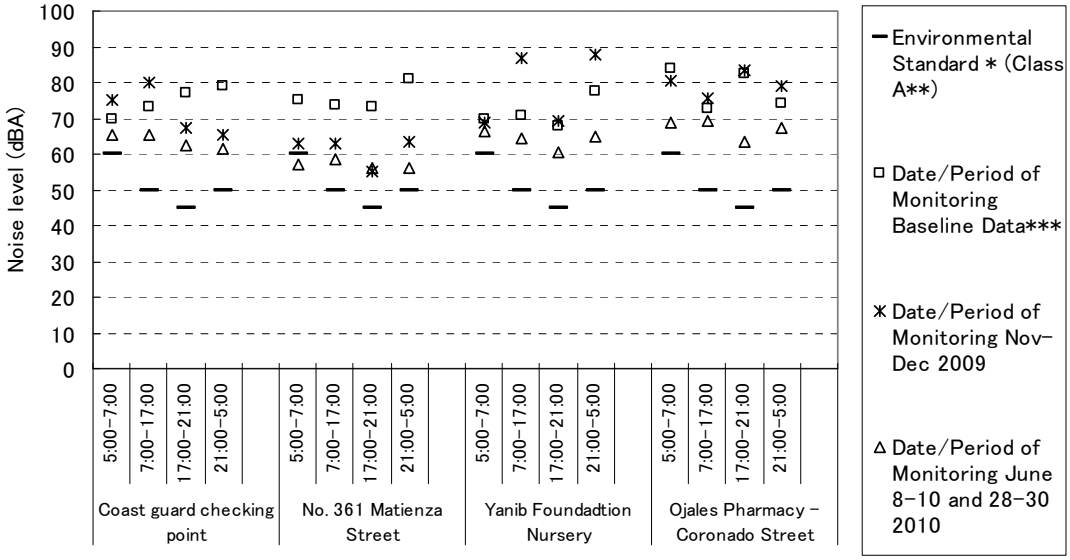
(2) Noise

According to 24-hour noise level monitoring of Phase II in nearby residential areas which are the most affected, noise levels are not necessary highest during day time (7:00 am-17:00 pm) when construction work takes place. This indicates that although construction contributes to noise pollution to some degree, most of the noise is from non-construction related vehicles, passing barges/ferries, and other day-to-day human activities. The following should be noted with regard to noise pollution in affected residential areas:

(a) Piling activity causes most of the noise in the Project, around 97 dBA while it was 83 dBA before piling work started. Although the noise level increases, the piling lasts on average for 10 minutes per piling work session, which is easily acceptable.

(b) Moreover, while it can be noted that Project construction may generate a considerable level of noise, it is considered short-term and therefore minimal in magnitude.

(c) In addition, before starting of the Project construction, the nearby communities were informed beforehand that such construction would be implemented. So far, no complaints from the communities have been reported during Project construction.



***Class A: a section or contiguous area which is primarily used for residential purposes.*

Source: Phase II Semi-Annual Monitoring Report No.4 (January –June 2010)

Figure 4.4 Noise Level around Phase II Construction Sites

Table 4.2 DENR Standards for Noise in General Areas (dBA)

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

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

(3) Vibration

Vibration level caused by a Vibro-Hammer of Phase II ranges from 0.02 to 0.03 mm/sec within 3 meters of the equipment. This is less than 2.5mm/sec applied in Phase II Project which is the limit that would affect properties. Hence the equipment least likely causes vibration hazardous to the residents in the concerned area.

4.2.3 Water Resources

The Pasig-Marikina River originates at the Southern Sierra Madre Mountain, running thru the Luzon Central Plain to Manila Bay. The Napindan River is one of seven major rivers supplying freshwater to Manila Bay from Laguna Lake (Laguna de Bay) through the Pasig River. Although the Pasig-Marikina River is classified as Class C, the water quality and their environment were declared as "biologically not active" in the 1990's.

4.2.4 Water Quality

Overall water quality is better upstream of Marikina River at Marikina Bridge sampling station. BOD, COD, TSS, Nitrates, Phosphates, Total Coliform, and Cadmium show a similar trend: they start with lower levels at Marikina Bridge, then increase toward Vargas Bridge of Lower Marikina River after merging with highly concentrated water from Buayang Bao creek water. The trend more or less remains steady from Guadalupe Ferry Station to Havana Bridge in the Pasig River, and then, after joining the San Juan River, it decreases toward Manila Bay. The reverse trend is observed for DO. Almost all parameters for all sampling locations do not satisfy Class C water quality criteria. Oil, Grease and Heavy Metals (except cadmium) do not display a clear trend.

(1) BOD and DO

The trend of Biological Oxygen Demand (BOD) loading has been rising from 1998 to 2008. Since 2002, BOD levels at most monitoring stations have been exceeding 7mg/L—the Class C river water standard. BOD is low at Marikina Bridge (upstream of the Marikina River) and higher downstream of Havana Bridge—toward Manila Bay (the river mouth of the Pasig-Marikina River).

The Dissolved Oxygen (DO) level trend is decreasing to below 5mg/L, which is below the Class C river water standard. DO level at Marikina Bridge is generally best of all the stations. DO tends to be high at Marikina Bridge, and it drops when moving downstream of Havana Bridge, then increases again when moving toward Manila Bay.

(2) Nutrient Salts

Both Nitrate (NO_3) and Phosphate (PO_4) do not satisfy water quality criteria for Class C level. Nitrate level fluctuates within the 5mg/L range below and above the Class-C level of 10mg/L throughout the rivers. There is no distinguishing difference throughout the Pasig-Marikina River. On the other hand, there is a higher concentration of phosphate between the Guadalupe Bridge and Havana Bridge in the Pasig River and also in the flow from the San Juan River.

(3) TSS and COD

Both Total Suspended Solids (TSS) and Chemical Oxygen Demand (COD) do not satisfy water quality criteria for Class C. General trends of TSS and COD are low in Marikina Bridge, increasing toward Guadalupe Bridge, and mostly leveling out until they finally taper out toward Manila Bay. TSS level is mostly above Class C standard of 30mg/L.

(4) Oil and Grease; Total Conliform

Both Oil and Grease and Total Coliform (TC) do not satisfy River water quality for Class C. The standard for Oil and Grease is 2mg/l and TC is 5,000 MPN/100ml. There is no trend for Oil and Grease, these fluctuate between 1 and 5 mg/L, mostly above Class C level (2mg/L). Total Coliform is mostly between 5000 and $1.36x10^{10}$ MPN/100ml, with a trend increasing toward Guadalupe Bridge then tapering off toward Manila Bay.

(5) Heavy Metals

Chromium (Cr), lead (Pb), and mercury (Hg) do not have a clear trend, but are equally dispersed throughout the Pasig-Marikina River. Cr is between diction limit to 0.5mg/L but mostly greater than 0.05mg/L (Class-C std). Pb and Hg clear Class-C std levels of 0.05 and 0.0005mg/L respectively. Cd levels increase toward the Manila Bay, between 0.01 and 0.02mg/L, mostly around Class-C level of 0.01mg/L.

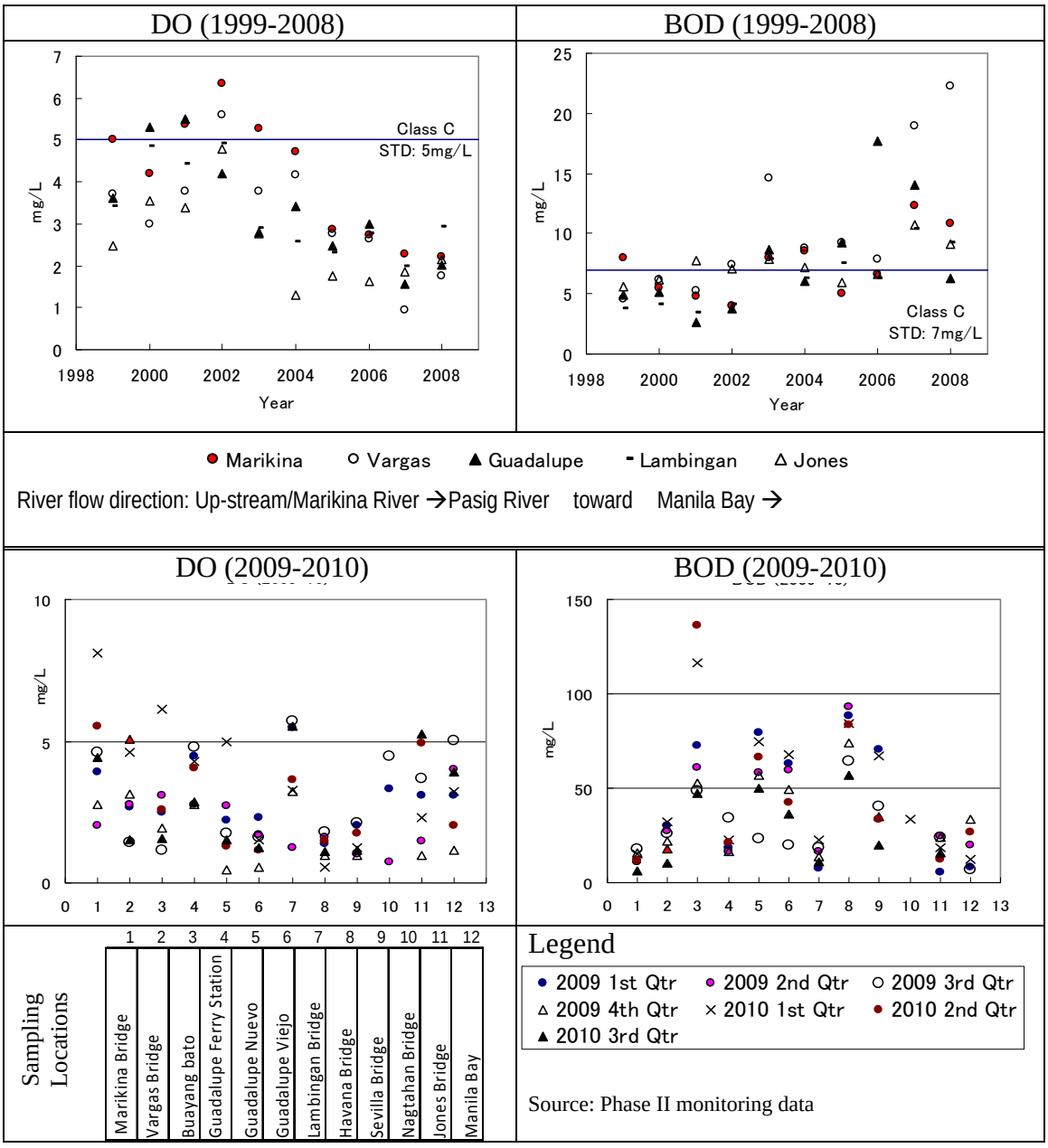


Figure 4.5 Water Quality（DO, BOD）

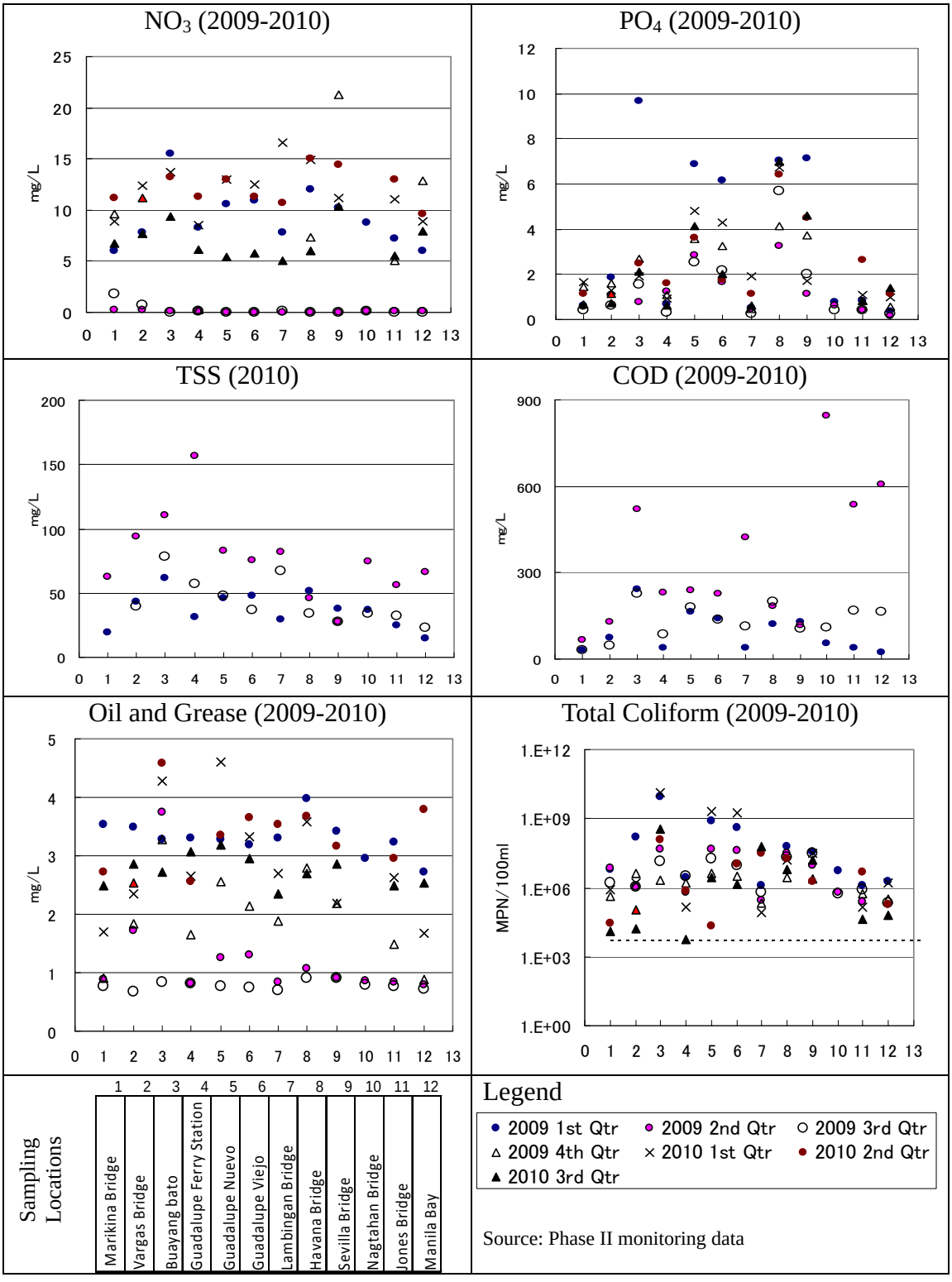


Figure 4.6 Water Quality（NO_3, PO_4, TSS, COD, Oil and Grease, Total Coliform）

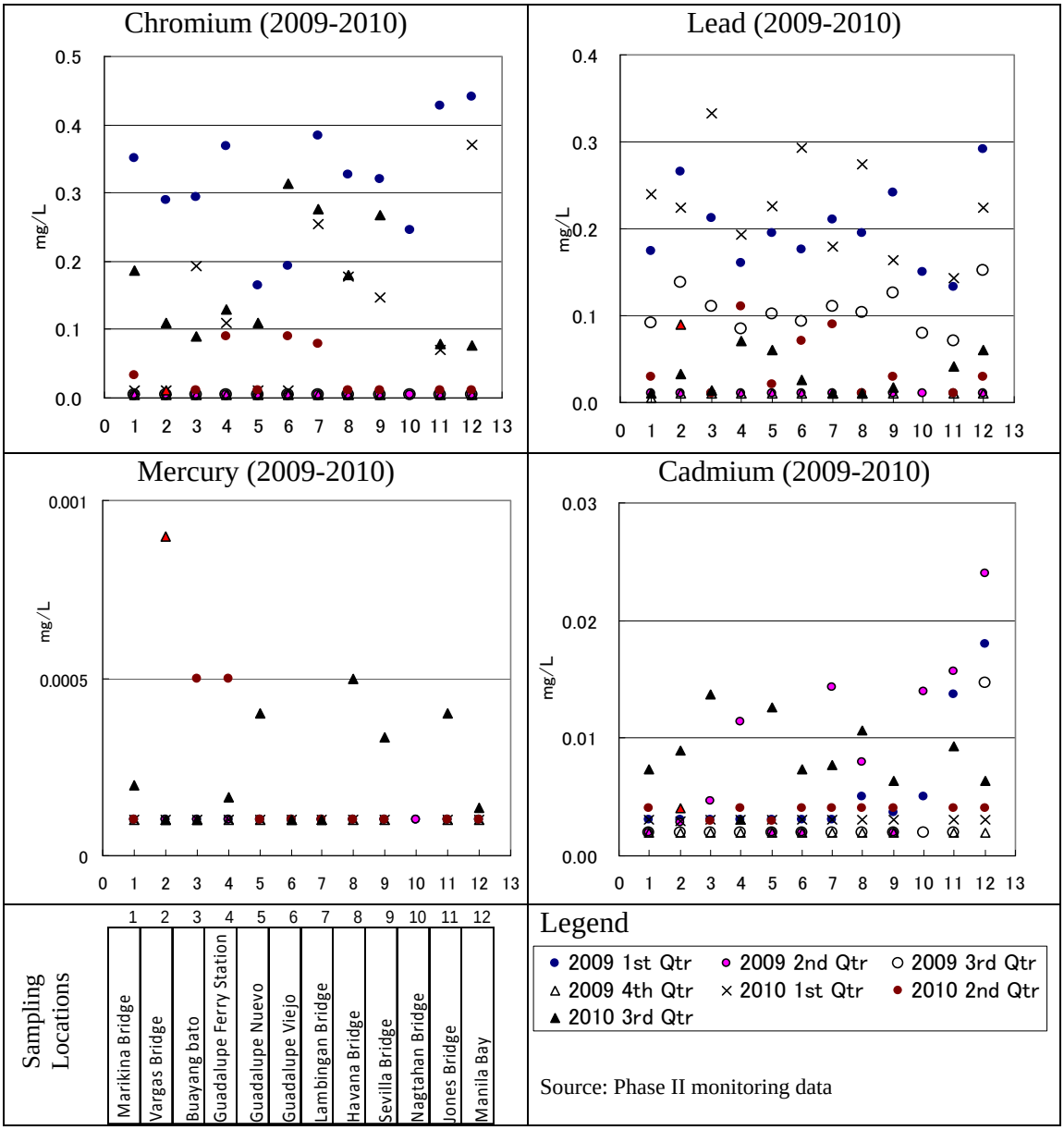


Figure 4.7 Water Quality（Heavy Metals）

4.2.5 Watershed

The cities located along the Pasig-Marikina River belong to the Pasig-Marikina River Basin, which is a sub-basin of the Laguna Lake Watershed, connecting with the existing Mangahan Floodway. The cities' political/administrative boundaries do not match with those of the watershed. The following table shows area coverage of the Pasig-Marikina River Basin.

Table 4.3 Pasig-Marikina River Basin

City/Municipality	Total administrative land area (km2)	Area within the Marikina River Basin (km2)	Administrative area in the basin (%)
Marikina City	23.48	23.48	100
Pasig City	33.77	8.90	26.35
Quezon City	129.84	33.05	25.45
Mandaluyong City	11.3	0.51	4.51
San Jose Del Monte	115.77	11.08	9.57
Rodriguez	360.55	218.58	60.62
Antepolo	293.49	206.52	70.36
San Mateo	53.74	53.74	100

Source: Sewerage Master Plan and Feasibility Study for the Marikina River Basin, (2008) Manila Water Company Inc.

4.2.6 Topology and Geology

The Philippines is situated in and along the Circum-Pacific Volcanic-Earthquake Belt, which is characterized by earthquakes and volcanic activities. General geological trends north to north-west are characterized by the Philippines Fault System and its splay faults, particularly along the Southern Sierra Madre Mountains. Two major faults run through the area: the Marikina Fault and Mont Alban Fault. Marikina Fault runs from northeast to south west, along the Marikina River, and crosses the Pasig River toward Makati City. Marikina Fault separates the valley plain and the plateau/hilly part of Pasig City, and Marikina and Quezon Cities. The Rolling hills part of Quezon City is located in the Marikina Valley, between the Marikina River and higher area with a 9% to 18% slope. Soil type for the area is San Manuel Clay.

The area of concern for the Phase III is mainly composed of three rock formations: Miocene rock, Alata Conglomerate, and Guadalupe Tuff. Guadalupe Tuff is the type that forms the main and visible part of Quezon City, foundation of Navatos, and Marikina Valley, which mostly composed of comminuted vitric volcanic ash with irregularly layered coarse fragments of volcanic pumice. There are alluvium deposit layers on top of the Guadalupe Tuff in the west of Quezon City toward Navotas. Below Alata Conglomerate there is Miocene rock.

Pasig City is located in Marikina Valley, which is composed of about 86% Marikina Clay loam, and about 14% are on the Guadalupe Plateau Zone. Slope of Pasig City is between 0 and 5%, and most Barangays are sloped between 0 to 2%, except Bagong-Ilog, Pineda, Kapitolyo, and Oranbo Barangays. Elevation of Pasig City is 1 m below mean sea level.

Areas of concern in Quezon and Marikina Cities have gentle slopes of between 0 and 2.5% on the relatively flat alluvial plain.

4.2.7 Sediment

(1) Sediment Quality

The Pasig River Rehabilitation Commission (PRRC) and Phase I (in 2001 in the Detailed Design) of this Project have been monitoring the Pasig-Marikina River sediment quality. Since two different testing methods, TCLP and Elutriate Test, were used, data obtained from the monitoring are discussed separately.

(a) Sediment Quality by TCLP

Table 4.4 Inorganic Chemicals in Sediments (mg/kg-dry weight)

Sampling Location (Bridge)		Sampling Date	Cadmium (MDL[1]=0.9)	Chromium	Copper	Lead (LOQ[2]=20)	Mercury (LOQ=0.2), (MDL=0.04)	Nickel	Zinc
Marikina River ↓ Laguna lake	Marikina	08/06/09	<MDL	42	101	12.5	<MDL	33.5	185
		12/11/09	<MDL	35.5	99	19.85	0.055	32	195
	Rosario (Lower Marikina)	2001	0.55	(1.11*)	75.57	14.88	<0.003		99.45
	Alfonso (Lower Marikina)	2001	0.91	(0.92*)	83.23	13.53	<0.003		99.45
	Vargas (Lower Marikina)	08/06/09	<MDL	56.5	125.5	25	0.19	38	320
		12/11/09	<MDL	36	113.5	26	0.15	36.5	239
		2001	0.89	(1.16*)	108.9	63.57	0.15		263.59
	Napindan	08/06/09	<MDL	29	79	12	0.06	14.50	125
		12/11/09	<MDL	28.35	102.5	17.5	0.050	27	202.5
		2001	0.55	(0.96*)	97.79	37.87	0.17		289.29
	Bambang	08/06/09	<MDL	33.5	91.5	45	0.089	19.5	250
		12/11/09	<MDL	28	81	42.5	0.08	27	250
	Ilugin	12/11/09	<MDL	16.2	59.5	21.5		12.5	205
Japan		*Soil Pollution*	*150*	*250*		*150*	*15*		
Allowable value in Canada[3]		*Agriculture*	*3*	*8*	*150*	*375*	*0.8*		*600*
		Residential	*5*	*8*	*100*	*500*	*2*		*500*
		Commercial	*20*		*500*	*1000*	*10*		*1500*
Washington State		*Sediment standard*	*5.1*	*260*	*390*	*450*	*0.41*	*140*	*410*
UK (ICRCL)		*Garden use*	*3*	*25[4]*	*130*	*500*	*1*	*70*	*300*
		Parks	*15*	*1000[5]*	*130[6]*	*2000*	*20*	*70[6]*	*300[6]*
The Netherlands		*Target value[7]*	*0.8*	*100*	*36*	*85*	*0.3*	*35*	*140*
		Intervention[8]	*20*	*800*	*500*	*600*	*10*	*500*	*3000*

Method of Analysis: GC/MS (Scan Method, acquisition) determination after extraction with methanol in DCM and hexane and cleanup in alumina column

*As Cr^{6+}

1. MDL: Method Detection Limit; 2. LOQ: Limit of Quantitation; 3. Interim Canadian Environmental Quality Criteria for Contaminated sites (in EIS1998); 4. As Hexavalent (Cr^{6+}); 5. As Total Cr; 6. As long as plants grow; 7. Dutch's final environmental quality goal value; 8. The degree of soil quality that is required a clean-up work.

Source: PRRC, EIS(1998) and Detailed Design (Phase I).

The placement of sampling stations runs from Marikina Bridge crossing upper Marikina River, located in the 30 km upstream from the river mouth, to Vargas Bridge in the lower Marikina River and toward Laguna Lake through the Napindan River. Bambang Bridge and Ilugin Bridge are located in Napindan River, which connects to Laguna Lake. Their locations are shown in Figure 4.8.

- Vargas also shows high lead values after Bambang. However, these values are less than the target value of the Netherlands, i.e. environmentally safe.
- Levels of cadmium are at a safe level in the lower Marikina River according to various reference values (with the exception of the target value employed by the Netherlands).

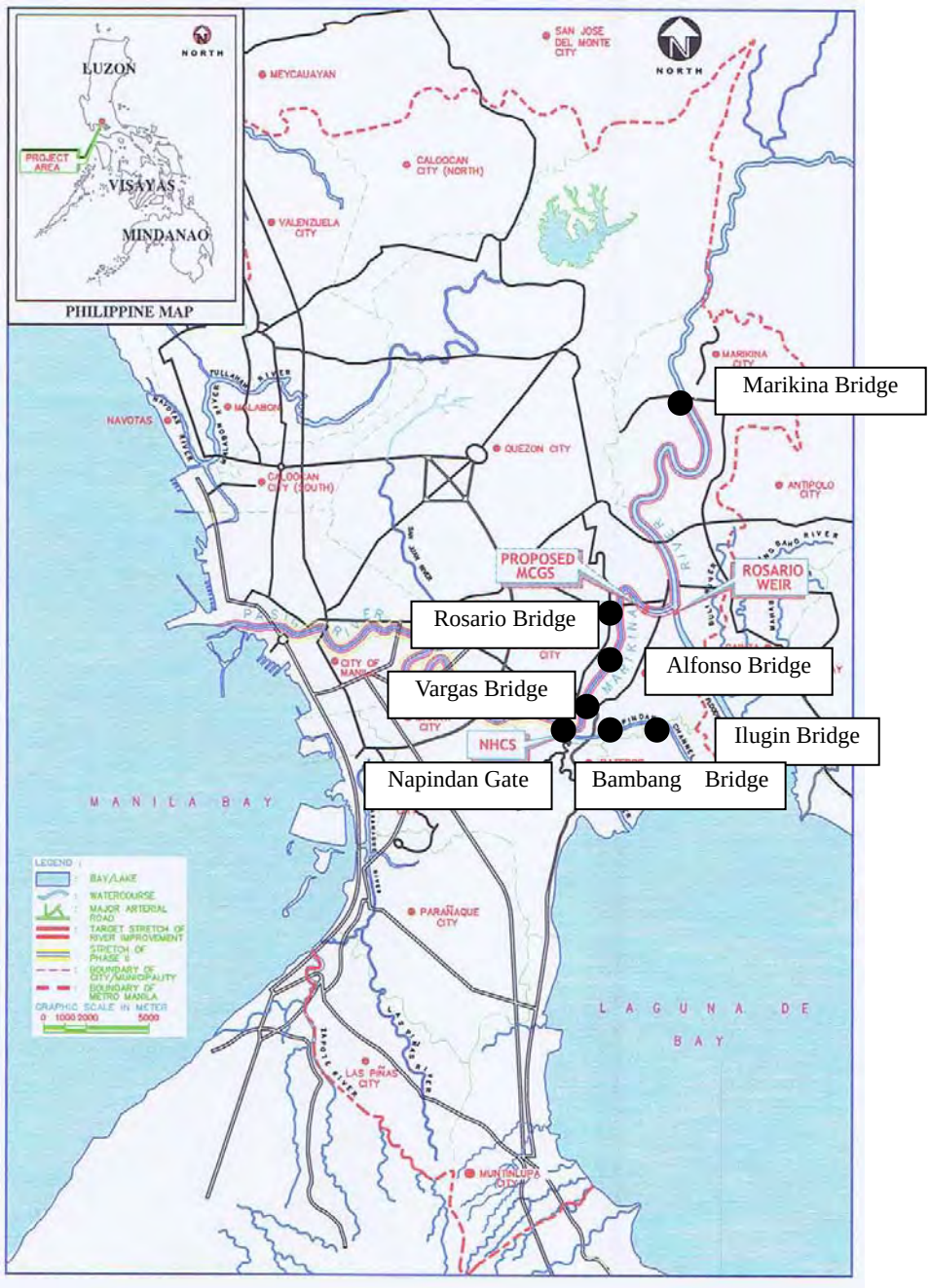


Figure 4.8 Sampling Locations for Sediment Quality

- Chromium in the lower Marikina River is at an environmentally safe level according to standard of Washington State and the Target Value employed by the

Netherlands, but this chromium level is not recommended for agricultural and residential use in Canada.

- Copper in the lower Marikina River is at an environmentally safe level according to standard of Washington State but does not conform to the Target Value of the Netherlands.
- Lead in the lower Marikina River is at an environmentally safe level according to all the reference values.
- Mercury in the lower Marikina River is at an environmentally safe level according to all the reference values.

Nickel and Zinc in the lower Marikina River are at an environmentally safe level according to all the reference values, but not conformed with the Target Value of the Netherlands. Chromium, copper, mercury, nickel, and zinc are highest in sediment samples taken at Vargas Bridge in the lower Marikina River. However, these values are lower than reference values such as natural sediment quality of State of Washington and mostly satisfy environment values used by Canada and the Netherlands.

Hence, according to this method, TCLP, it can be said that disposal of dredged materials is less likely to cause contamination of surfaces and groundwater via the leaching process if sediment quality is equal to or less than reported levels.

TCLP (Toxicity Characteristic Leaching Procedure) is recommended by the DENR. TCLP is sometimes conducted to determine the leaching potential of sediments under more severe conditions to measure an effect of dredging action. Test Methods for Evaluating Solid Waste (SW-846) Method 1311 (US EPA, 2009) are used.

(b) Sediment Quality by Elutriate Test

All the values taken from the lower Marikina River are less than regulatory levels set by the Government of the Philippines. This indicates a decreased likelihood that dredging causes significant levels of toxicity to occur in the river water, except perhaps for turbidity.

Table 4.5 Inorganic Chemicals in Sediments[1] (mg/L)

Sampling Location	Cadmium	Chromium	Copper	Lead	Mercury	Zinc	Arsenic	Cyanide
Napindan gate	0.0011	0.0028	0.0203	nil	nil	0.0368	0.0015	nil
Vargas bridge	0.0020	0.0020	0.0179	nil	nil	0.0381	0.0010	nil
Alfonso S. bridge	0.0020	0.0038	0.0097	0.0038	nil	0.1239	0.0014	nil
Rosario bridge	0.0016	0.0007	0.0189	0.0008	nil	0.0416	0.0017	nil
Hazardous[2]	*5*	*5*		*5*	*0.2*		*5*	
Class-C River[3]	*0.01*	*0.05*		*0.05*	*0.002*		*0.05*	*0.05*
Effluent to Class-C[4]	*0.05*	*0.1[*]*		*0.3*	*0.005*		*0.2*	*0.2*
TCLP regulatory[5]	*1.0*	*5.0*		*5.0*	*0.2*		*5.0*	

* As Cr^{6+}

1. Source: Phase I (Detailed Design in 2001); 2. Procedural manual Title III of DAO 92-29 "Hazardous Wastes Management", DAO36(2004); 3. DAO 90-35; 4. DAO 90-35 Table 1 Effluent Standards (maximum limits for the protection of public health): Discharge limit from new/proposed industry to Inland water (Class C); 5. US EPA.

Elutriate Test method was developed by the U.S. Army Corps of Engineers to simulate a condition that occurs during a dredging operation. An amount of chemicals that is absorbed to sediment and that may reabsorb into the water column under normal pH is estimated. When dredging effects are a study objective, elutriate analysis should be included in the test design.

4.2.8 Wastes

Social survey conducted in the JICA Preparatory Study shows that 84% of households answered that their wastewater is going to collection pipes that are connected to a city sewer. However, there are very few sewer collection systems; as of 2006 only 8% of people were served by sewerage systems in Pasig City, while the percentages of people served in Quezon and Makati cities were 20% and 25% respectively. Marikina city and Pateros municipality are not connected to a sewer system at all. Also, during the field investigation in JICA study it was observed that raw wastewater is discharged into the river from most of houses located on the river banks.

Social survey results show that 94% of households' garbage is collected and disposed of by a regular garbage collection system. About 5% burn their garbage and another 5 % discard garbage into the river or open spaces intentionally. Safe and sanitarily solid waste disposal sites do not exist in Pasig city. In Quezon city there is an open dumping site located in Payatas in close vicinity to La Mesa dam, which is a source of drinking water to Metro Manila.

Cities encourage their citizens to separate recyclable and reusable materials from other garbage. The garbage is collected by LGUs and private garbage collectors. Industrial hazardous and toxic materials must be separated and safely disposed of by licensed contractors (DAO92-29, DAO2004-36). Although there are many "recycle centers" that collect and process usable "recyclable materials," these are more like conventional "junk shops" and are not capable of treating complex, highly toxic, and mixed hazardous wastes such as industrial wastes. As of 2002, only three (3) hazardous waste treatment facilities that are equipped with appropriate technologies and skilled workers were identified. Hence, it can be said that some of the wastewater from the Pasig and Quezon cities are still discharged into the river one way or another and that this discharge is the major source of river water and sediment pollution.

4.2.9 Protected Area

Republic Act No, 7586, titled the National Integrated Protected Areas System (NIPAS) Act, prescribes the following eight (8) categories of protected areas: (1) strict nature reserve, (2) natural park, (3) natural monument, (4) wildlife sanctuary, (5) protected landscapes and seascapes, (6) resource reserve, (7) natural biotic areas and (8) other categories established by law, conventions or international agreements which the Philippine Government is a signatory.

Protected area nearest the Phase III site is Marikina Watershed Reservation (18,965.86 ha) which is located about 20 km upstream from the project site, Lower Marikina River, in Antipolo city and Montalban municipality in Rizal Province. Therefore, no adverse impact is predicted.

Candaba Swamp and Manila Bay have been nominated as Important Bird Areas by Bird Life International. Candaba Swamp is located in the Pampanga River Basin about 60 km far (straight distance) from the Pasig-Marikina River. Bird area of Manila Bay is located around Cavite area, 20 km far from Pasig River. Therefore, no adverse impact is predicted.

4.2.10 Recreational Area

The PRRC initiated the creation of Environmental Preservation Areas (EPAs) in order to promote a cleaner Pasig River. The EPAs take the form of linear parks, walkways and greenbelts on both sides of the Pasig River. So far, a total of 24.64 linear kilometers of parks have been completed extending from the City of Manila to Taguig City.

Table 4.6 Environmental Preservation Areas

Protected Area and other	Environmental Preservation Areas (EPAs)
Pasig	Pineda Linear Park Buting Linear Park West Rembo Linear Park
Makati	Vergara Linear Park Hulo Linear Park Barangka Itaas Linear Park Barangka Ibaba Linear Park Barangka Ilaya Linear Park Buayang Bato Linear Park
Tagig	Napindan North Riparian Forest

Source:. www.prrc.com.ph (2011), PRRC

4.3 Biological Environment

4.3.1 Flora

(1) Terrestrial Flora

The riverbanks serve as habitat for a few thriving natural plants, the majority of which are Ficus spieces. Agricultural fruit trees and ornamental plants were also observed on the banks of the Pasig River. The terrestrial plants along the embankment of the river stretch were recorded. Among the commonly encountered plants in the riverbanks, either planted for bank enhancement and shade or occurring naturally through seed dispersal agents as wind, insects and birds, are Ficus religiosa, Leucaena leucocephala, Terminalia catappa, Sandoricum koetjape, Swietenia macrophylla, Cocos nucifera, Ficus septica, Trema orientalis, Ficus balete and Gmelina arborea.

Other species recorded but not frequently encountered include Vitex parviflora, Carica papaya, Pterocarpus indicus, Premna odorata, Chrysophyllum cainito, Cannax generalis and Macaranga tanarius.

(2) Mangrove

It was reported that mangrove areas have declined significantly in the Manila Bay area due to conversion of land use. For instance, in 1994, it was estimated that there were 1,276 ha of mangrove forests in the Bay. In 2005, *the Environmental Resource Validation by Manila Bay Environmental Atlas* identified 414.15 ha of mangrove forests in the Bay.

(3) Aquatic Flora (Macrophytes)

The aquatic biota is low diversity of macrophytes in the Pasig River, which can be attributed to river pollution and concentration of population in the nearby areas.

The same or similar habitat and biological characteristics can be expected in the Marikina River and its surroundings.

Table 4.7 Aquatic Macrophytes found in the Pasig River

Species	Common name	Family	Remarks
Eichornia crassipes	Water hyacinth	Pontederiaceae	Exotic
Ceratophyllum demersum	Hornwort	Ceratophyllaceae	Indigenous
Ipomoea aquatica	kangkong	Convolvulaceae	Indigenous
Pistia stratoites	Quiapo	Araceae	Indigenous

(4) Phytoplankton

The phytoplankton species that were collected on 20 September 2008 during Pasig (II) environment monitoring session are of 3 different classes: Cyanophyceae, Chlorophyceae and Bacillariophyceae.

- Stephanodiscus sp. of Bacilliariophyceae dominates the phytoplankton population with 83% of the total population in all of the sampling stations.
- Pediastrum sp. belongs to Chlorophyceae. It occupies 8% of the total phytoplankton population in all of the sampling stations.
- The Melosira sp. of Bacilliariophyceae occupies 5% of the total phytoplankton population in all of the sampling stations.
- Oscillatoria sp. of Cyanophyceae and Cymbella sp. of Bacillariaphyceae occupy 0.05% of the total phytoplankton population in sampling stations.

4.3.2 Fauna

(1) Wildlife

Table 4.8 National List of Threatened Fauna in and around Metro Manila Area

Taxonomy	Scientific Name	Common Name	Conservation Status	Distribution area
Mammals	*Macaca fascicularis*	Philippine Monkey	OTS	Throughout the Philippines
	Cervus mariannus	Philippine brown deer	VU	
	Pteropus vampyrus	Giant flying fox	OTS	
	Dugong dugon	Dugong	CR	Manila, Taytay
	Acerodon jubatus	Golden-crowned fruit bat	EN	Manila, Quezon
	Pteropus leucopterus	White-winged fruit bat	VU	Quezon
Birds	*Ptilinopus marchei*	Flame-breasted fruit dove	VU	Quezon
	Ptilinopus merrilli	Cream-bellied fruit dove	VU	Quezon
	Grus antigone	Sarus crane	CR	Quezon
	Sterna bernsteini	Chinese crested tern	CR	Manila Bay (1905)
Reptile	*Hydrosaurus postulatus*	Philippine sailfin lizard	OTS	Quezon
	Eretmochelys imbricata	Hawksbill turtle	CR	Quezon
	Crocodylus mindorensis	Philippine crocodile	CR	Quezon
	Varanus olivaceus	Gray's monitor lizard	VU	Quezon, Manila
	Varanus salvator. marmoratus	Malay monitor lizard	VU	Northern Philippine

Note: Conservation Status: CR (Critically Endangered), EN (Endangered), VU(Vulnerable), OTS(Other Threatened Species).
Source: 2004 Statistics on Philippines Protected Areas and Wildlife Resources, Protected Areas and Wildlife Bureau (PAWB), DENR

Pursuant to Department of Environment and Natural Resources (DENR) Administrative Order No. 2004-15, the National List of Threatened Fauna was prepared with the aim to determine species of wild birds, mammals, and reptiles which shall be declared as priority concern for protection and conservation. It shall be prohibited to collect and/or trade any of the species in the list unless in possession of a permit granted by the DENR. The list includes 146 species composed of 33 species of mammals, 80 species of birds, 18 species of reptiles and 15 species of amphibians.

According to the National List of Threatened Fauna, six (6) species of mammals, four (4) species of birds, and five (5) species of reptiles are listed in and around the Project sites. According to Manila Bay Area Environmental Atlas, (PAWB-DENR, 2007) there is no distribution of coral reefs in the costal zone of the Study Area.

No protected habitat of endangered species designated by the country's laws or international treaties and conventions has been reported throughout Phase II environmental monitoring and on DENR's report, and the same is expected to be the case for Phase III. Moreover, since construction and dredging activities are held within the already

highly-developed Metro Manila area, exclusively in and along the already highly-polluted and disturbed Pasig-Marikina River.

(2) Nektons (fish)

Ancistrus temminckii, commonly known as “janitor fish,” was the only fish species caught during the aquatic biota sampling. The Janitor Fish is an invasive specie, which was brought for a research purpose from out of the country, and not a native of the Pasig-Marikina River. The greatest number of janitor fish caught and observed was in Guadalupe Bridge. None were caught at Lambingan Bridge.

(3) Zooplankton

Three groups of zooplankton were found in four sampling stations in the Pasig River. As in most tropical freshwaters, results show that the zooplankton population is dominated by Cladocerans, with 46% of the total population count of zooplankton in all of the sampling stations. Diaphanosoma excisum is the species notably recorded as the most abundant among the other Cladoceran species.

(4) Macrobenthos

- Oligochaetes and dextral pond snails dominate the macrobenthic population, occupying 48 % of the total collection in all sampling stations. Oligochaetes belong to Phylum Annelida, which are known as well-segmented worms.
- The river snail, which belongs to family Pleuroceridae, holds 19% of the total number of collected macrobenthic organisms.
- Shrimp are the least number in the macrobenthic community with 5% dominancy. They are under the Subphylum Crustacea, that requires well-oxygenated water. This explains its low dominance among the macro invertebrate species in four stations.
- Corbicula manilensis, commonly known as “tulya,” was observed in Guadalupe station since the station is near Laguna de Bay. Few individuals of Pomacea canaliculata, or “golden kuhol,” were also obtained from all the four stations.

4.4 Socio-economic Environment

4.4.1 Area Directly Affected by Construction

Phase III activities involve dredging more heavily than in Phase II. River bank revetment works, river wall works and repair works of existing revetments are going to be given to sections geographically allocated to both Phase II and III. Construction procedure, monitoring, and construction site managements in Phase III would be more or less the same as that of Phase II. Considering the scale and nature of construction activities in Phase III, directly affected areas along the Lower Marikina River are identified to be all Barangays located in between the Mangahan Floodway and Napindan River. Such concerned Barangays are listed in a table below.

Table 4.9 Project Affected Barangays

City	Barangay
Quezon	Bagumbayan
	Ugong Norte
Pasig	Ugong
	Bagong Ilog
	Mangahan
	Rosario
	Maybunga
	Caniogan
	Kapasigan

	San Jose
	Bagong Katipunan
	Sta. Rosa
Makati	West Rembo

4.4.2 Population

Pasig City, where most of Phase III of construction sites takes place, experienced about a 1.6 fold population growth between 1990 and 2007, from 397,309 to 627,445 in 17 years.

The populations and annual average growth rates from 1990 to 2007 in the Study Area are shown in the below table.

Table 4.10 Estimated Population in the Study Area

City	1990	1995	2000	2007
Makati	450,559	484,176	444,867	567,349
Manila	1,588,203	1,654,761	1,581,082	1,660,714
Marikina	309,320	357,231	391,170	424,610
Pasig	397,309	471,075	505,058	627,445
Pateros	-	55,286	57,407	61,940
Quezon	1,662,950	1,989,419	2,173,831	2,679,450
NCR	7,907,386	9,454,040	9,932,560	11,566,825
Philippines	60,703,206	68,616,536	76,506,928	88,566,732

Ref: www.census.gov.ph, Demographic Statistic, National Statistic Office

Table 4.11 Estimated Annual Growth Rates in the Study Area

City	5-7 years annual growth rate (%)			10-12 years annual growth rate (%)	
	1990-1995	1995-2000	2000-2007	1990-2000	1995-2007
Makati	1.25	-1.80	3.41	-0.18	1.34
Manila	0.62	-0.97	0.68	-0.13	0.03
Marikina	2.68	1.96	1.14	2.34	1.46
Pasig	3.22	1.50	3.04	2.42	2.43
Pateros	1.37	0.81	1.05	1.11	0.96
Quezon	3.33	1.92	2.92	2.67	2.53
NCR	3.30	1.06	2.12	2.25	1.71
Philippines	2.32	2.36	2.04	2.34	2.16

Source: www.census.gov.ph, Demographic Statistic, National Statistic Office

The population densities of the Study Area from 1990 to 2007 are shown below table.

Table 4.12 Estimated Population Density in the Study Area

City	Area (km2)	Population Density (persons/km^2)			
		1990	1995	2000	2007
Makati	21.57	2.09	2.24	2.06	2.63
Manila	24.98	6.36	6.62	6.33	6.65
Marikina	21.52	1.44	1.66	1.82	1.97
Pasig	48.46	0.82	0.97	1.04	1.29
Quezon	171.71	0.97	1.16	1.27	1.56

Source. http://www.nscb.gov.ph/activestats/psgc/listcity.asp, Source: Study Team

Populations in Barangays located along the Phase III construction segment of the Lower Marikina River are listed in following table.

Table 4.13 Estimated Population in the Directly Affected Barangays

	2000	2007
Quezon City (Total)	2,173,831	2,679,450
Bagumbayan	7,597	9,209
Ugong Norte	6,959	6,822
Pasig City (Total)	505,058	627,445
Ugong	19,034	22,266
Bagong Ilog	16,423	15,454
Pineda	16,655	15,013
Santolan	37,055	43,286
Manggahan	32,615	38,063
Rosario	48,998	50,690
Maybunga	24,529	35,627
Caniogan	23,553	21,769
Kapasigan	6,178	6,569
San Jose	1,575	2,347
Bagong Kapipuan	1,044	1,185
Santa Rosa	1,120	1,515
Buting	10,408	9,073
San Joaquin	10,694	12,498

Source: www.census.gov.ph, Demographic Statistic, National Statistic Office

Overall populations in Pasig City increased about 24% on average between 2000 and 2007. It can be assumed that social, commercial and industrial activities in such areas have increased as population grew, which in turn resulted in changing mutual influences of the cities and the river since the EIA report was prepared in 1998.

Most of the lower Marikina River runs through Pasig City. Pasig City's population increased from 505,058 in 2000 to 627,445 in 2007. Maybunga, one of 14 major Barangays located along the river, increased its population by 11,098 people by 2007, which is 45% growth when measured from 2000. While Barangay Buting lost 1,335 people, its neighboring Barangays—namely San Jose, Banong Kapipuan, and Santa Rosa—gained 1,308 people all together from 2000 to 2007.

Barangays Santolan and Mangahan, located upstream from the Phase III section, each increased their populations about 17%. This implies that about 2,500 households (1 household contains 4.66 people in Pasig City) have moved into the two Barangays between 2000 and 2007. Ugong, another major Barangay located in the middle of the Marikina River, has increased its population from 19,034 in 2000 to 22,266 in 2007. This indicates that about 700 new households moved into Ugong since 2000.

Residents in the projected affected area originate from neighbouring cities as well as from other islands, such as: Albay, Samar, Pangasinan, General Santos, Iloilo, Sorsogon, Cagayan, Misamis Oriental, Negros Occidental, Bacolod, Zamboanga, Marinduque, Legaspi, Masbate, Quezon, Bulacan, Surigao, Cebu, Oriental Mindoro, Pampanga, Mindanao.

Populations in Barangays that are located upper and lower streams of Lower Marikina River section are listed in the table below.

Table 4.14 Estimated Population in the Upper and Lower Sections of Phase III

	2000	2007
Makati City		
Total	444,867	567,349
East Rembo	23,902	23,119
West Rembo	28,889	28,578
Cembo	25,815	26,589
Guadalupe Nuevo	22,493	23,359
Marikina City		
Total	391,170	424,610
Industrial valley	13,366	14,050
Calumpang	14,552	15,589
Barangka	19,466	17,424
Tanong	9,477	9,360
Jesus de la Pena	9,796	8,553
Santa Elena	5,704	7,008
Conception Uno	76,736	40,277
Malanday	42,256	51,363
Nangka	32,273	41,837
Santo Nino	27,602	24,694
Conception Dos	23,845	27,809

Source: www.census.gov.ph, Demographic Statistic, National Statistic Office

Barangays East Rembo, West Rembo, and Cembo in Makati City are located 2 km directly downstream of the lower end of the lower Marikina River section. While Makati City's population increased about 83,000 people (approx. 17%) between 2000 and 2007, the populations in the three concerned Barangays has increased less than 1%, and rests were decreased.

Marikina City, which is located above the Mangahan Floodway, has increased about 19% in the 7 years following 2000. Santa Elena, Conception Uno, Malanday, and Nangka have changed their population about 23%, -48%, 22%, and 30% respectively since 2000. Reduction of population in Conception Uno, which is located in the upper edge of Marikina City, is the greatest of all; 36,459 people—or about 7500 households (1 household is 4.86 people in Mrikina City)—had moved out in a 7 year-period. Meanwhile, Barangays Malanday and Nangka, which are located right next to Conception Uno, increased their populations about 9,100 and 9,600 respectively during the same time period. Between 2000 and 2007, Barangay Parang also lost about 45% of its population (30,136 people), while its neighboring Barangays Marikina Heights and Conception Dos gained about 10,000 people.

4.4.3 Development Trend

Commercial development in Pasig City increased 100% between 1994 and 2000, while traditional industrial activities have remained stagnant. Development of pedestrian malls, high-rise mixed-use condominiums, and warehouses has risen in the last 10 to 20 years, while industry lost about 3.5% of its land for commercial use by 2000. Industries in Ugong, Rosario, Santolan and Kapitolyo baramgays have hardly expanded during the last 20 years or more, but relocated to the neighboring regions of CALABARZON and MMARILAQUE. Residential area is shifting to the east of Pasig City, to Cainta, Taytay, Angono, Antipolo and Binangonan. Pasig City is changing its role from an industrial area to a trade and commercial area.

The city of Manila is spilling over to Quezon City to release population pressure. Quezon City was once a new capital city of the Philippines and developed according to a master plan for a

while. About 36% of the city was estimated to be residential area in 2008. The residential area grew from southwest to northeast and west along major roads such as Quirino Highway, Tandang Soro Avenue, and Commonwealth Avenue. Quezon City had been developed as a residential area by both private developers and NHA. However, most of the development has been done by private developers. The city has been lacking "firm control and direction," which has resulted in "unrelated subdivisions with inadequate and uncoordinated service and facilities (Quezon City CLUP, 2000)" and a growing population of informal settlers. Most of the informal settlements are located on Constitution Hill, along Commonwealth Avenue, at the northeast of Quezon City of upper Marikina River, Bagong Silangan, UP Campus, Escopa, Matandang Balara, Pasong Tamo, Sauyo, and Bahay Toro Barangays as well as along riverbanks, creek sides, aqueducts, and transmission lines.

In Quezon City, commercial areas have been developing along major roads and around public markets. Fairview, North Triangle Business Center, and the Eastwood Cyber Park in Bagumbayan Barangay are growing areas. The west side of the city is a traditional industrial area and is still expanding. Potential industrial growth is expected to continue to occur in the Balintawak and Novalishes districts. Light industries are expected to grow in the area east of E. Rodoriguez Jr. Avenue in Ugong Norte. Spread of industrial zones is westward bound as they consolidate and become less hazardous to the environment.

4.4.4 Land Use

The Project area is located in the National Capital Region (NCR). While most of NCR consists of buildup areas, about 50% of the NCR consists of residential area and about 9% consists of commercial areas.

Phase III construction sites are located close to high schools, major highways, narrow and congested residential streets, community/Barangay parks, churches, Barangay Halls, hospitals/clinics, and a Barangay fire station.

Table 4.15 Special Economic Zones in NCR

Special economic zones	Location
Amor Technology Special Economic Zone	Muntinlupa City
Asahi Special Economic Zone	Pasig City
Food Terminal Inc. Special Economic Zone	Taguig City
Marcoasia Ecozone	Pasay City
Manila Harbour Centre Special Economic Zone	Manila
Philippine International Air Terminals Co. Special Economic Zone	Pasay City
Victoria Wave Special Economic Zone	Kalookan City

Source : Philippien Economic Zone Authority (2006) *IN Manila Bay Area Environmental Atlas*

Table 4.16 Significant Facilities and Industries Located along the Marikina River and Major Roads Nearby

City	Barangay	Avenues/Road	Major Industries	Major Facilities
Pasig	Santlan	Evangelista Ave.	Portland Cement, Tamilee Industries, Himmel Industreis	San. Tomas de Villanueva Church
		E. Amang Rodriguez Ave.	Selecta Warehouse, PAG-ASA Steel factory,	RFM, Aggragates, Mangahan Business center, Park Center, Sta. Lucia Church
	Manggahan	E. Amang Rodriguez Ave.	Litten Mills Inc., Universal Robina Corp.,	
	Rosario	Dr. Sixto Antonio Ave.		Alfonso Specialist Hospital, Rosario Market
		Pasig Blvd. Ext. (C. Raymundo/MRR Rd)	Mariwasa Tiles	Rosario Sport Complex, Rizal High school Rosario Annex,
	Maybunga	Dr. Sixto Antonio Ave.		Hampton gardens, San Antonio Abad parish
		Pasig Blvd. Ext. (C. Raymundo/MRR Rd)	Lunar Steel, Negro Woodwork Inc.	St.Therese hospital
	Caniogan	Dr. Sixto Antonio Ave.		Riverfront residences, Arelland University Andres Bonifacio High School, Sta. Clare de Montefalco Parish, Rizal High School
		Pasig Blvd. Ext. (C. Raymundo/MRR Rd)	Defcon Ready Mix Plant,	Crossings Supermarket, Iglesia Ni Kristo Church, Evergreen Pasig Memorial park pantheon,
	San Nicolas	Caruncho Ave.		Pasig City hall, Pasig public market, Health canter, Sport Center, Sabater hospital
	Ugong	Eulogio Redoriguez Jr. Ave.	International piple industries, Republic cement, Armour products, PR Cement, Resine & Ajinomoto,	Iglesia Ni Kristo Church, Astron Bldg., Ovaltine, Toyota Ortigas, Tendesitas, SM Supercenter Pasig, Relience center, Mitsubishi motors, Admiral Unnisphene,
	Bagong Ilog	Eulogio Redoriguez Jr. Ave.	Universal Robina Corp(food)., Chateau Verde restaurant	Gren valley sport center, Hyundai Pasig, Resins Inc., Mary Immaculate Hospital
		Pasig Blvd	Universal Robina Corp(food).	Rizal Medical Center
	Pineda		Wellington Flour Mills	
Quezon	Bagumbayan	Eulogio Redoriguez Jr. Ave.	D&L Industries, Universal Robina Inc., Concrete aggregates, Auto mechanica	Camp Atienza, Phoenix Sun Business Park, 3D service center, Mercury drug corp., Holy family chapel, One Luna Lifestyle center, IDS Logistics, Shopwise, Robinson's Inc., IBM HQ, Citi Bank HQ
	Ugong Norte	Eulogio Redoriguez Jr. Ave.	Builder's depot, McKenzie distribution	Olympic badminton club, Red Ribbon office, Super 8, Nissan galley Oltigas

Pasig City has been developed as an uncontrolled as industrial area during the 1960s and 1970s. More than 200 large scale industries have been established along the Pasig and Marikina Rivers. Economic development through industrial activities has attracted more people to immigrate to the city indiscriminately. This has led to problems such as

pollution, squatters, flooding, unplanned communities, and urban expansion. Some industries that might cause environmental hazards coexist with residential areas.

Table 4.17 Proportional Land Use in Pasig City

Land use	%
Residential	60.2
Commercial	7.1
Industrial	15.1
Institutional	1.0
Agricultural	0.8
Parks/Recreational	0.8
Open spaces	15.0
Total	100

Source : City of Pasig Comprehensive land Use Plan (2001-2010)
Remark : Total land areas reported in CLUP and in NCSB are different. Break down of land use is reported in CLUP only. Because of land value differences in the two official statistics, only percentages are employed to demonstrate a trend of land use in Pasig.

As of 2000, major establishments in Pasig City were mostly manufacturing industries such as garments, chemical products, electronics, steel products, and food. Major commercial businesses in the city are those in the retail, banking, and service sectors. Major commercial areas are Pasig Public Markets (about 600m to the Napindan Channel, Brgy. San Nicolas), Ortigas Commercial Center (located at the boundary of Pasig City, Mandaluyong City, and Quezon City). There are almost no agriculture, forestry or fishing operations except for very small patches of vegetable gardens and back yard livestock operations.

Most of Pasig City consists of moderately to highly populated residential areas, except for some parks, cemeteries, and an about 16% share of small-scale agricultural and open/vacant spaces which are located mostly within the Laguna Bay Basin. Commercial areas make up about 7% of the city and are located in Ortigas Center, the Central Business District of Pasig, which is in San Antonio Barangay, on the border to Mandaluyong City. Pasig Public Markets are located in San Nicolas Barangay, near by Pasig City Hall, about 600m to Napindan channel.

The city's land use plan is incoherent and its execution is relaxed. Hence, it has caused encroachments and hazardous living conditions. Ownership of land is often unclear. Boundaries of private land, as well as Barangays, is often not clear. Ownership of land is often confused, with land claimed by more than one owner, untitled, and overlapped. Squatters live in such gray zones, setback zones, river banks, or simply in any vacant places.

Two main road routes in Pasig City are Rodoriguez-Dr.Sixto Antonio Avenue from north to south and Ortigas Avenue from east to west; the former runs along, and the latter crosses, the Marikina River, and together they provide access to surrounding cities. Jeepneys are mainly used to get around the city.

4.4.5 Living and Livelihood

In order to predict the impact of construction work, an area-specific social survey was conducted of current residents in the areas directly impacted by Phase III construction activities.

4.4.6 Basic Biodata for Area Directly Affected by Phase III Construction

Most household heads (67%) are female and most household heads are also married (66%). Twenty-five percent of them have been in their current residences for 1 to 10 years, while 52 percent have been living in the same Barangay.

The vast majority (92%) of household heads are house/structure-owners, while rent-free occupants and renters comprise 3 and 12 % respectively. Lowest rent payment is Php1,200, while the highest is Php5,000 for those who rent dwelling units. 97 percent of structures house only 1 household, with 55 percent of structures housing 4 to 6 persons/ members. 49 percent of house/structure-owner households are comprised of 4 to 6 persons as well. Household size of all 3 rent-free occupants is 5 persons. Only 8 percent of all households have caregivers. Most renters have a household size of 3 persons**.**

Sixty three (63) percent of the households have only 1 member employed, while 59 percent of the households have 2 members contributing to income. Forty one (41) percent of households income comes from salaries ranging from Php9,001 to 15,000. Thirty eight (38) percent of households earn a total income from business ranging from Php5,001 to 10,000. Lowest income from pensions is Php1,200 while the highest is 10,000. There is no income derived from agriculture.

Table 4.18 Biodata of Households in the Area Directly Affected by Phase III

Basic Biodata of Households	Survey result (2011)
Household head	Female (63%)
Marital status of head of HH	Married (66%)
Averaged number of families in one HH	1
Averaged number of HH members	5
Own their dwellings (home owners)	89%
Averaged monthly rent	Php 2,850
Averaged monthly income (total)	Php 15,708
Averaged monthly remittance (domestic)	None (98%)
Averaged monthly remittance (OFW)	None (96%)
Averaged monthly expenses (total)	Php 14,615
Averaged monthly expense on food	Php 7,378
Averaged monthly expense on recreation	Php 375

The lowest and highest incomes derived from remittance/s domestically is Php1,000 and 3,000, respectively, while from OFWs are Php5,000 and 37,000, respectively. 40 percent of other sources of income, such as loans and gifts, range from Php5,001 to 10,000 per annum. 38 percent of the respondents earn a total or combined monthly income (both from employment/ salary and various sources) of Php9,001 to 15,000.

Seventy one (71) percent spend Php5,001 to 10,000 monthly for food. Food is the single biggest cost item for almost all of the households. 55 percent spent Php150 to 500 last year on clothing. Thirty eight (38) percent of the respondents spend monthly from Php150 to 500 on transportation; 46 percent spend from Php300 to 1,000 on education; 33 percent spend from Php100 to 500 on water bills; 52% spend from Php1,001 to 2,000 on power bills; 54 percent spend from Php100 to 300 on telecommunications; 64 percent spend from Php501 to 1,000 on cooking fuel; 60 percent spend a monthly average of Php50 and below on medicines/ hospital; 60 percent did not spend anything on recreation last year; remittance to relatives outside household is from Php200 to 3,000 monthly; and, 88 and 58 percent does not spend anything on gambling and cigarettes/ alcohol.

Thirty three (33) percent spend the highest total monthly expenses ranging from Php9,001 to 15,000. Thirty-six percent said that they have a saving at least Php1,000 or below per month.

About 35 percent of the households have a member who has graduated from college. 46 percent have at least 4 years of schooling, while fifteen percent stopped schooling mostly for financial reasons.

4.4.7 Living Conditions

Twenty nine (29) percent are living in houses that are 11 to 20 years old. Seventy seven (77) or 54 percents of households are living in single-detached houses and houses that are exclusively devoted to residential use, respectively. Seventy nine (79) percent of houses are 1-story/ level structures, and 59 percent of houses have a gross area of 51 to 100 square meters.

Forty two (42) percent of house structures are semi-concrete. 62 percent of them are made of semi-concrete walling materials; 93 percent are made of galvanized iron roofing materials; and, 82 percent are made of concrete flooring materials. 90 percent of toilet facilities are water sealed and connected to a septic tank, and 93 percent have piped water connections.

Ninety three (93) percent of households suffered flood damage/s since 1998, with 90 percent of them being damaged in September 2009/ Typhoon Ondoy. 91 percent said that flooding came from the river, 76% of damages were done mostly to household furniture. To protect themselves, 55 percent stayed at home, with 32 percent moving to a higher place. A specific coping mechanism identified at the community level by the respondents is that of moving to an evacuation center but mere 2% .

4.4.8 River Dependency

None of the household livelihoods in the directly affected area are dependent upon the river; incomes both derived from agriculture or fishing and dependent upon the river were reported. None of the households is depending on their income to the rivers and river banks.

The residents in the directly affected area do not think that temporary inaccessibility to the river during the period of construction and dredging will adversely affect their lives. Moreover, no one sees the river as culturally and religiously important place.

4.4.9 Drinking Water

Pasig, Marikina, parts of Makati and Manila, and the southeast part of Quezon cities are located in the East Concession area of Manila Water Company, Inc (MWCI). As of 2003, MWCI achieved 85% coverage of water service, connected to 396,778 outlets. (Source: MWSS Regulatory office 2003 annual report, 2003; most recent to download from MWSS website). The supply of water is not constant in the East Concession area of MWCI; tap water rationing takes place in many areas in Pasig City.

The primary supply of water for the people living in the directly affected area is derived via piped water (92.5%), public tap water (0.9%), and water vendors (6.5%); none of their water supply is derived from river water or well water. And although deep wells do exist, they are not a reliable source of drinking water.

4.4.10 Important Social Bounding and Places

No households belong to a particular social group with deep connections to the river or nature contained within the Phase III affected area. Moreover, there are no culturally or anthropologically significant places in the affected area that have been passed down through the generations.

There are major public facilities located within 20 minutes walking distance of the residences of those living in the directly affected area. Barangay centers are accessible to everybody (100%) within 20 minutes walking distance. there are schools, LGU offices, evacuation centers and women’s centers located within 20 minutes walking distance of their residences for 95 to 99% of the respondents.

Table 4.19 Public Places within 20 Minutes Walking Distance

Place	% HH
Police station	50%
Church or other religious places	54%
Market place	56%
Fire station	64%
Hospital/ clinic	70%
School	95%
LGU office	98%
Evacuation center	99%
Women center	99%
Barangay center	100%
Multiple answers (N=107)	

In case of an emergency, such as flood, 98% of those surveyed stated that they do not have a specific community-based coping mechanism, while 5% stated they would go to an evacuation center. In the case of flood occurrence, about 60% stated that they would choose to stay home; 35.5% would choose to "move to higher place"; and 6.5% would move to somebody else's house.

4.4.11 Health

(1) Waterborne Disease

Diarrhea combined with dehydration was the 7th leading cause of infant death in Quezon City, 46 out of 1251 deaths for each 100,000 population in 1998. Pneumonia was the top cause of morbidity in Quezon City for the same year, followed by diarrhea/acute gastro enteritis; there were 25,880 and 14,564 cases respectively. The morbidity rate for Dengue fever was 25 per 100,000 people.

From June to December 2010, 35% of HH in the directly affected area were infected with water related illness, including Dengue 1.9%, Malaria 2.8%, and Diarrhoea 33%. This trend of disease occurrence matches the national trend. On the other hand, 62% have not experienced illness in past six months.

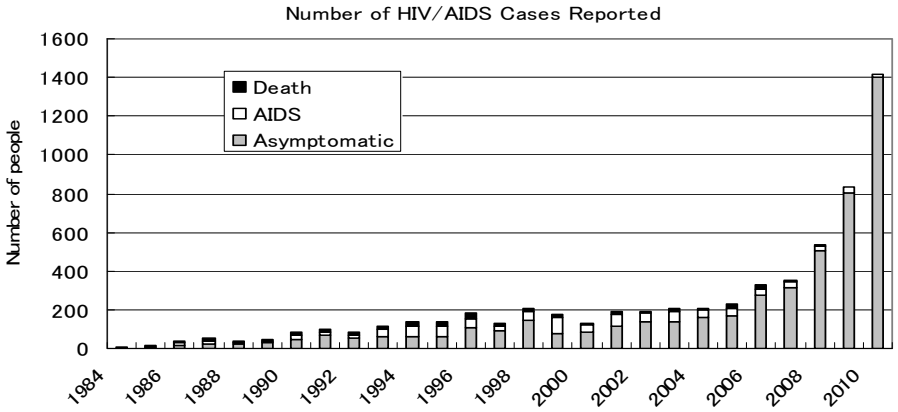
Table 4.20 Number of Water-related Disease in Philippines (Five-year Average from 1998 to 2002)

Case of Disease	Number infected	Proportion of Total Water-Related Diseases	Rate per 100,000 Persons
Malaria	59,218	57.6%	83.6
Dengue Fever	19,408	18.9%	26.3
Typhoid/Paratyphoid Fever	14,744	14.3%	20.8
Schistosomiasis	8,845	8.6%	12.5
Cholera	565	0.5%	0.8
Total	102,780	100.0%	145.2

Source: 2006 Compendium of Philippines Environmental Statistics, NSCB

(2) HIV/AIDS

According to the Philippine Department of Heath (DOH), as of December 2010, five (5) new cases of HIV/AIDS are reported each day. Based on this statistic, DOH predicts that there will be about 46,000 HIV cases by 2015.



Source: Philippine HIV and AIDS Registry (November 2010), Department of health, national Epidemiology Center

Figure 4.9 Prevalence Rate of HIV/AIDS

4.4.12 Religion and Indigenous Belief

No household whose religion is deeply associated with the river and the nature of the Pasig-Marikina River was found. About 94% of the HH claimed to be Roman Catholic and 5.6% claimed to be of other Christian faith. 0.9% (1 out of 107HHs) professed a traditional/indigenous belief, but such traditional/indigenous belie is not associated with the River or nature of the Pasig-Marikina River or its surrounding area.

No special places have been passed down through the generations and no social groups associated with the river were reported by households living in the directly affected area.

About 16% of household are members of social groups, such as home owners' associations (9.3%), women's groups (2.8%), and religious organizations (5.6%). No special social group related to the river exists, and no one in the directly affected area thinks their social lives would be affected by the construction or the Project.

4.4.13 Heritage

The following 16 significant historical sites and landmarks around the project affected area are listed below:

Table 4.21 Significant / Historical Sites and Landmarks in the Study Area

Municipality/City	Historical Site/Landmark
Manila City	Chinese Cemetery
	Paco Park
	Plaza San Luis
	San Agustin Church and Musesum
	Malacanan Palace
	Fort Santiago
	Riazl Park
	Manila Cathedral
Marikina City	Kaptian Moy Residence
Pasig City	Bahay na Tisa
	Pasig City Museum
Quezon City	The Pugda Lawin Shrine
	The Quezon Memorial Circle
	General Lawton Memorial
	Camps Aginaldo and Crame
	The EDSA Shrine and People Power Monument

Source: Manila Bay Area Environmental Atlas(2007), UNDP/GEF, IMO, DENR
Quezon City CULP (2000)

Only Malacanan Palace and Fort Santiago are located on the banks of Pasig River. Others are located at least 0.5 km away from the project site. No construction activities are planned near these areas. Therefore, there is no adverse impact on these historical sites.

4.4.14 Gender

The Philippine government established the National Anti-Poverty Commission (NAPC), the Department of Social Welfare and Development (DSWD), and National Commission for the Role of Filipino Women (NCRFW) to support poor and women and to deal with gender problems.

More than half (63%) of households are female-headed, 66% include married couples, and 12% include separated persons. Most households have water available within the home, and important social services are located within 20 minutes walking distance of households. No obvious gender inequity was observed.

4.4.15 Ethnic Minority and Indigenous People

The National Commission of Indigenous People (IP) is a mandated agency for ethnic minority and indigenous people. NCIP does not provide data regarding IPs living in NCR or municipalities and cities located in the Phase III construction area.

According to the interview survey that was conducted, there is no ethnic group or indigenous people in the project affected area.

Twenty four percent of household members identified themselves as belonging to some local groups (native regional/provincial places) such as Bisaya; Ilongo, Bicolano, Pangasinense, etc.

Table 4.22 Original Region/Province of People in the Project Affected Area

Ethnicity	%
Albayano	1
Bicolano	7
Bisaya	9
Bulaqueño	1
Cebuano	1
Ilongo	7
Marinduqueno	1
Pampangueno	1
Pangasinense	2
Tagalog	1
Sample number	N=107

Source: Sampling of JICA Study Team (2011)

4.4.16 Awareness of Phase III

A household survey conducted in 2010/2011 found that majority of current residents in the Lower Marikina River area of Phase III do not aware of the Project. Public awareness IEC and some meetings to obtain public consensus are necessary for the area of Lower Marikina River once the Phase III commences.

On the other hand, ICE has been conducted for the residents, offices, factories, etc., along the Pasig River since the commencement of implementation of Phase II.

The following are summary of survey for the area of Lower Marikina River:

- About 1/3 of the current population living in the area directly affected by the Phase III moved in after 1998, when the EIS (1998) was conducted. However, 80% of all new residents have moved within the same LGU or barangay and only 11% are from outside of Metro Manila.

- About 67% have not been informed of the Project Phase III.
- Out of 33% that have been informed, 9% were informed in 2008, the rest were informed in 2009 or 2010.
- Out of the 33% that have been informed, 57% were informed by neighbors, 37% were informed by Barangay Captains, and only one person received the information from the media.
- Out of the 33% that have been informed, 71% were informed only once while 29% were informed twice.
- Meetings were the most common medium for receiving the information about the Project. 66% of all those informed were informed via meetings. On the other hand, 29% were informed through “rumors”.
- Although 67% of the interviewed HH have never been informed of the Project, 98% are positively accepting and supportive to the Project.

CHAPTER 5 POSSIBLE IMPACTS WITHOUT MITIGATIONS

5.1 Possible Impacts without Mitigations based on Available Data/Information

The following Table 5.1 shows the possible negative impacts without mitigations based on the available data/information:

Table 5.1 Possible Negative Impacts without Mitigations

Items			Negative Impact		Explanations
			EIS(98)	This Review	
Social Environment:	1	Involuntary Resettlement	-	A	58 house holds (204 people) to be relocated due to the Project were identified.
	2	Local Economy such as Employment and Livelihood, etc	-	D	There are no negative impacts expected due to construction activities.
	3	Land Use and Utilization of Local Resources	—	D	Since project area is already urbanized, no negative impacts might be anticipated for change in land use and utilization of local resources.
	4	Social Institutions such as Social Infrastructure and Local Decision - making Institutions	—	D	Since construction activities is limited inside of existing river area in the urbanized, no negative impacts might be anticipated.
	5	Existing Social Infrastructures and Services	D	B	Construction materials are transported via barge and construction activities are conducted in river area. River navigation might be affected slightly. Use of existing river parks along the Lower Marikina River will be affected because of construction of dikes and re-construction of river parks on dikes.
	6	Poor, Indigenous and Ethnic People	—	D	Livelihood of general low income people is not dependent on resources from the rivers, such as fish and drinking water. Also, no Indigenous and Ethnic People were identified.
	7	Misdistribution of Benefits and Damage	—	D	People in the project affected area do not think construction work is a problem for their daily life according the interview conducted.
	8	Cultural heritage, historical and religious sites	—	D	No cultural heritage sites or spiritually important places are identified in the project affected areas.
	9	Local Conflicts of Interest	—	D	No negative impact on local conflict could be predicted based on information of Phase II Project.
	10	Water Usage or Water Rights and Communal Rights	—	D	There are no people that are dependent on river water for domestic consumption, irrigation, etc.
	11	Sanitation	—	B	Inadequate sanitation during construction is a major cause of disease and dirty the area.
	12	Hazards (risk) Infectious Diseases such as HIV/AIDS	—	D	Almost no demand is anticipated for commercial sex workers who are potentially HIV positive and might spread the disease, based on the result of Phase II Project.
al En vir	13	Topography and Geographical Features	—	D	In the construction, dredging of river bed and filling low-lying area with dredged materials are planned. However, such works are in the limited scale.

	14	Soil Erosion	—	D	In the construction, no soil erosion which affects on wide area due to earth excavation might occur.
	15	Groundwater	—	D	No changes in volume, flow direction, lowering water level, etc., for groundwater are anticipated.
	16	Hydrological Situation	—	D	Revetments are planned to be constructed along the existing river banks. Although the channel will be deepened by the dredging, there is no change in normal water level because dredged section is within tidal affected area of Manila Bay. No change in hydrological situation is anticipated by the project.
	17	Coastal Zone	—	D	No damage to coastal zone is anticipated since site is far from coastal zone.
	18	Flora, Fauna and Biodiversity	—	D	Although construction works will damage some terrestrial flora, these can be naturally revived in time. No endangered or concerned species are identified in the construction affected area.
	19	Meteorology	—	D	Not affected or least likely affected by the construction work.
	20	Landscape	—	D	In the construction period, no obstruction to landscape views of river walk/parks is expected.
	21	Global Warming	—	D	Not affected or least likely affected by the construction work.
Pollution	22	Air Pollution	D	D	Exhaust and fumes from construction machinery will add pollutants to the air, but the pollution will be very light, temporary, and localized, and it will not be as significant an issue as the already heavily polluted air in Metro Manila Area. As Phase II project monitoring results show that the machineries and vehicle used for the construction works least likely aggregate already existing air pollution. Dust will be generated due to construction activities such as transportation, spreading, and embankment of soils, stones, etc.
	23	Water Pollution	B	B	In the project construction period, suspension of sediments and release of sediment pollutants will occur as a result of excavation/dredging in the river.
	24	Soil Contamination	B	B	Dredged materials contain some heavy metals. However, all the values taken from sediment to be dredged are less than regulatory levels set by the Philippines. It can be said that disposal of dredged materials is less likely to cause soil contamination.
	25	Wastes (including Dredged Material)	B	B	In the project construction period, generation of garbage, demolished structures, dredged material (612,000 m^3), etc. are expected.
	26	Noise and Vibration	B	B	During construction period, vibration and noise caused by construction activities add pollution to surroundings, but the pollution will be very light, temporary and localized, and it will not be as significant an issue as the already existing ones in the Metro Manila area. As Phase II project monitoring results show that the machineries and vehicle used for river channel improvement work least likely aggregate already existing noise and vibration.
	27	Ground Subsidence	—	D	No ground subsidence was reported in Phase II. Also, the same result is expected for Phase III. No ground extraction is planned in the construction.
	28	Offensive Odor	C	B	In the dredging work, offensive odor is occasionally and locally anticipated.

	29	Bottom Sediment	—	D	Since the dredging works remove polluted sediments of river, no pollution of bottom sediments are predicted.
	30	Accidents	—	B	In the project construction period, construction related accidents might occur.
A: Significant impact, B: Slight impact, C: Unknown, D: Few impact. — : Not Applicable *EIS1998) did not use JICA's method to evaluate the impact using "A,B,C and D". Evaluation results of EIS(1998) were converted to JICA's method.					

5.2 Overall Evaluation on Environmental Impacts in EIS(1998)

(a) Overall Evaluation on the Negative Impacts

EIS (1998) concluded that the overall environmental impact would be positive and that the overall benefit to society would outweigh the overall negative impact.

(b) Option "Without the Project"

Zero (without the Project) option would not help the community to prevent flood damage. In contrast, although with-project option would have certain extent of adverse impacts on natural and social environment, it would help to prevent flood damage in Metro Manila, which is the center of politics, economics, and culture of the Philippines, and hence contribute to stable economic development of the country. Since the environmental and social impacts are alleviated by the mitigation measures prepared in EIS(1998) and supplemental EIS, the total benefits to be derived will overwhelmingly outweigh the effects of the adverse impacts.

CHAPTER 6 SUGGESTED MITIGATION MEASURES AND ENVIRONMENTAL MANAGEMENT PLAN

6.1 Mitigation Measures of EIS(1998)

The following table shows the suggested mitigation measures proposed in the EIS(1998) for the possible negative impacts:

Table 6.1 Mitigation Measures in EIS(1998)

Project Impact	Mitigation Measures
Air pollution	Regularly adjusting the engines of construction machinery
	Watering to prevent dust generation when necessary during dry season
River water quality change (turbidity increase)	Preventing accidental discharge of excavated / demolished soil / materials during repair / rehabilitation works
Noise generation	Adjusting working time to avoid early morning and night and holiday as much as possible
	Regularly adjusting the engine and muffler of heavy equipment to keep an appropriate function
	Adopting less noise generation type of heavy equipments, when necessary
Impair river navigation	Adjusting mobilization and formation of vessel for piling work to avoid navigation route
Influx of outside labor and their households	Close and advance contact with LGU officials to disseminating about mobilization of labor
	Conduct of Information, Education and Communication (IEC)
Increase of demand for housing and associated utilities (water supply, toilet, etc.) of outside construction crew	Prioritizing to employ local people to reduce outside workers to immigrate and demand housing and utilities
Deterioration of sanitation level	Prioritizing to employ local people to reduce outside workers to immigrate and reside around construction site
Land acquisition and relocation / resettlement of Project Affected Families (PAFs)	Enough dialogue through Information Campaign and Publicity
	Facilitation of resettlement program to be launched by PRRC and LGUs
	Appropriate procedures for eviction/relocation of informal settlers

6.2 Mitigation Measures for Negative Impact of Phase III

The following table shows the suggested mitigation measures for the possible negative impacts:

Table 6.2 Suggested Mitigation Measures for Possible Negative Impacts

Items			Impact Evaluation (as Table 5.1)	Mitigation Measures
Social Environment	1	Involuntary Resettlement	A	Project Affected People (PAP) are relocated according to the Resettlement Action Plan which is prepared in accordance with JICA Guidelines/World Bank's related policies.
	2	Local Economy such as Employment and Livelihood, etc	D	Hire construction workers locally and prevent influx of outsiders in coordination with construction contractor and Barangay captains.
	3	Land Use and Utilization of Local Resources	D	Not necessary
	4	Social Institutions such as Social Infrastructure and Local Decision - making Institutions	D	Not necessary
	5	Existing Social Infrastructures and Services	B	Make a good coordination with Coastal Guard, related LGUs and Barangays on operations time between the barges, ferry, and boats and construction equipment so that dredged activities and construction operation might minimize interference to commercial activities. During construction of dike and reconstruction of river parks, temporary access will be provided to the residents.
	6	Poor, Indigenous and Ethnic people	D	Not necessary
	7	Misdistribution of Benefit and Damage	D	Not necessary
	8	Cultural heritage, historical and religious sites Recreational area	D	Not necessary
	9	Local Conflicts of Interest	D	Not necessary
	10	Water Usage or Water Rights and Communal Rights	D	Not necessary
	11	Sanitation	B	Provision of facilities and system at each construction site and disposal periodically by construction contractor..
	12	Hazards/ Risk; Infectious Diseases such as HIV/AIDS	D	Seminars to be conducted for construction workers by construction contractor.
Natural Environment	13	Topography and Geographical Features	D	Not necessary.
	14	Soil Erosion	D	For small scale of erosion, excavation works should be done in accordance with the design of civil works for stability.
	15	Groundwater	D	Not necessary

	16	Hydrological Situation	D	Not necessary
	17	Coastal zone	D	Not necessary
	18	Flora, Fauna and Biodiversity	D	Not necessary
	19	Meteorology	D	Not necessary
	20	Landscape	D	Not necessary
	21	Global Warming	D	Not necessary
Pollution	22	Air Pollution	D	Air quality is monitored as the same as Phase II, although it is considered to be "D". Fumes and exhaust from machinery and equipment used for Project can be reduced or prevented by properly installed and maintained mufflers and filters. CO_2 level is suppressed by frequent and timely changing of machine/engine oil and stopping excessive idling of engines. Hosing of ground is done during earth work to prevent dust from dispersing into the air. Measures such as watering, cover-sheets will be taken.
	23	Water Pollution	B	Use technology that prevents sediments from suspending/re-dissolving to the river, such as prevention sheet, watertight type eco-grab, etc.
	24	Soil Contamination	B	For dredged materials, cement will be added, which will contain the hazardous substances within cement-mixed soils. Leaching from dredged materials at disposal site should be monitored. As required based on monitoring, more adequate mitigation measures should be taken, such as use of sheets under disposal materials.
	25	Waste	B	Generated contaminated solid wastes/sediments are taken care of according to Republic Act 6969. Construction debris and work related garbage are transported to the construction contractor's office unit and disposed of according to regulation by a licensed entity. Eco-tube or cement-base pre-mix method for solidification can be used as mentioned above.
	26	Noise and Vibration	B	Noise and vibrations are reduced by using adequate machines and by installing mufflers/noise reduction devices. If necessary, construction work that involves generation of nuisance noise and vibration is carried out during less noticeable/affective times. As Phase II project monitoring results show that the machineries and vehicle used for river channel improvement work least likely affects to social and earth environment..
	27	Ground Subsidence	D	Not necessary
	28	Offensive Odor	B	Use technologies that prevent offensive odor from being generated during dredging work. For example, dredged materials on barge are covered with a plastic sheet, or stored in Eco-Tube or Cement-base pre-mix method to contain the fowl smell.
	29	Bottom Sediment	D	Not necessary
	30	Accidents	B	Prevent accidents that might occur around a construction site by looking for possible dangerous and hazardous conditions. Use billboards, Information, Education and Campaign (IEC) to the residents and construction workers to promote workplace safety awareness.

A: Significant impact, B: Slight impact, C: Unknown, D: Few impact. － : Not applicable.

*EIS（1998）did not use JICA's method to evaluate the impact using "A,B,C and D". Evaluation results of EIS(1998) were converted to JICA's method.

6.3 Environmental Management Plan for Phase III

6.3.1 Environmental Management Plan for Phase III

The following shows the suggested Environmental Management Plan (EMP) for Phase III.

This EMP will be finalized during Pre-construction stage based on the detailed construction design for Phase III.

Table 6.3 Suggested Environmental Management Plan for Phase III

No. (Table 6.2)	Impacts	Proposed Environmental Management Plan (EMP)	Implementing Organization	Cost (Pesos)
1	Involuntary Resettlement	1) Enough dialogue through Information Campaign and Publicity.	DPWH in assistance with Consultant and LGU.	P7 million
		2) Facilitation of Resettlement Action Plan (RAP).	Ditto	P7 million
		3) Appropriate procedures for Resettlement of Informal Settlers.	Ditto	Not Applicable
2	Local Economy such as Employment and Livelihood, etc. (Influx of Outside Labor and their Households)	1) Close and advance contact with Local Government Unit (LGU) officials to disseminating about mobilization of laborers.	DPWH through Consultant and Contractor.	P60 million
		2) Conduct of Information, Education and Campaign (IEC).	DPWH through Consultant.	
2	Local Economy such as Employment and Livelihood, etc. (Increase in Demand for Housing and Associated Utilities, such as water supply, toilet, etc., of Outside Construction Crews)	Prioritizing to employ local people to reduce outside workers to immigrate and demand housing and utilities.	Ditto	Not Applicable
5	Existing Social Infrastructures and Services (Impairment of River Navigation)	Adjusting mobilization and formation of vessels for construction activities to avoid navigation route in coordination with Philippine Coast Guard.	Ditto	Not Applicable
11	Sanitation (Deterioration of Sanitation Level due to Workers Presence at Contractor Campsite as Construction Workers)	1) Prioritizing to employ local people to reduce outside workers to immigrate and reside around construction site.	Ditto	Not Applicable
		2) Provision of adequate portalets for construction workers.	Ditto	P3 million
		3) Initiate training and information dissemination on proper waste segregation.	Ditto	Not Applicable
12	Hazards/Risk: Infectious Diseases such as HIV/AIDS	Seminars to be conducted for construction workers.	Construction Contractor in accordance with Construction	Not Applicable

			Contractor's Environmental Program (CCEP)	
14	Soil Erosion	1) Proper excavation/ dredging scheme and construction techniques should be applied.	Ditto	P80 million
		2) Measures such as shoring, sand bags, bracing supports, etc., are installed to prevent sudden soil erosion, as necessary.	Ditto	P200 million
		3) Excavation work is to be avoided during rainstorm.	Ditto	Not Applicable
20	Landscape	Planting of trees/shrubs/ornamental plants or landscape activities.	DPWH, DENR, LGUs, etc.	P1 million
22	Air Pollution	1) Regularly/ Properly maintaining the engines of construction equipment/machinery.	Construction Contractor in accordance with Construction Contractor's Environmental Program (CCEP)	Not Applicable
		2) Watering to prevent dust generation when necessary during dry season. Use of tarpaulins to cover loaded materials such as soils during transportation.	Ditto	P12 million
23	Water Pollution (Change in Quality of River Water such as Turbidity Increase)	Preventing accidental discharge of excavated/demolished soil/ materials during the civil works.	Ditto	P50 million
24 & 25	Soil Contamination and Waste (Disposal of Excavated/ Dredged Materials)	1) Efficient handling of dredged materials providing temporary containment facility and apply the measure to reduce high water contents for transportation and disposal.	Ditto	P650 million
		2) Use Eco-tube method	Ditto	P97 million
26	Noise and Vibration	1) Adjusting working time to avoid early morning and night and holidays.	Ditto	Not Applicable
		2) Regularly maintaining/ adjusting the engine and muffler of machinery/equipment to keep an appropriate function.	Ditto	Not Applicable
		3) Adopting less noise/ vibration generation type of heavy equipment.	Ditto	Not Applicable
28	Offensive Odor	Application of plastic sheet-cover, Eco-tube and cement/lime mix method.	Ditto	Included in Item Nos. 24 and 25.
30	Accidents	Use of billboards. Information, education and campaign to the residents and construction workers to promote workplace safety awareness.	Ditto	P1 million

6.3.2 Compliance with ECC Conditions

The conditions described in the ECC shall be followed and fulfilled by the proponent (DPWH) as stated. Compliance with ECC shall be monitored by the DPWH and a Multipartite Monitoring Team (MMT) to be set up in the proposed Phase III Project. A contractor for construction is also mandated to comply with the ECC conditions. For each ECC conditions, the following actions are proposed to be taken:

<table>
<tr><th>No.</th><th>ECC Conditions</th><th>Action to be Taken</th></tr>
<tr><td colspan="3">I. Pre-construction and Construction Stage</td></tr>
<tr><td>1</td><td colspan="2">This Certificate covers only the improvement of Pasig and Marikina river channel including construction and operation of water front amenities and Marikina Control Gate Structures having the following project activities/components;
<table>
<tr><th>River Stretch</th><th>Scope of Work</th></tr>
<tr><td>Pasig River: 6.84 km
(River mouth to Sun Juan River)</td><td>Raising of existing parapet wall and rehabilitation of revetment.</td></tr>
<tr><td>Pasig River: 9.76 km
(San Juan River to Napindan Channel)</td><td>Raising of existing parapet wall and rehabilitation of revetment.</td></tr>
<tr><td>Lower Marikina River: 5.58 km
(Napindan Channel to Marikina Control Gate Structure; MCGS)</td><td>Dredging/excavation, provision of new parapet wall and rehabilitation of revetment.</td></tr>
<tr><td>MCGS and Upper Marikina River: 1.21 km (MCGS to Mangahan Floodway)</td><td>Construction of MCGS, dredging/excavation, raising of embankment.</td></tr>
<tr><td>Upper Marikina River: 6.43 km
(Mangahan Floodway to Sto. Nino)</td><td>Excavation and raising of embankment.</td></tr>
</table></td></tr>
<tr><td>2</td><td>All other permits from pertinent government agencies shall be secured before project implementation. Likewise, the proponent should submit a Memorandum of Agreement (MOA) with Local Government Units (LGUs) pertaining to the preparation of maps identifying/showing the flood prone barangays, profile of the poor which include the families living in high risk location along the Pasig-Marikina Rivers, preparation of disaster management plan including response to flooding and greening and maintenance of project amenities as well as with the Pasig River Rehabilitation Project relative to the resettlement plan for the affected families.</td><td>To be complied by DPWH in assistance with the services of the Consultant employed by DPWH.</td></tr>
<tr><td>3</td><td>A detailed construction design and contract documents shall be submitted to this Office one (1) month prior to the start of construction.</td><td>To be compiled upon the conclusion of Contract between DPWH and Contractor, prior to the start of construction.</td></tr>
<tr><td>4</td><td>A Construction Contractor’s Environmental Program (CCEP) shall be submitted to this Office for approval 30’days before the start of construction which should contain among others, definite mitigation measures such as proper disposal of spoils and waste materials, excess concrete and wash water from transit mixers and others.</td><td>To be complied by the Construction Contractor in accordance with the Conditions/Technical Specification of the Contract between the Contractor and DPWH.</td></tr>
<tr><td>5</td><td>The project proponent shall conduct orientation for resident engineers and contractor who will undertake and</td><td>To be complied through the Project Consultant employed by DPWH. Multi-media information education campaign is one of scope of services of</td></tr>
</table>

	implement the project, to apprise them of the conditions/stipulations of the ECC and the necessary measures that will mitigate adverse environmental impacts, and submit reports of such orientation to this Office, copy furnished the Multipartite Monitoring Team (MMT).	Consultant.
6	A multi-media information education campaign shall be implemented by the proponent covering the immediate areas as well as adjacent and affected cities. The target public will include the local government unit officials and residents concerned, basic sectors which will include NGOs and POs.	To be complied through the Project Consultant employed by DPWH. Multi-media information education campaign is one of scope of services of Consultant.
7	A billboard measuring 0.5 meters by 1.0 meter bearing "ECC-98-NCR-QC301 issued pursuant to P.D. 1586" shall be displayed in a conspicuous location at the project site for identification and guidance.	To be complied by the Contractor in accordance with the Conditions/Technical Specification of the Contract between the Contractor and DPWH.
8	In case that the construction of the project temporarily stopped due to financial reason or forced majeure, measures to project and safeguard the adjacent properties and the general public should be strictly observed.	To be complied by the Contractor in accordance with the Conditions/Technical Specification of the Contract between the Contractor and DPWH.
II.	**Operation Stage**	
9	All restoration works/grading of the exposed grounds shall be immediately undertaken after construction all in accordance with the Technical Specifications of the Contract.	To be complied by the Contractor in accordance with the Conditions/Technical Specification of the Contract between the Contractor and DPWH.
10	Planting of trees/shrubs/ornamental plants or landscape activities shall be undertaken to contribute to the aesthetic value of the area and to compensate for the lost capability of the area to absorb carbon dioxide.	To be complied by inclusion in the detailed design and conditions/technical specification of the Contract with the Contractor.
III.	**Others**	
11	A separate Initial Environmental Examination (IEE) or an Environmental Impact Statement (EIS) shall be prepared and submitted to this Office for the designated/chosen disposal site.	To be carried out by the consultant during the detailed design, including coordination with concerned agencies, collection data/information, site reconnaissance, data consolidation, etc.
12	The proponent shall set up/provide a Contractor's All Risk Insurance (CARI) and Quick Response Fund (QRF) to compensate/ cover expenses for indemnification of damages to life, health, property and environment caused by the project and further environmental assessment. The QRF shall be established and committed through a Memorandum of Agreement (MOA) between and among the proponent, the LGU concerned, Non-governmental Organization's (NGO) and affected parties within sixty days (60) after the issuance of the ECC.	Submitted on May 27, 1999.
13	The Department of Public Works and Highways (DPWH) Environmental Unit (EU) together with the Project	To be complied by DPWH. DPWH EU is Environmental and Social Service Office. Project Management Office is PMO-Major Flood Control

	Management Office and Technical Consultants shall supervise the contractors, implement the EMP and other measures that may be required by this Office during construction and operation phases.	Projects, Cluster I. Environmental monitoring is one of scope of works of consultancy services of the Consultant to be employed by DPWH.
14	All the proposed environmental management measures contained in the submitted documents shall be effected.	To be complied by DPWH.
15	Project implementation and maintenance throughout its lifespan shall strictly conform with the submitted documents, any modification from the approved project scope shall be covered by another ECC application.	To be complied by DPWH.
16	Should adverse impact occur as a result of project operations, all the activities causing the same shall be immediately stopped, remedial measures shall be effected and all damages to life and property will be properly compensated to all aggrieved parties.	To be complied by DPWH.
17	The project proponent shall allocate funds or provide the financial requirements of the Multipartite Monitoring Team (MMT) and shall allow the same to conduct inspection/monitoring in the entire project area without prior notice to oversee compliance to ECC conditions and to determine the residual impacts to the environment.	To be complied by DPWH. (Environmental monitoring including preparation and operation for MMT is one of scope of works of consultancy services of the Consultant to be employed by DPWH.)
18	Additional ECC condition(s) shall be imposed if findings to protect the environment warrants.	To be complied.
19	Any false information contained in the submitted documents and non-disclosure of vital information which led to the issuance of the ECC shall render the same null and void and a ground for filing of appropriate legal charges.	To be complied.
20	This Certificate shall be posted in a conspicuous place in the Field Office for easy reference and guidance.	To be complied.
21	The project proponent shall submit to this Office a quarterly environmental monitoring report based on the submitted/approved environmental monitoring plan.	To be complied. (Environmental monitoring including preparation of quarterly environmental monitoring reports is one of scope of works of consultancy services of the Consultant to be employed by DPWH.)
22	In case the project proponent cannot comply with any of the conditions for technical reasons, a written approval from the DENR-NCR shall be secured first prior to implementation.	To be complied.

6.3.3 Possible Required Environmental Permission for Phase III

The following table shows the environmental permissions to be possibly required for the implementation of Phase III:

Table 6.4 Environmental Permissions to be Possibly Required

No.	Necessary Permission	Approved by	Requested by	Schedule for Application
1	ECC for Disposal of Excavated/Dredged Materials In case that there would be subsidiary works involved in Phase III which were not identified and not mentioned in the EIS(1998) which served as the basis for the granting of ECC, it is deemed that an amendment of the ECC or separate ECC for disposal area is necessary to include all other works to be identified. DPWH will secure a separate ECC during the detailed construction design stage.	DENR-EMB	DPWH	Upon completion of the Detailed Construction Design. Prior to start of construction.
2	LLDA Clearance Project proposed by DPWH within the Laguna de Bay Region is required to secure LLDA Clearance in accordance with Resolution No.223, Series of 2004, including clearance for disposal of excavated/dredged materials.	LLDA	DPWH	Prior to start of construction.
3	Disposal of Excavated/ Dredged Materials	LGU	DPWH	Pre-construction Stage.
4	Permission for Passage of Heavy Construction Equipment/Barge	PCG (Philippine Coastal Guard) MMDA LGUs	DPWH with Contractor	Prior to start of construction activities.
5	Construction Activities	LGUs	Contractor	Prior to start of construction activities.

6.3.4 Information Disclosure and Implementation of IEC

(1) Information Disclosure

Information on not only social and environmental concern but also structural detailed design will be disclosed properly and adequately in accordance with JICA Guidelines.

Stakeholders can access the information such as EIS(1998) report, supplemental EIS, results of detailed design, etc., at the following. Stakeholder may request the explanation with local language (Tagalog).

a) DPWH-PMO-MFCP I (Project Management Office for Major Flood Control Projects, Cluster I) in Port Area, Manila City.

b) DPWH-ESSO (Environmental Social Services Office), Central Office of DPWH, Port Area, Manila City, including website of ESSO.

c) LGUs-Manila, Makati and Pasig Cities

There are also disclosed at Barangay Halls of one of the affected Barangays in each city, where it takes about 20 minutes from the farthest affected communities by walk. Such disclosure shall start as soon as the Supplemental EIS Report is completed and last until completion of the

project. Those shall be available at all times for perusal by project stakeholders such as local residents during project's life and copying is permitted. Disclosure of EIS Reports shall be informed to public distribution of brochures.

Summary documents or brochures of EIS(1998) and Supplemental EIS written in Tagalog, will be prepared and disclosed in the Philippines.

(2) Implementation of IEC

The JICA study survey in 2010 revealed that the residents are not familiar with the improvement of Lower Marikina River of Phase III. This need can best be responded to with a campaign plan for information dissemination.

The Information Education and Communication (IEC) Plan, to be effective, shall have the following objectives:

a) To disseminate vital information about the Project, objectives, phased implementation, activities involved, and impacts.
b) To reach as wide an audience among major stakeholders of the Project.
c) To provide a venue for these stakeholders to discuss the project.
d) To enable the affected residents to have a sense of ownership of the Project which will lead to a greater support and cooperation from the public.
e) To encourage community participation in responding to flooding as a major community problem.

Cost for IEC is to be included in the cost of Consulting Services for the Phase III as the same as ongoing Phase II.

In the scope of consulting service for PMRCIP Phase II, the consultant has continuously been conducting various information campaigns in the project area that belongs to Manila City, Mandaluyong City, Makati City, and Pasig City. The campaigns are coordinated for various target groups such as government officials, general public, and students. The contents of the campaign cover many educational subjects such as importance of flood control, and necessity of river bank management work.

(3) Public Hearings/Consultations

DPWH, with assistance of the JICA Study Team, coordinated information dissemination/consultation meetings in every Barangays with PAFs in April (1st round), in July (2nd round), and August (3rd round) in 2011, and two consultations for stakeholders in July 2011 as shown in Table 6.5. City officials and Barangay Captains, as well as PAFs and any other persons concerned were invited to share the information about the project and its possible impacts and to discuss any concern of the attending parties.

Table 6.5 Record of Public Consultation

No.	Date	Time	Target Group	Venue	No. of Participants*	No. of PAFs to be Relocated in the Barangay / LGU
1	Tue. April 19,2011	14:00 – 17:00	West Rembo, Makati	West Rembo Barangay Hall	Residents: 4 (3) Officials: 10	10
2	Thu. April 28,2011	9:00 – 10.40	Barangay 900, Manila	Barangay 900 Barangay Hall	Residents: 32 (16) Officials: 10	26
3	Thu. April 28,2011	11:00 – 12:30	Barangay 896, Manila	Barangay 896 Barangay Hall	Residents: 19 (8) Officials: 9	13
4	Thu. April 28,2011	13:30 – 15:00	Barangay 897, Manila	Barangay 897 Barangay Hall	Residents: 5 (1) Officials: 15	7
5	Thu. April 28,2011	15:30 - 17:00	Barangay 894, Manila	Barangay 894 Barangay Hall	Residents: 17 (11) Officials: 8	2
6	Fri. April 29, 2011	9:15 – 10:30	Ugong, Pasig	Ugong Basket Ball Court	Residents: 77 (44) Officials: 3	-
7	Fri. April 29, 2011	10:40 – 12:00	Caniogan, Pasig	Barangay Hall	Residents: 43 (19) Officials: 3	-
8	Fri. April 29, 2011	13:30 – 15:05	Maybunga, Pasig	Barangay Hall	Residents: 18 (7) Officials: 3	-
9	Sat. April 30, 2011	11:30 – 12:10	Bagong Ilog, Pasig	Barangay Hall	Residents: 54 (29) Officials: 2	
10	Fri. July 8, 2011	14:50 – 16:15	Stakeholder	Consultant Office of Phase II	18	-
11	Mon. July 11, 2011	14:55 – 16:00	Stakeholder	Consultant Office of Phase II	11	-
12	Fri. July 15, 2011	14:35 - 16:35	PAFs in Manila	Barangay 894 Barangay Hall	Residents: 67(28) Officials: 8	48
13	Wed. July 20, 2011	10:00 – 11:45	PAFs in Makati	West Rembo Barangay Hall	Residents: 20 Officials: 8	10
14	Fri. Aug. 12, 2011	10:00 – 10:45	Owners of improvements and crops in Brgy. Maybunga, Pasig	Barangay Hall	Residents: 24(11) Officials: 2	-
15	Fri. Aug. 12, 2011	11:00 – 12:15	Owners of improvements and crops in Barangay Ugong, Pasig	Ugong Baseket Ball Court	Residents: 27(10) Officials: 2	-
16	Sat. Aug. 20, 2011	11:00 – 11:45	Owners of improvements and crops in Brgy. Bagong Ilog, Pasig	Barangay Hall	Residents: 12(9) Officials: 2	-
17	Sat. Aug. 20, 2011	8:00 – 10:30 14:00 – 15:30	Owners of improvements and crops in Brgy. Rosario, Pasig	Existing Promenade, Barangay Rosario	Residents: 42(14) Officials: 2	-

*: Number in ( ) means number of female participants. Officials include Barangay office staff.

In the consultation meetings held as the above, contents of EIS(1998) and supplemental EIS conducted in 2010/2011 in accordance with JICA Guidelines have been explained in Tagalog, showing pictures and documents. There was no request for implementing additional environmental study. No objection about implementation of the Project was heard during the

consultation meetings.

6.3.5 Institutional Plan

The Institutional Plan intends to delineate the roles and responsibilities of the key players who will be directly involved in the implementation of the Project in general and the EMP in particular.

It is reasonable to continue using the existing organizational structure and MMT of Phase II for the proposed Phase III but it needs to be improved to meet additional/new demands required by dredging activities in the lower Marikina River section.

The following is institutional relationship of ongoing Phase II:

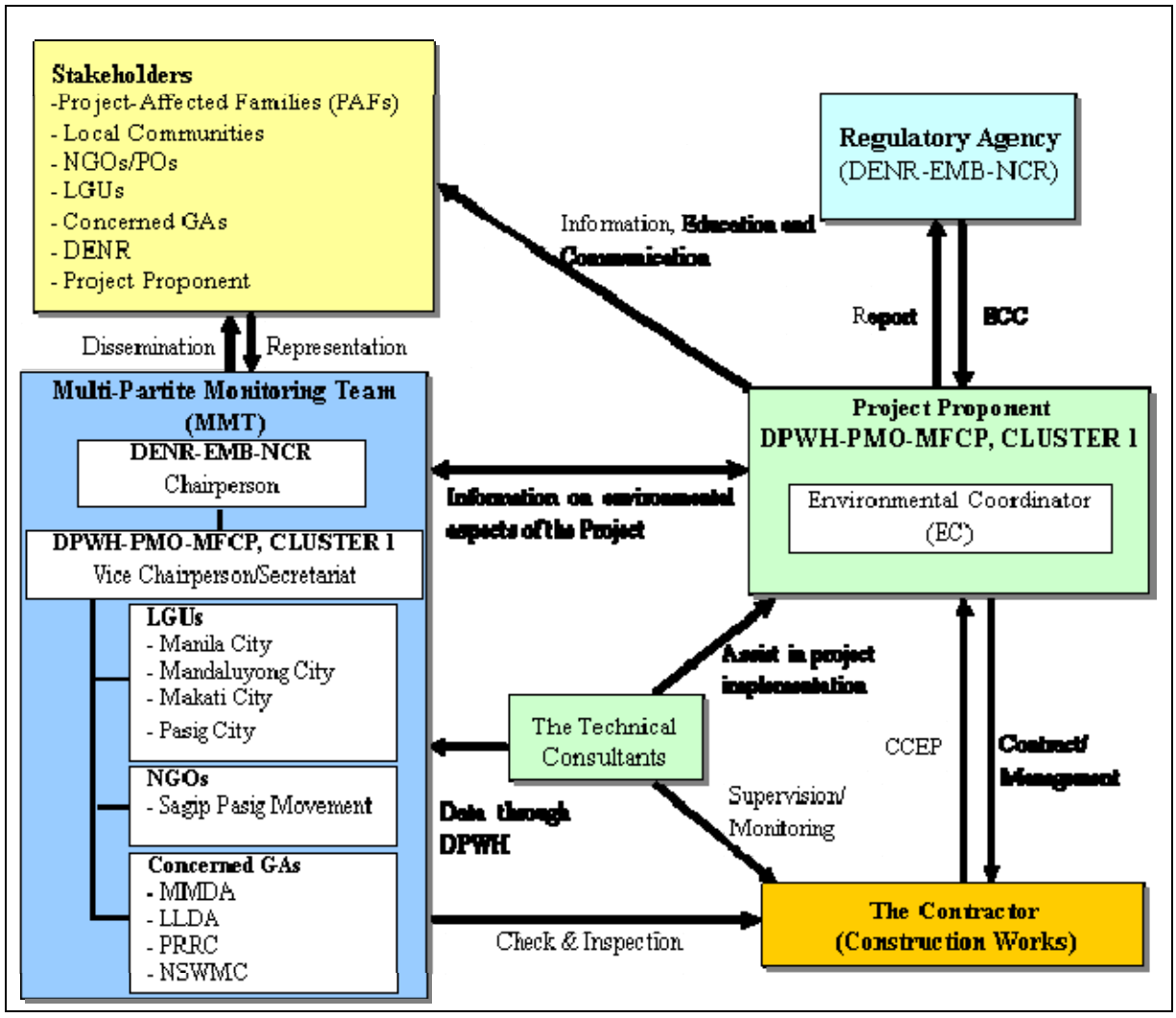


Figure 6.1 Institutional Relationship on EMP under Ongoing Implementation of Phase II

(1) PMO-MFCP I of DPWH

DPWH-PMO-MFCP I as proponent of the Project must appoint Environmental Coordinator (EC) who is responsible on environmental issue of the Project. The EC shall be tasked with the followings:

- To coordinate with the LGUs and the DENR on the environmental aspect of the preconstruction and construction activities of the Project,
- To monitor all activities relative to the ECC stipulations to ensure compliance of all requirements,
- To coordinate with the DENR on all environmental monitoring activities,
- To actively participate in the periodic consultations with all concerned sectors on the various environmental impact issues of the Project,
- To maintain records on all matters concerning the environmental aspects of the Project,
- To prepare a monthly environmental status report of the project during the construction phase and consolidate these reports for a quarterly submittal to the DENR, and
- To prepare an annual environmental status report of the project during the operation phase.

(2) Consultants

The DPWH Consultants, personnel/s in charge of environmental monitoring in particular, will assist the Proponent, DPWH-PMO, in facilitating all the necessary activities and tasks concerning the environmental aspects of the Project. The Consultants shall assign an Environment Specialist.

(3) Contractor

The Contractor shall be bound by the Contract Agreement with DPWH to implement the sound environmental protection and safety measures in the execution of the Contract Works, and to comply with all requirements of ECC conditions and EMP. To ensure this, the Contractor shall have in its employ an Environmental Manager who should be an expert in environmental engineering/management system.

(4) LGUs

The LGUs related with Phase III, Manila, Mandaluyong, Makati and Pasig cities, shall be aptly represented in the MMT. It should coordinate closely with the DPWH, DENR MMDA and concerned government agencies towards ensuring sound management of the Project and impacted environment.

(5) MMT

The MMT is a multi-stakeholder body and shall be organized to monitor compliance with ECC conditions, measures set out in the EMP and pertinent DENR rules and regulations. The MMT shall also serve as an independent evaluator that will provide check, balance and objectivity to the entire environmental monitoring process. The table below shows expected membership and its roles:

Table 6.6 Suggested MMT Components

Components	Roles
DENR-EMB-NCR	MMT Chairperson
DPWH-PMO-MFCP I (proponent)	MMT Vice Chairperson/ Secretariat
LGUs:	
Manila City	Member
Mandaluyong City	Member
Makati City	Member
Pasig City	Member
Concerned Government Agencies:	
MMDA	Member
LLDA	Member
PRRC	Member
NSWMC	Member
（Add or replace them with most appropriate government agencies for Project Phase III）	
Non-Governmental Organization (NGOs)	Member

Necessary operation costs of EMP and MMT shall be borne by DPWH as cost for consulting services of Phase III in the Project Cost.

CHAPTER 7 SUGGESTED ENVIRONMENTAL MONITORING PLAN

7.1 General

The Environmental Monitoring Plan for the Phase III will cover the construction and operation phases of the Project. This summarizes what important parameters will be monitored and where, which methodologies will be used in monitoring, and how frequent will be for measurements.

The Monitoring Plan will basically cover the following:

a) Compliance monitoring for ECC, EIS(1998), Supplemental EIS, and EMP conditions,

b) Environmental quality monitoring, and

c) Socio-economic monitoring (employment, existing social infrastructures and services, misdistribution of benefit and damage, sanitation, accident, resettlement, etc.).

In Phase III, the monitoring locations, frequencies and parameters chosen are the same as those chosen for Phase II except that Phase III includes use of monitoring locations in the lower Marikina River. An additional monitoring requirement for Phase III is that river water quality and sediment toxicity must be monitored intensively during the course of dredging work.

The monitoring plan shall include the Construction Contractor's Environmental Program (CCEP) which is mandated for a contractor to submit to the proponent (DPWH).

7.2 Environmental Monitoring Plan

The following table shows suggested environmental monitoring plan based on this review works:

Table 7.1 Suggested Environmental Monitoring Plan

	Monitoring Item	Monitoring Method	Parameter(s)	No. of Sampling / Location	Monitoring Frequency	Duration
1	Noise	Measured by noise level method	Decibels (dB)	4 points (Pasig R.) 4 points (L. Marikina R.)	Quarterly	Pre-Construction and Construction Stages
2	Air Quality	High volume sampling method	SO_2, NO_2, TSP (24 hours)	4 points (Pasig R.) 4 points (L. Marikina R.)	Quarterly	Pre-Construction and Construction Stages
3	River Water Quality (Complete)	Sampling, laboratory test and analysis	pH, Temperature, EC, Turbidity, DO, True Color, Nitrate as Nitrogen, Phosphate as Phosphorous, TDS, TSS, Conductivity, Salinity, Chloride, Oil & Grease, Cr^{6+}, Cu, Pb, Total Hg, Cd, Total Coliform, Surfactants, Phenolic Substances, Cyanide, Arsenic, Organophosphates, BOD	4 points (Pasig R.) 4 points (L Marikina R.)	Semi Annually Intensive sampling for the first dredging work	Pre-Construction and Construction Stages
4	River Water Quality	Sampling, laboratory test and analysis	BOD, TSS	4 points (Pasig R.) 4 points (L. Marikina R.)	One time every 2 months	Pre-Construction and Construction Stages
5	Generation of Excavated/ Dredged Materials	Sampling, laboratory test and analysis	Total Mercury, Cadmium, Lead, Hexavalent Chromium, Copper, Arsenic, Cyanide, Zinc, Organophosphates, PCB's, Formaldehyde	Sampling shall be done. Number/Location of samplings will be determined in the Detailed Construction Design.	Monitoring frequency will be determined in the Detailed Construction Design.	Construction Stage
6	Disposal/Re use of Excavated / Dredged materials	Field inspection and observation Groundwater sampling as necessary	Cd, Cr, Pb, Hg, As, CN, (Cu, Zn, PCB, groundwater quality std as necessary)	Sampling shall be done. Number/Location of samplings will be determined in the Detailed Construction Design.	Monitoring frequency will be determined in the Detailed Construction Design.	Construction Stage
7	Aquatic biota (if necessary as a reference data)	Identify species, number of species and abundance / density of species per station.	-Density and diversity of phytoplankton and zooplankton - Density and diversity of macrobenthic organisms, - Nekton (fish) - Aquatic flora	4 points (Pasig R.) 4 points (L Marikina R.)	Once before construction, once during construction and once after construction	Pre-Construction and Construction Stages

7.3 Monitoring/Sampling Locations

Possible monitoring/sampling locations are suggested in Table 7.2 below and Figure 7.1.

(1) As for the Pasig River sections to be constructed in the Phase III, current monitoring/sampling locations of Phase II are planed to be used.

(2) Natural environmental and pollution statuses during Phase III construction are monitored at four (4) locations on water quality, noise, vibration, air pollution and sediment/soil to be dredged. Sediments are also monitored to measure impact of dredging and terrestrial construction activities. Samples of sediment/soil are taken at the interface of the river and bank, center of the river, and during both rainy and dry seasons around the four monitoring locations.

Table 7.2 Sampling Locations for Phase III (Construction Stage)

Sections	Monitoring Sites	Objectives	Remarks
Lower Marikina River (Dredging/ Excavation of riverbed, construction of dikes, river walls, riprap for bridge pier protection and boundary bank)	Rosario Bridge	Water Quality, Flora and Fauna, Air Quality, Noise and Vibration, and Sediments/ Soil	-Around construction sites - Sediment is monitored at the edge of construction site and in the middle of the channel, at 4 points twice a year. - 1 grab sample per $1m^3$ of dredged materials is taken at a storage unit before transfer. Test one composite sample out of one load/batch of dredged material that is transported to a disposal site as one unit.
	Alfonso Sandoval Bridge		
	Vargas Bridge		
	Napindan Hydraulic Control Structure		
Pasig River (Construction of revetments with steel sheet pile foundation, and river walls)	Guadalupe Bridge	Water Quality, Flora and Fauna	- Continuing monitoring at current monitoring sites of Phase II section.
	Lapindan Bridge		
	Pandacan Bridge		
	Jones Bridge		
	Sta.Ana, Manila	Sediments/Soil, Flora and Fauna,	
	Sta.Mesa, Manila		
	Pobacion, Makati		
	Boundary of Buayang Bato, Mandaluyong and Pineda,Pasig		
	Left bank side of lower Pasig River	Air quality, and Noise	-Monitored in residential areas where noise and air pollution affect residents' lives; ensure that source of electric power for measuring devices is available.
	Right bank side of lower Pasig River		
	Left bank side of upper Pasig River		
	Right bank side of upper Pasig River		
	Places where relocated PAP	PAFs	

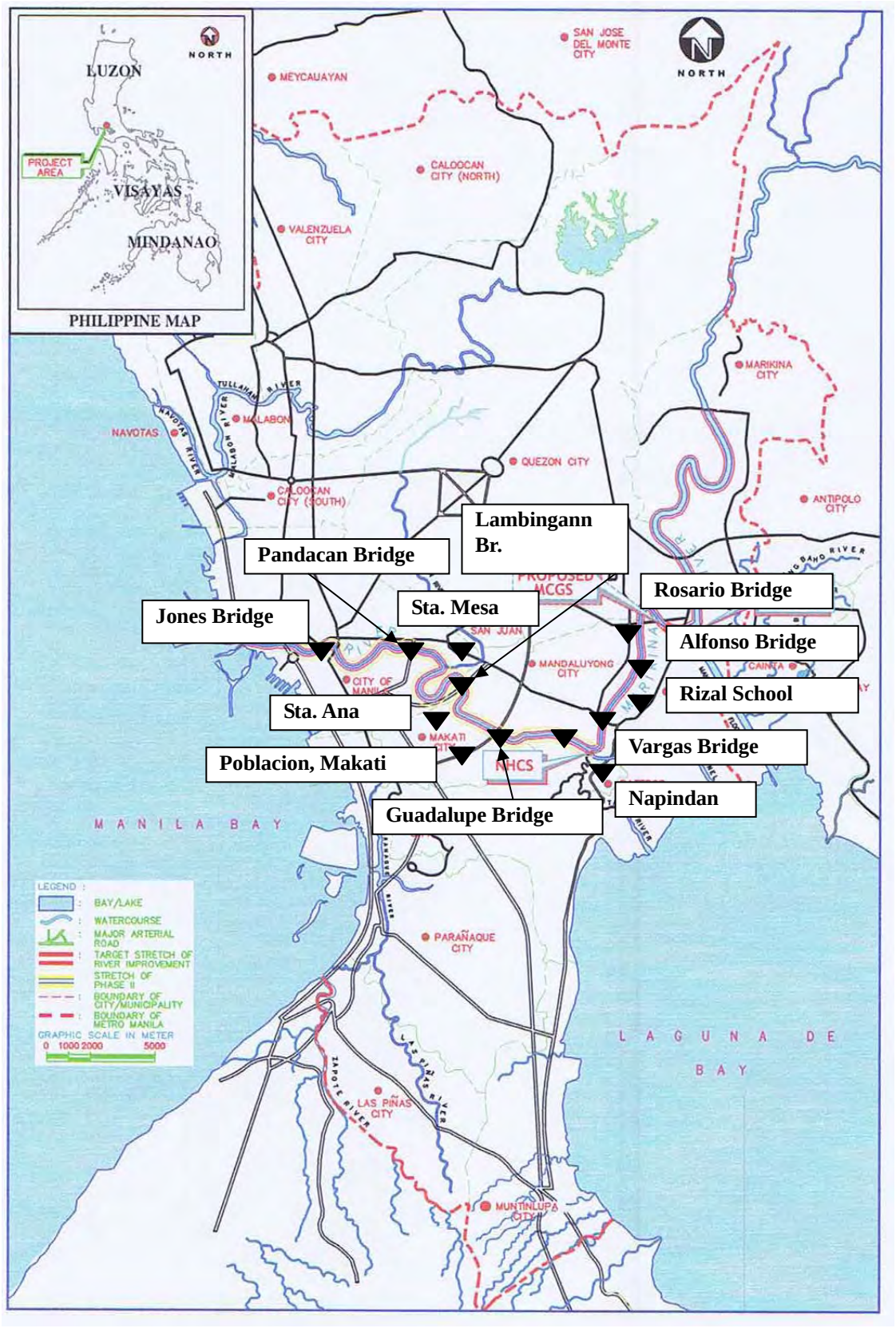


Figure 7.1 Suggested Monitoring/Sampling Locations for Phase III

7.4 Monitoring Parameters

The following standards and regulations shall be used for environmental status monitoring.

- Water Quality: DAO No. 34 series of 1990 ; Water quality criteria for conventional and other pollutants contributing to aesthetics and oxygen demand for fresh waters; Class C River water
- Air: DAO No. 14 series of 1993
- Noise: the Environmental Quality Standards for Noise in General Areas specified in Presidential Decree (PD) 984
- Vibration: To be studied (there is no known standard for vibration in the Philippines).
- Dredged/Excavated Materials: To be studied in the Detailed Construction Design and confirmed by DENR and concerned agencies (no specific standard values for sediment and dredged materials set in the Philippines)

Table 7.3 Suggested Monitoring Parameters

Water Quality	
1. Temperature	14. Arsenic (As)
2. pH	15. Cadmium (Cd)
3. Turbidity	16. Cyanide (CN)
4. Dissolved Oxygen (DO)	17. Hexavalent Chromium (Cr^{6+})
5. Electric Conductivity (EC)	18. Copper (Cu)
6. Salinity	19. Total Mercury (T-Hg)
7. Biochemical Oxygen Demand (BOD)	20. Chloride (Cl)
8. Nitrate as Nitrogen	21. Lead (Pb)
9. Phosphate as Phosphorous	22. Oil and Grease
10. Total Suspended Solids (TSS)	23. Surfactants
11. Total Dissolved Solids (TDS)	24. Organophosphates
12. Phenolic substances	25. Total coliform
13. True Color	
Air	
1.Sulfur dioxide (SO_2)	3.Particulate Matters(PM_{10})
2. Nitrogen dioxide(NO_2)	4. Total Suspended Particulates (TSP)
Sediment/ Dredged Material(TCLP Test & Elutriate Test)	
1. Total Mercury (Hg)	5. Arsenic (As)
2. Total Chromium (Cr), Hexavalent Cr (Cr^{6+})	6. Cyanide (CN)
3. Cadmium (Cd)	7.Organophosphates (“OP”)
4. Lead (Pb)	8. Zinc (Zn)
Flora and Fauna	
1. Flora (terrestrial, aquatic, phytoplankton)	2. Fauna (aquatic, zooplankton, macrobenthos)

CHAPTER 8 ENVIRONMENTAL STUDY ON DISPOSAL SITE FOR DREDGING MATERIALS

8.1 Laws and Regulations related to Dredged Materials

There are no laws and regulations to directly control or regulate the dredged materials in the Philippines.

However, the following laws and regulation shall be applied:

(1) For the dredged materials which do not contain hazardous substances

Republic Act 9003 "Ecological Solid Wastes Management Act of 2000": for the management of no-hazardous or non-toxic waste, this law seeks to adopt a systematic, comprehensive and ecological solid waste management program which shall;

a) Ensure the protection of public health and environment.
b) Utilize environmentally sound methods that maximize the utilization of valuable resources and encourage resource conservation and recovery.

(2) For the dredged materials which contain hazardous substances

Republic Act 6969 (1990) "Toxic Substances and Hazardous and Nuclear Wastes Control Act" which is a law designed to respond to increasing problems associated with toxic chemicals and hazardous and nuclear wastes. RA 6069 mandates control and management of import, manufacture, process, distribution, use, transport, treatment, and disposal of toxic substances and hazardous and nuclear wastes in the country. The Act seeks to protect public health and the environment from unreasonable risks posed by these substances in the Philippines.

DENR Administrative Order 29 (1992): RA 6969 designates the DENR as the implementing agency and clothes the same with specific functions, powers, and responsibilities. The Implementing Rules and Regulations of RA 6969 were issued under DAO No. 29 Series of 1992.

DENR Administrative Order 36 (2004): Thereafter, the Procedural Manual of DAO 29, a comprehensive documentation on the legal and technical requirements of hazardous waste management, was issued in 2004.

(3) Other Related Laws and Regulations

No. of Law/Regulation	Year	Title/Description
Presidential Degree (PD) 825	1975	Providing penalty for improper disposal of garbage and other forms of uncleanliness and for other purposes.
PD 856	1975	Code on sanitation of the Philippines which prescribes guidelines, requirements and restrictions to ensure cleanliness in various establishments such as restaurants, hospitals, hotels, etc.
PD 1152	1977	Philippine Environmental Code. Providing a basis for an integrated waste management regulation starting from waste source to methods of disposal. PD 1152 has further mandated specific guidelines to manage municipal wastes (solid and liquid), sanitary landfill and incineration, and disposal sites in the Philippines.
DAO 34	1990	Revised water usage and classification for water quality criteria amending Section Nos. 68 (Water Usage and Classification) and 69 (Water Quality Criteria), Chapter III of the 1978 NPCC Rules and Regulations.

DAO 35	1990	Revised Effluent Regulations of 1990, revising and amending the effluent regulations of 1982.
DAO 26-A	1994	Philippine Standard for Drinking Water 1993 under the revision of Chapter II, Section 9 of PD 856 (Code on Sanitation of the Philippines).

8.2. Status of Riverbed Sediment Quality

The following shows the previous data/information on riverbed sediments.

(1) Sediment Quality by Elutriate Test

All the values taken from the lower Marikina River are less than regulatory levels set by the Government of the Philippines. This indicates a decreased likelihood that dredging causes significant levels of toxicity to occur in the river water.

Table 4.5 Inorganic Chemicals in Sediments[1] (mg/L)

Sampling Location	Cadmium	Chromium	Copper	Lead	Mercury	Zinc	Arsenic	Cyanide
Napindan gate	0.0011	0.0028	0.0203	nil	nil	0.0368	0.0015	nil
Vargas bridge	0.0020	0.0020	0.0179	nil	nil	0.0381	0.0010	nil
Alfonso S. bridge	0.0020	0.0038	0.0097	0.0038	nil	0.1239	0.0014	nil
Rosario bridge	0.0016	0.0007	0.0189	0.0008	nil	0.0416	0.0017	nil
Hazardous[2]	*5.0*	*5.0*		*5.0*	*0.2*		*5.0*	
Class-C River[3]	*0.01*	*0.05*		*0.05*	*0.002*		*0.05*	*0.05*
Effluent to Class-C[4]	*0.05*	*0.1**		*0.3*	*0.005*		*0.2*	*0.2*
TCLP regulatory[5]	*1.0*	*5.0*		*5.0*	*0.2*		*5.0*	

* As Cr^{6+}

Source: 1. Phase I (Detailed Design in 2001); 2. Procedural manual Title III of DAO 92-29 "Hazardous Wastes Management", DAO36(2004); 3. DAO 90-35; 4. DAO 90-35 Table 1 Effluent Standards (maximum limits for the protection of public health): Discharge limit from new/proposed industry to Inland water (Class C); 5. US EPA

(2) Sediment Quality by TCLP

The Pasig River Rehabilitation Commission (PRRC) and Phase I (Detailed Design in 2001) of this Project have been monitoring. Since there are environmental quality criteria or guidelines for contaminated soils and sediments in the Philippines, regulation values of some developed countries are used for reference. According to these data, the concentrations of toxic substances in the river sediments are within the acceptable levels of the reference guidelines of some developed countries.

Table 4.4 Inorganic Chemicals in Sediments (mg/kg-dry weight)

Sampling Location (Bridge)		Sampling Date	Cadmium (MDL[1]=0.9)	Chromium	Copper	Lead (LOQ[2]=20)	Mercury (LOQ=0.2), (MDL=0.04)	Nickel	Zinc
Marikina	Marikina	08/06/09	<MDL	42	101	12.5	<MDL	33.5	185
		12/11/09	<MDL	35.5	99	19.85	0.055	32	195
	Rosario (Lower Marikina)	2001	0.55	(1.11*)	75.57	14.88	<0.003		99.45
↓	Alfonso (Lower Marikina)	2001	0.91	(0.92*)	83.23	13.53	<0.003		99.45
Laguna lake	Vargas (Lower Marikina)	08/06/09	<MDL	56.5	125.5	25	0.19	38	320
		12/11/09	<MDL	36	113.5	26	0.15	36.5	239
		2001	0.89	(1.16*)	108.9	63.57	0.15		263.59

	Napindan	08/06/09	<MDL	29	79	12	0.06	14.50	125
		12/11/09	<MDL	28.35	102.5	17.5	0.050	27	202.5
		2001	0.55	(0.96*)	97.79	37.87	0.17		289.29
	Bambang	08/06/09	<MDL	33.5	91.5	45	0.089	19.5	250
		12/11/09	<MDL	28	81	42.5	0.08	27	250
	Ilugin	12/11/09	<MDL	16.2	59.5	21.5		12.5	205
Japan		*Solid Pollution*	*150*	*250*		*150*	*15*		
Allowable value in Canada[3]		*Agriculture*	*3*	*8*	*150*	*375*	*0.8*		*600*
		Residential	*5*	*8*	*100*	*500*	*2*		*500*
		Commercial	*20*		*500*	*1000*	*10*		*1500*
Washington State		*Sediment standard*	*5.1*	*260*	*390*	*450*	*0.41*	*140*	*410*
UK (ICRCL)		*Garden use*	*3*	*25*[4]	*130*	*500*	*1*	*70*	*300*
		Parks	*15*	*1000*[5]	*130*[6]	*2000*	*20*	*70*[6]	*300*[6]
The Netherlands		*Target value*[7]	*0.8*	*100*	*36*	*85*	*0.3*	*35*	*140*
		Intervention[8]	*20*	*800*	*500*	*600*	*10*	*500*	*3000*

Method of Analysis: GC/MS (Scan Method, acquisition) determination after extraction with methanol in DCM and hexane and cleanup in alumina column

*As Cr^{6+}

1. MDL: Method Detection Limit; 2. LOQ: Limit of Quantitation; 3. Interim Canadian Environmental Quality Criteria for Contaminated sites (in EIS, 1998); 4. As Hexavalent (Cr^{6+}); 5. As Total Cr; 6. As long as plants grow; 7. Dutch's final environmental quality goal value; 8. The degree of soil quality that is required a clean-up work.

Source: PRRC and Phase I (Detailed Design in 2001).

On the other hand, EIS(1998) Report stated that *"A PRRP report on the "Preliminary Assessment of the Water Quality of Laguna de Bay with and without Flushing of Pasig River" prepared by the Water Quality Institute (1993) revealed that heavy metals were not found in suspended and bed sediments in any significant concentrations. In addition, the study concluded that the concentrations of the heavy metals, such as cadmium, chromium, copper, nickel, lead, zinc, and mercury are low. These concentrations correspond to normal background values in slightly polluted sediments.*

8.3 Further Study on Dredged Materials during Detailed Construction Design

While previous studies indicate that hazardous chemicals especially heavy metals in riverbed sediment were not present in excessive amount and did not easily leach out, this situation could change, if discharge of pollutants into the river would continue unabated. It could lead higher pollution load such that the results of the previous studies may no longer hold true.

Dredging/excavation works are expected to generate significant amount of disposable materials in the Phase III. The quality of these materials in terms of concentration of hazardous or toxic chemicals may influence the construction methodology as well as the handling, selection of appropriate disposal area and disposal methodology for the dredged materials.

On account of the above conditions, a further environmental survey covering riverbed sediments should be made as a component of the detailed construction design for the Phase III, namely:

a) To update the baseline data for environmental management and monitoring plan,

b) To determine the existence of heavy metals and/or other contaminants and their concentrations in the river sediment, and

c) To further study in deciding appropriate methodologies for contaminated dredged materials in dredging, excavation and disposal in addition to the cement based pre-mix method proposed in this study.

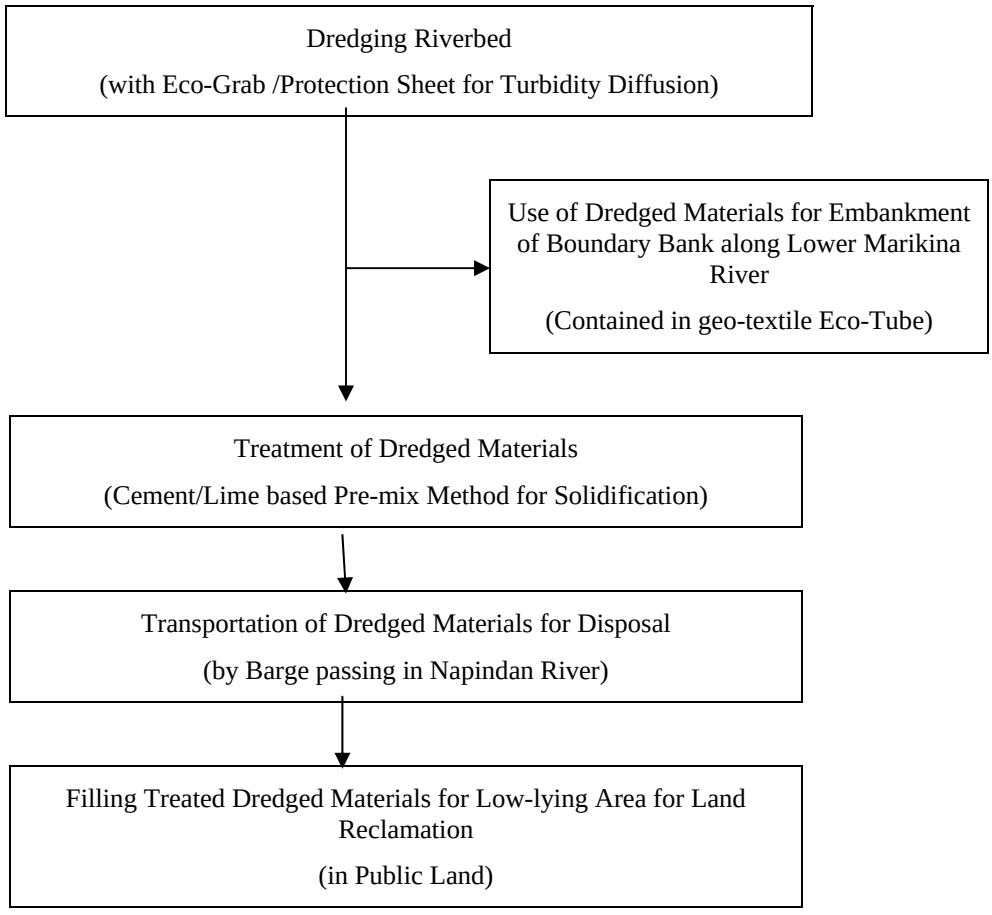
8.4 Procedure of River Dredging Works

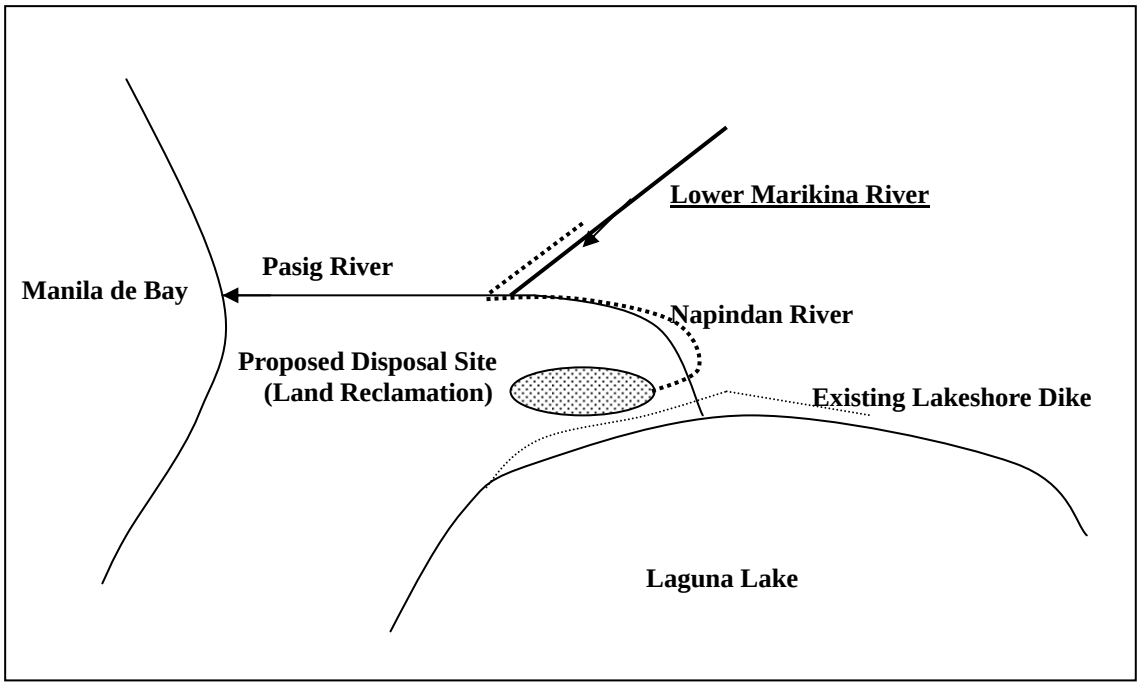
For the purpose of flood control, riverbed soil of 612,000 m^3 in total are dredged. Part of dredged materials, which are packed in geo-textile eco-tube, are planned to be used for the embankment of Boundary Bank Works along the Lower Marikina River. The remaining materials are transported to the designated disposal area for land reclamation, as follows:

(Unit: m^3)

Volume of Generated Dredged Material	Volume to be Used for Boundary Bank (in Eco-tube) at Site	Volume for Disposal for Land Reclamation
612,000	50,100	561,900

The following shows the proposed procedure of Dredging Works:



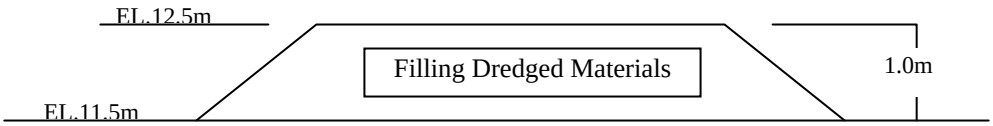


8.5 Proposed Disposal Site (Reclamation Area)

Dredged materials will be treated with soil admixtures by Cement/Lime based Pre-mix Method to solidify and increase strength and deposed as filling materials for land reclamation. After treatment, dredged materials are transported by barges using the Napindan River to the disposal site.

At the low-lying disposal site (reclamation site), dredged materials will be embanked about 1 m high from the existing ground elevation 11.5 m. Necessary disposal area is 62 ha which is public land under the administration of LLDA.

Before starting the filling work, clearance of LLDA and LGU-Taguig will be necessary. LLDA' clearance includes filling material (sediment) quality.



8.6 Current Environmental Situation in/around the Disposal Site

Area in/around the proposed disposal site is in Taguig City, Metro Manila, and located in the northern shore of the Laguna Lake. The area is low flat land. Before the Metro Manila Flood Control Project – West of Mangahan Floodway completed in 2007 which aimed to prevent the area from high water levels of Laguna Lake, the area was subject to inundation during high water of lake.

(1) Climate and Hydrology

Item	Description
Climate	The area lies within the Philippine region classified as having Type I Climate. It has two pronounced seasons; dry season (November – April) and wet season (May – October).
Rainfall	Maximum rainfall occurs from the months of June to October or during the prevalence of the southwest monsoon rains. The mean annual rainfall within the Pasig-Marikina-Laguna Lake Basin ranges from 1700 mm to 3200 mm.
Hydrology (Laguna Lake)	Laguna Lake with 900 km^2 and 220 km shoreline is a shallow lake. Water levels of Laguna Lake depend on the seasonal variation; from EL. 10.5 m in average annual minimum and EL. 12.5 m in average annual maximum. Laguna Lake is a brackish water. Recent recorded high water level is about EL. 15.0 m at the time of Typhoon Ondoy in September 2009.
Water Quality (Laguna Lake)	Lake water quality is being monitored by the LLDA at various points within lake. Waters of Laguna Lake near the proposed area are within the standard for Class C fresh surface waters.
Groundwater	During dry season groundwater level is about 2 m below existing ground. During rainy season, the low-laying area is submerged.

(2) Geology, Topography and Soil

Item	Description
Geology	The area is located within the Quartenary Marikina Valley Alluvial Plain which is between the hills of Guadalupe Formation and the Sierra Madre Range. The Guadalupe Formation is a thick sequence of tuff, volcanic breccias, conglomerates, sandstone and mudstone. There are two prominent faults found in the area, namely, the Marikina Valley Fault and the Binangonan Fault.
Topography	The area is situated at the southern end of the Marikina Valley bounded by the Guadalupe Formation Lowland on the west (EL. 2- to 200 m) and the Sierra Madre Range (EL. 100 to 300 m) on the east. The Laguna Lake bounds the area to the south and the Pasig-Marikina River lies to the north of the area. Generally, the terrain of the area is described to be low-lying flat land.
Soil	Soils of the coastal landscape type consists predominantly of fluid marine deposits of sandy materials, mostly found in fresh water marshes. The soils in the broad and alluvial plains are often subjected to seasonal flooding as evidently shown by the high clay content that ranges from 40 to 70%. The physico-chemical characteristics of the substrate in the terrestrial communities in/around the area are; soil texture (C;lay-Clay-Loam), soil depth (0 – 200m), soil drainage (poor) and pH (5.6 – 7.8). Eighty-six % of the soils of Laguna Lake basin are volcanic in origin, the rest is composed of alluvial and fluid marine deposits. The soil media within and around the area is relatively homogenous specially in those localities occupying the low-lying areas and is flat or plain.
Soil Erosion	The area is in the area of no sheet erosion and no gullying.

(3) Land Use

Current land use in/around the proposed disposal site are:

a) Present land use of proposed disposal area is open area covered by natural grass.

b) Present land use around the disposal areas is open area, agricultural land and residential area.

c) Near the disposal site, there are the existing flood control structures such as Lakeshore road-dike and drainage pumping station along the Laguna lakeshore.

(4) Flora and Fauna

The area is generally homogenous in terms of non-productive grass vegetation in unused area. There are no trees observed.

Domestic animals and birds are commonly found around the area. There are no endangered species of either flora and fauna found in the area.

8.7 Preliminary Assessment of Impacts around the Disposal Site Caused by Reclamation Works of Dredged Materials

Major predicted environmental impacts during construction and operation phases are preliminary discussed below. Detailed IEE/EIS will be conducted in the next stage as mentioned in Section 8.3.

No	Item	Description
1	Air Pollution	During construction, air pollution is predicted due to use of heavy equipment. However, the magnitude of the rate of of emission of these exhaust gases are relatively small and could be easily dispersed by surrounding air since the area is described as an open space.
2	Noise and Vibration	Due to the construction activities, noise and vibration by heavy equipment such as dump trucks and bulldozers.
3	Dust	Dust is moderately generated by transportation, spreading, and embankment of soil during the dry season.
4	Traffic Condition	After unloaded at Napindan River from barge, dredged materials are hauled on the temporary road constructed in the open area. No negative impact is predicted.
5	Flora and Fauna	A loss of flora species due to reclamation can be easily restored. Domestic animals and birds are commonly found around the area. There are no endangered species of fauna existing in the area.
6	Soil Pollution/ Groundwater	In case the dredged materials contain hazardous substances, these will contaminate the original soil of disposal site.
7	Water Quality	In case the dredged materials contain hazardous substances, when existing drainage channel overflows due to flood, there is possibility to effect on water quality around the disposal site.

8.8 Environment Management Plan for Disposal of Dredged Materials

The preliminary Environmental Management Plan including Mitigation Measures and Monitoring Plan for treatment of dredged materials is tabulated below. In the next stage, detailed construction design, applicable and proper mitigation measures will be studied and proposed.

No.	Impacts	Proposed EMP	Implementing Organization	Respo'ble	Monitoring	Cost (Pesos)
1	Air Pollution	Regularly and properly maintaining the engines of equipment/ machinery.	Construction Contractor in accordance with Construction Contractor's Environmental Program (CCEP)	DPWH	1 point at Disposal Site. Quarterly during Pre-construction & Construction Phases	N.A.
2	Noise and Vibration	Regularly maintaining and adjusting the engines and mufflers of equipment/machinery to keep an appropriate function. Adjusting working time to avoid early morning and night and holidays.	Construction Contractor	DPWH	1 point at Disposal Site. Quarterly during Pre-construction & Construction Phases	N.A.
3	Dust	Watering to prevent dust generation when necessary during dry season. Use of sheets to cover loaded or embanked materials.	Construction Contractor	DPWH		P10 M.
6	Soil Pollution/ Ground Water	Apply dredged materials mixed with cement/lime to confine the hazardous substances to prevent leaching of contaminants into groundwater.	Construction Contractor	DPWH	Sampling, laboratory test and analysis. 4 point at in/around disposal site. Quarterly during Pre-construction, Construction & Operation phases.	P650M.
7	Water Quality	Apply dredged materials mixed with cement/lime to confine the hazardous	Construction Contractor	DPWH	Sampling, laboratory test and analysis.	Included in No. 6 above.

		substances to prevent leaching of contaminants into adjacent surface.			1 point at Drainage Canal. Quarterly during Pre-construction, Construction & Operation phases.	

8.9 Implementation Plan of Separate IEE/EIS for Disposal Site

In accordance with the condition of ECC for the Project, a separate Initial Environmental Examination (IEE) or an Environmental Impact Statement (EIS) will be prepared and submitted to the DENR for the disposal site.

This study will be conducted during the detailed construction design in 2012 and a separate ECC for disposal site will be obtained from the DENR.

Proposed implementation schedule for IEE/EIS is as follows:

No.	Item	1st Month	2nd Month	3rd Month	4th Month	5th Month	6th Month
1	Understanding of Project Features	—					
2	Site Reconnaissance/ Identification of Potential Impacts	—					
3	Secondary Data Collection	—					
4	Sediment Sampling & Analysis	—	—				
5	Surface Water, Groundwater, Biological Survey, etc.	—	—				
6	Study/Preparation of Report		—	—			
7	DENR Evaluation				—	—	—

8.10 Methods and Procedure of Disposal of Dredged Materials in Case of Hazardous Substances Contained

It is proposed to add the cement or lime to dredged materials for solidification. This method is also useful to confine the hazardous substances in mixed soils.

Detailed methods including alternatives such as application of geotextile layers, etc., and procedure will be studied and planned in the Detailed Construction Design for execution.

CHAPTER 9 ENVIRONMENTAL EVALUATION IN THE OPERATION PERIOD OF THE PHASE III

The possible positive and negative impacts and suggested each mitigation measure in the operation period of the Phase III are forecasted and summarized in the table below.

Concerning the natural environment and pollution items, a few possible negative impacts might be occurred by the Project. Therefore, it is not necessary to conduct any specific mitigation measures and monitoring activities for the natural environment and pollution items in the project operation period.

Table 9.1 Possible Impacts and Suggested Mitigation Measures in the Operation Phase of Phase III

Item		Impact		Explanations and Suggested Mitigation Measures
		Positive	Negative	
Social Environment:	Local Economy such as Employment and Livelihood, etc	A	-	**Positive**: Losses of properties and lives are reduced considerably and lives of people on the directly and indirectly affected areas are stabilized which allows improvement of household economy.
	Land Use and Utilization of Local Resources	A	-	**Positive:** developed area will be protected from habitual floods and flood disaster be reduced.
	Social Institutions such as Social Infrastructure and Local Decision - making Institutions	A	-	**Positive**: Community based organizations /groups that help developing and exercising preparedness and cooping mechanism to flood disaster are formed as part of non-structural measure.
	Existing Social Infrastructures and Services	A	-	**Positive**: Existing social infrastructures and services will be protected from the habitual floods.
	Misdistribution of Benefit and Damage	D	C	**Negative**: There might be unequal mitigation results in places with and without the Project. The areas that the Project improved river protective banks might raise their land price and business opportunities while the other would not receive such benefit. LGU level land use plan must taking into account leveling such inequity.
	Sanitation	A	D	**Positive**: Reduction of flood incidence would also reduce frequency of water born disease which often occur after flood or prolong stagnation of ponding water.
	Hazards/ Risk; Infectious Diseases such as HIV/AIDS	D	C	**Negative:** As economic activities increases as a positive effect of the Project, new businesses also expects. On the other hand, outside workers who have statistically higher prevalence rate of HIV/AIDs and other STDs. Behavior Change Communication shall be employed to disseminate appropriate information about these diseases.

A: Significant impacted, B: Slight impact, C: Unknown, D: Few impact -: Not Appilicable

CHAPTER 10 CONCLUSION AND RECOMMENDATIONS

The EIS(1998) has concluded that the proposed project can be implemented in an environmentally acceptable manner. The total benefits to be derived will overwhelmingly outweigh the effects of the adverse impacts. Environmentally, the proposed project is beneficial since it is actually a mitigating measure against the annual adverse impacts of a natural hazard.

In addition to the EIS(1998), the Supplemental EIS Study has been conducted in the JICA Preparatory Study to comply with the JICA Guideline for the proposed implementation of Phase III. Through the supplemental study and evaluation, it is conformed that the Project can be implemented in an acceptable manner.

Through this review/supplemental study, the following are recommended to be done before commencement of the construction of Phase III:

a) Project's information dissemination and communication shall be provided to PAPs via a mobile ICP (information, communication and publicity) team once the construction starts in such way that Phase II Project does.

b) ICP team uses local language in communicating with PAPs instead of solely depending on a written report of EIS and RAP. Essence of the Project shall be informed in this manner.

c) Update/ Measure and revise the concerned environmental data of baseline status of natural and social environment are necessary before the Phase III construction work starts.

d) Detailed and appropriate testing of dredged material should be prepared in accordance with DENR's policy.

CHAPTER 11 ENVIRONMENTAL CHECKLIST

Environmental checklists for the Project based on a JICA Environmental Checklist for River Channel Improvement Project Form are shown as follows:

Category	Item	Main Check Item	Negative Impact (Yes/No)		Confirmation of Environmental Considerations (Reasons/Mitigation Measures)
1. Permits and Explanation	(1) EIA (EIS*) and Environmental Permits * NB: In the Philippines, "EIA" system is called "EIS (Environmental Impact Statement)	(a) Have EIA reports been officially completed?	Y		"The Pasig-Marikina River Channel Improvement Project Environmental Impact Statement (Final Report), 1998" was complied with PIESS requirement and endorsed by DENR.
		(b) Have EIA reports been approved by authorities of the host country's government?	Y		EIA report was approved by the DENR-EBM of Government of the Philippines. Then, ECC was issued in 1998. Validation of the ECC was confirmed in 2008.
		(c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied?	Y		EIA has been approved conditionally in the ECC. No claim or penalty was imposed yet. MMT monitors the compliance with ECC conditions for Phase II of the Project.
		(d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	Y		All necessary documents have been submitted and approved by the concerned agencies including DENR and LLDA.
	(2) Explanation to the Public	(a) Have contents of the project and its potential impact been adequately explained to local stakeholders based on appropriate procedures, including information disclosure? Has understanding of Local stakeholders been obtained?	Y		Since the beginning of the Project, stakeholders have been informed and involved; Such stakeholders are: LGUs, PRRP, Star Craft Ferry Corp., DENR-NCR office, EMB, MMDA, NGOs, LLDA, etc. A public awareness meeting was held on May 20, 1998 in Manila to disseminate information about the entire Project. All the concerns were taken care of and/or considered through the Scoping workshop. Multi-party Monitoring Team (MMT) has been holding quarterly meetings to explore, consider, and address PAP concerns. Information Campaign and Publicity (ICP) Team carries out periodic activities in order to disseminate information regarding the Project under the implementation of Phase II since 2008. Several public consultation meetings with stakeholders have been held in 2011 for Phase III.
		(b) Have comments from stakeholders (such as local residents) been reflected to the project design?	Y		The most important public consultation was held on February 27, 1998 by DPWH at its central office in order to work to formulate a Scoping matrix which reflects stakeholders' social and environmental concerns regarding the project design. Also, through frequent meetings hosted by DPWH and mediated by Barangay captains, Stakeholders' comments reflected in the design as much as possible through detailed design stage and construction in Phase II.
	(3) Examination of Alternatives	Have alternative project plans been examined in light of	Y		An alternative (i.e. Zero-Option) plan was considered in the EIS(1998). EIS(1998) concluded

		social and environmental considerations?			that the zero (no project) option would not help the community to prevent flood damage. Also, alternative plans in light of social and environmental aspects were considered in the feasibility study, to minimize land acquisition and affected structure/families in the highly urbanized project area.
2. Pollution Mitigation Measures	(1) Water Quality	Is there a possibility that changes in river flow downstream (mainly water level drawdown) due to the project will cause areas to not comply with the country's ambient water quality standards?	Y		The project helps in controlling river water flow in a flood event which itself does not change water quality. During the construction period, it might temporarily increase suspended solids by working in and on the river bank and dredging. However, the adverse effects caused by construction activities can be negligible when compared with existing water pollution levels and size of the rivers. Also, in the event of large-scale dredging, the project plans to use dredging techniques that minimize suspension of sediments.
	(2) Wastes	In the event that large volumes of excavated/dredged materials are generated, are the excavated/dredged materials properly treated and disposed of in accordance with the country's standards?	Y		The soils generated in the Project are tested and disposed of properly in accordance with regulations in the Philippines. They are transported and used as fill-material for low land areas. EIS shall be conducted for the disposal area in accordance with ECC conditions prior to start of construction.
	(3) Subsidence	Is there a possibility that the excavation of waterways will cause groundwater level drawdown or subsidence? Are adequate measures taken, if necessary?		N	No effect or a negligible effect on groundwater and subsidence will be caused by construction works, based on the examples of structural construction in/around the sites.
3. Natural Environment	(1) Protected Areas	Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?		N	According to "Statistics on Philippine Protected Areas and Wildlife Resources (2004)", there is one protected area in NCR, "Quezon Memorial; Ninoy Aquino Parks and Wildlife Nature Center" in Diliman, Quezon City, which is different from a protected area established for nature preservation purposes. The Project will be unlikely to affect the Parks since construction sites are well distanced from it.
	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)?		N	These are no primeval forests, tropical rain forests, or ecologically valuable habitats that were recorded according to "2004 Statistics on Philippines Protected Areas and Wildlife Resources, Protected Areas and Wildlife Bureau (PAWB), DENR". Some mangrove areas exists in Manila Bay, but it is unlikely that the project will affect them. According to LLDA report, the Pasig-Marikina River has been declared to be "biologically inactive…" and "…no longer classified as class C" for a long time. No rare species have been found in quarterly monitoring of the areas during Phase II.
		(b) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions?		N	No protected habitat of endangered species designated by the country's laws or international treaties and conventions has been reported thoughout Phase II environmental monitoring and on DENR's report. The same is expected to be the case for Phase III. Construction and dredging activities are held within the already highly-developed Metro Manila area, exclusively in and along the already highly-polluted and

					disturbed Pasig-Marikina River.
		(c) If significant ecological impact is anticipated, are adequate protection measures taken to reduce the impact on the ecosystem?	N/A	N/A	It is not anticipated that the project or its construction activities will have a significant ecological impact.
		(d) Is there a possibility that hydrologic changes, such as reduction of river flow or seawater intrusion upriver will adversely affect downstream aquatic organisms, animals, vegetation, and ecosystems?		N	The construction of river walls is on the edges of river banks and has a very negligible effect on downstream ecosystems, and flow is predicted in comparison with river size.
		(e) Is there a possibility that changes in water flows due to the project will adversely affect aquatic environments in the river? Are adequate measures taken to reduce the impacts on aquatic environments, such as effects on aquatic organisms?		N	The Project does not change the river's flow pattern or volume of the river while the river banks are reinforced and protected in normal circumstances.
	(3) Hydrology	Is there a possibility that hydrologic changes due to the project will adversely affect surface water and groundwater flows?		N	No possibility.
	(4) Topography and Geology	Is there a possibility that excavation of rivers and channels will cause a large-scale alteration of the topographic features and geologic structures in the surrounding areas?		N	No change in topography is anticipated. Disposal sites for dredged materials taken from the Pasig-Marikina River can raise disposal site elevation, but only on a very localized and negligible scale.
4. Social Environment	(1) Resettlement	(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impact of resettlement?	Y		A census was conducted in November 2010. It was found that there are 58 household to be affected by the construction activities of the Project along the Pasig River. In the process of planning and designing of the Project, efforts on structural components and construction methods are made to minimize the number of households to be affected.
		(b) Is adequate explanation regarding relocation and compensation given to affected persons prior to resettlement?	Y		Explanation on compensation and resettlement assistance were given to Project Affected Families (PAFs) and related LGUs/Barangays prior to resettlement in April and July 2011.
		(c) Is the resettlement plan, including proper compensation, restoration of livelihoods and living standards, developed based on socioeconomic studies on resettlement?	Y		Resettlement Action Plan including information of the target households, their socio-economic condition, and compensation package with full replacement costs is currently prepared by the DPWH.
		(d) Is compensation going to be paid prior to resettlement?	Y		The compensations shall be paid prior to the resettlement.
		(e) Are compensation policies prepared in document?	Y		Compensation policies are documented in the Resettlement Action Plan.
		(f) Does the resettlement plan pay particular attention to vulnerable groups or persons, including women, children, the elderly, people living below	Y		There are no indigenous peoples living in the project area. As a custom operation of resettlement, staff of welfare department of the LGUs will attend the demolition work so that the rights of the vulnerable

		the poverty line, ethnic minorities, and indigenous peoples?			people are not violated. Also, when the households are transported to the resettlement sites, special arrangements will be provided for the elderly and those with difficulty in mobility.
		(g) Are agreements with the affected persons obtained prior to resettlement?	Y		During the public consultation meetings held twice so far, information was distributed orally, questions were raised and answered, and PAFs showed understandings about the resettlement plan. Final agreements with the affected households are to be obtained at the final stage of preparation of the resettlement activity. The official documents of agreement are obtained prior to resettlement.
		(h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan?	Y		DPWH, as a project implementing agency, will attend the Local Inter-Agency Committees (LIAC) which iwas already established in affected LGUs, Manila and Makati, for implementation of resettlement. Using the organizational framework, LIAC, DPWH will be able to implement the preparation and implementation of resettlement properly and effectively. The budget for the implementation of the resettlement plan will be secured in the Project Cost.
		(i) Have any plans been developed to monitor the impact of resettlement?	Y		Internal Monitoring will be conducted by DPWH (ESSO, PMO and Consultant). External Monitoring Team will be contracted by DPWH. Check lists for both Interior and External Monitoring are included in the Resettlement Plan. Cost for the external monitoring is to be included in the Consulting Services.
		(j) Is the grievance redress mechanism established?	Y		DPWH (PMO-MFCP I) will be the window for receiving opinions, consultations and complaints. Information about contact numbers and names were shown on board during the public consultation meetings in July 2011. LIAC in each LGU will also work as the window. PAFs may go to LGU staff (offices for social welfare or urban poor affairs) for expressing opinions, consultations and complaints. All received opinions will be transfered to the LIAC (Sub-Committee for Beneficiary, Selection, Awards and Arbitration) for immediate action.
	(2) Living and Livelihood	(a) Is there a possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts, if necessary?	Y		There is a possibility that some informal settlers who are living on riverbanks and in right-of-way areas will be relocated due to construction activities. They will be taken care of properly, according to the prepared RAP and JICA Guidelines. Construction activities generate noise and exhaust fumes via machine operation. Providing mufflers and filters for the machineries maintains the capacity to absorb and reduce noise levels and exhaust fumes. Barges and dredging boats used by the project might hinder boats and ferry traffic. This hindrance can be eased by consultation, IEC and coordinating operation space, hours and dates. Vehicles used for construction may block and congest the streets. Barges can therefore be used to ship construction materials and for construction

					activities. Dredged materials shall be covered or dried for transportation to disposal area in such way that no offensive odor or leak from dredged materials.
		(b) Is there a possibility that the amount of water (e.g., surface water, groundwater) used by the project will adversely the downstream fisheries and other water uses?		N	The Project regulates river water but does not use it.
		(c) Is there a possibility that waterborne or water-related diseases (e.g., schistosomiasis, malaria, filariasis) will be introduced?		N	Cleaning of the river bank and constructing river bank-protection will result in reduction of mosquito breeding places and thus reduction of mosquito infestation and related spread of disease. Moreover, suspended solids caused by excavation will also help coagulate and settle floating viruses and bacteria.
	(3) Heritage	Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage sites? Are adequate measures taken to protect these sites in accordance with the country's laws?		N	There are no local archeological, historical, cultural, or religious heritage sites reported on or around the Project site. Neither have such palaces at small community levels been reported.
	(4) Landscape	Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken to deal with such adverse effects?		N	River banks often serve as natural parks/river walks/water parks and serve amenity functions for the local population. During construction activity, some area will be adversely affected. But this is temporary and limited narrow area. Although vegetation might be lost temporarily due to construction, it will grow back naturally in the Philippines' tropical climate.
	(5) Ethnic Minorities and Indigenous Peoples	(a) Does the project comply with the country's laws regarding rights of ethnic minorities and indigenous peoples?	N/A	N/A	No ethnic group has been identified.
		(b) Is consideration given to reducing impact on culture and lifestyle of ethnic minorities and indigenous peoples?	N/A	N/A	Ditto
		(c) Is consideration given to reducing impact on culture and lifestyle of ethnic minorities and indigenous peoples?	N/A	N/A	Ditto
		(d) Will all of the rights of ethnic minorities and indigenous peoples in relation to land and resources be respected?	N/A	N/A	Ditto
	(6) Working Conditions	(a) In the course of carrying out the project, is the project proponent violating any laws or ordinances relating to working conditions of the country?		N	No, the Project is not violating national laws.
		(b) Are tangible safety considerations in place for individuals involved in the project, such as the	Y		BOSH (Basic Occupational Safety and Health) protocol and CCEP are followed in Phase II. Phase III is carried out in the same manner. Fences, warnings, notice-of-construction billboards

		installation of safety equipment which prevents industrial accidents, and management of hazardous materials?			and information campaigns are also provided. Proper environmental training is given to construction workers by construction contractors. Helmets and steel-toe shoes are worn by most construction workers. Occupational safety training will be continuously and periodically provided and appropriate safety measures will always be in place.
		(c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health programs, and safety training (including traffic safety and public health) for workers, etc.?	Y		In accordance with CCEP, proper environmental training is given to construction workers by construction contractors. Helmets and steel-toe shoes are worn by most construction workers. Occupational safety training will be continuously and periodically provided and safety measures will be in place at all times.
		(d) Are appropriate measures taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?	N/A	N/A	No security guard is assigned to a construction site except for storage units and HQ office. Barangay officials assure safety of local residents.
5. Others	(1) Impact during Construction	(a) Are adequate measures undertaken to reduce impact during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)?	Y		An appropriate and reasonable amount of countermeasures to reduce construction-related nuisances, such as noise, vibration, dust, etc, will be undertaken. Phase II construction has already proved the effectiveness of counter measures that have been taken during construction of river channel protective walls. It should be noted that problematic noise levels in the Philippines are defined so strictly that even normal human conversation levels exceed the allowable noise limit. The levels of noise, air pollution level (as TP_{10}), and water quality and vibration are monitored. Mufflers and filters for machinery are provided to properly maintain their absorption capacity. Solid wastes and construction debris are collected, bagged and transported via barge to project's construction management HQ office for proper disposal. Chemical or portable toilets for construction workers are placed at each construction site, and waste is collected periodically. Frequent cleaning is required in order to keep the toilet usable and to suppress odor.
		(b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures taken to reduce the impact?	Y		The Project shall use adequate technology to reduce suspension in river water during dredging works. It should be noted that water quality of the Pasig Marikina River is already beyond Class C water criteria and the original ecosystem had been destroyed long time ago.
		(c) If construction activities adversely affect the social environment, are adequate measures undertaken to reduce the impact?	Y		Staff of IEC of the DPWH, MMT and Barangay captains are to handle complaints from residents affected by the construction, if any occur. Most construction workers are hired locally from the Barangay where construction takes place, with the exception of a few skilled technicians and engineers. In hiring local workers, gender equity and appropriateness of assigning position are considered. Hence, a damping effect of numbers of workers and cash flooding into a Barangay will

					not occur and disturbance of the social environment will be minimized.
		(d) If necessary, is health and safety education (e.g., traffic safety, public health) provided for project personnel, including workers?	Y		CCEP (Construction for Contractors Environmental Program) and BOSH (Basic Occupational Safety and Health) protocols are followed to ensure safety and health of both residents and workers.
	(2) Monitoring	(a) Does the proponent develop and implement monitoring programs for environmental items considered to have potential impact?	Y		DPWH through consultant hired to supervise construction prepares the Environmental Monitoring Plan. Under this plan, quarterly and semi-annual monitoring reports are prepared and submitted to DENR receives.
		(b) Are the items, methods and frequencies included in the monitoring program judged to be appropriate?	Y		Items and methods follow the Philippines' and JICA Guideline's requirements. Since there are only two seasons in the Philippines, bi-annual monitoring of flora and fauna seems appropriate to check seasonal effects. It is appropriate to include additional information in the quarterly monitoring report.
		(c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget) to sustain the monitoring framework?	Y		Multiparty Monitoring Team (MMT), DPWH through consultant and Contractor are proposed for monitoring of entire Project which is applied to Phase II. Phase III shall do the same.
		(d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	Y		The Proponent of the Project shall conduct environmental monitoring and its reporting to DENR in coordination with MMT. The environmental monitoring activities consist of (1) Compliance Monitoring and (2) Environmental Surveillance. The results of monitoring will provide a basis for timely decision and implementation of necessary countermeasures and actions. Use criteria states in DAO 2003-30, procedure manual.
6. Note	Note on Using Environmental Checklist	If necessary, the impact on trans-boundary or global issues should be confirmed (e.g., the project includes factors that may cause problems, such as trans-boundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	N/A	N/A	No county shares a border with Luzon island, where the project takes place. The Philippines is an island nation, and thus has no land borders. River improvement works for flood mitigation do not cause global-scale climate change.

ANNEX

ANNEX-1: ECC

Republic of the Philippines
Department of Environment and Natural Resources
NATIONAL CAPITAL REGION
AARONN II Building, 20 G. Araneta Ave. Ext., Q.C.
Tel. Nos.: 712 52-78 • 731-76-65 • 731-70-85 • 743-31-26

14 December 1998

The Director
Project Management Office
Major Flood Control Projects
Department of Public Works & Highways
2nd Street, Port Area, Manila

Sir:

This has reference to your *Pasig-Marikina River Channel Improvement Project.*

After evaluation of the documents submitted on the aforesaid project, this Office has decided to grant the same an Environmental Compliance Certificate (ECC).

You may proceed with the project implementation after securing all the necessary permits from the pertinent government agencies. Please be advised, however, that this Office will be monitoring the project periodically to ensure your compliance with the stipulations cited in the attached ECC. Further, any expansion of currently approved operations will be subjected to the Environmental Impact Assessment (EIA) requirements.

Very truly yours,

CLARENCE L. BAGUILAT
Regional Executive Director

Grow a Tree for Legacy

...Natural Resources
NATIONAL CAPITAL REGION
...NN II Building, 20 G. Araneta Ave. Ext., Q.C.
Tel. Nos.: 712-52-78 • 731-70-65 • 731-70-85 • 740-31-25

ECC-98-NCR-301
9807-128-120

ENVIRONMENTAL COMPLIANCE CERTIFICATE

DENR-NCR hereby grants Environmental Compliance Certificate (ECC) for the proposed PASIG-MARIKINA RIVER CHANNEL IMPROVEMENT PROJECT of Department of Public Works and Highways – PMO- Major Flood Control Projects, after complying with the Environmental Impact Statement (EIS) System requirements as prescribed in the guidelines of the Implementing Rules and Regulations of Presidential Decree no. 1586.

This Certificate is being issued subject to the following conditions:

I. Pre-construction and Construction Stage:

1. This Certificate covers only the improvement of Pasig and Marikina river channel including construction and operation of water front amenities and Marikina Control Gate Structures having the following project activities/components ;

River Stretch	Scope of Work
Pasig River : 6.84 km (river mouth to San Juan River)	Raising of existing parapet wall and rehabilitation of revetment
Pasig River: 9.76 km (San Juan Napindan Channel)	Raising of existing parapet wall and rehabilitation of revetment
Lower Marikina River: 5.58 km (Napindan to Marikina Control Structure [MCGS])	Dredging/excavation, provision of new parapet wall and rehabilitation of revetment
MCGS and Upper Marikina River: km (MCGS to Mangahan Floodway)	Construction of MCGS, dredging/excavation, raising of embankment
Upper Marikina River; 6.43 km (Mangahan Floodway to Sto.Nino	Excavation and raising of embankme

2. That all other permits from pertinent government agencies shall be secured before project implementation. Likewise, the proponent should submit a Memorandum of Agreement (MOA) with the Local Government Units (LGU's) pertaining to the preparation of maps identifying/showing the flood prone barangays, profile of the poor which include the families living in high risk location along the Pasig-Marikina Rivers, preparation of disaster management plan including response to flooding and greening and maintenance of project amenities as well as with the Pasig River Rehabilitation Project relative to the resettlement plan for the affected families;

3. That a detailed construction design and contract documents shall be submitted to this Office one (1) month prior to the start of construction;

4. That a Construction Contractor's Environmental Program (CCEP) shall be submitted to this Office for approval 30 days before the start of construction which should contain among others, definite mitigation measures such as proper disposal of spoils and waste materials, excess concrete and wash water from transit mixers and others;

5. That the project proponent shall conduct orientation for resident engineers and contractor ..... will undertake and implement the project, to apprise them of the conditions/stipulations of this ECC and the necessary measures that will mitigate adverse environmental impacts, and submit reports of such orientation to this Office, copy furnished the Multipartite Monitoring Team (MMT);

6. That a multi-media information education campaign shall be implemented by the proponent covering the immediate areas as well as adjacent and affected cities; The target publics will include the local government unit officials and residents concerned, basic sectors which will include NGOs and POs;

7. That a billboard measuring 0.5 meters by 1.0 meter bearing "ECC-98-NCR-QC-301 Issued pursuant to P.D. 1586" shall be displayed in a conspicuous location at the project site for identification and guidance;

8. That in case that the construction of the project temporarily stopped due to financial reason or forced majeure, measures to protect and safeguard the adjacent properties and the general public should be strictly observed;

II. Operation Stage:

9. That all restoration works/grading of the exposed grounds shall be immediately undertaken after construction all in accordance with the Technical Specifications of the Contract;

10. That planting of trees/shrubs/ornamental plants or landscape activities shall be undertaken to contribute to the aesthetic value of the area and to compensate for the lost capability of the area to absorb carbon dioxide;

III. Others:

11. That a separate Initial Environmental Examination (IEE) or an Environmental Impact Statement (EIS) shall be prepared and submitted to this Office for the designated/chosen disposal site;

12. That the proponent shall set up/provide a Contractor 's All Risk Insurance (CARI) and Quick Response Fund (QRF) to compensate/ cover expenses for indemnification of damages to life, health, property and environment caused by the project and further environmental assessment. The QRF shall be established and committed through a Memorandum of Agreement (MOA) between and among the proponent, the LGU concerned, Non-governmental Organization's (NGO) and affected parties within sixty days (60) after the issuance of this ECC;

13. That the Department of Public Works and Highways (DPWH) Environmental Unit (EU) together with the Project Management Office and Technical Consultants shall supervise the contractors, implement the EMP and other measures that may be required by this Office during construction and operation phases;

14. That all the proposed environmental management measures contained in the submitted documents shall be effected (please refer to Annex A);

15. That project implementation and maintenance throughout its lifespan shall strictly conform with the submitted documents, any modification from the approved project scope shall be covered by another ECC application;

16. That should adverse impact occur as a result of project operations, all the activities causing the same, shall be immediately stopped, remedial measures shall be effected and all damages to life and property will be properly compensated to all aggrieved parties;

17. That the project proponent shall allocate funds or provide the financial requirements of the Multipartite Monitoring Team (MMT) and shall allow the same to conduct inspection/monitoring in the entire project area without prior notice to oversee compliance to ECC conditions and to determine the residual impacts to the environment;

18. That additional ECC condition(s) shall be imposed if findings to protect the environment warrants;

19. That any false information contained in the submitted documents and non-disclosure of vital information which led to the issuance of the ECC shall render the same null and void and a ground for filing of appropriate legal charges;

20. That this Certificate shall be posted in a conspicuous place in the Field Office for easy reference and guidance;

21. That the project proponent shall submit to this Office a quarterly environmental monitoring report based on the submitted/approved environmental monitoring plan; and

22. That in case the project proponent cannot comply with any of the conditions for technical reasons, a written approval from the DENR-NCR shall be secured first prior to implementation.

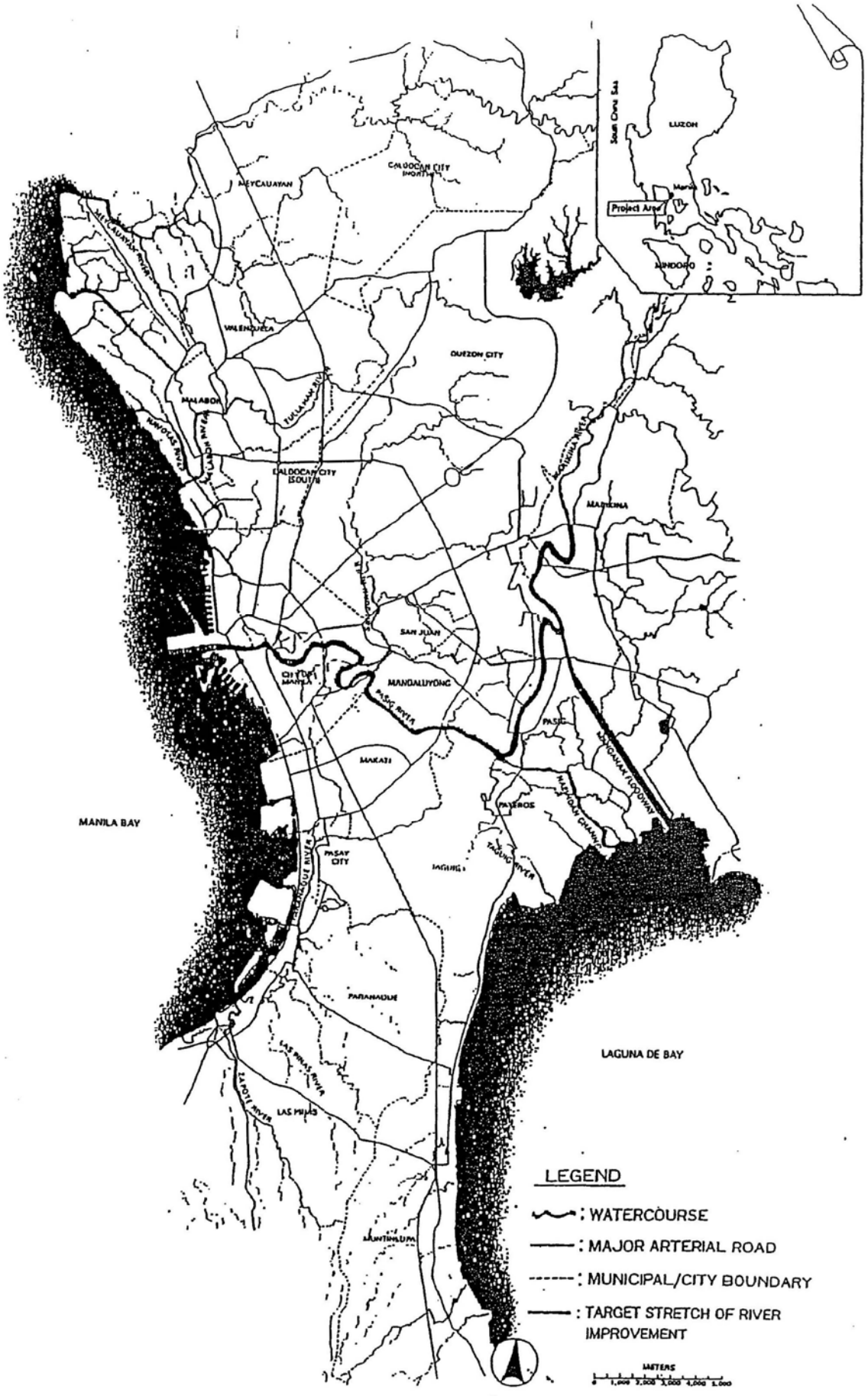
Non-compliance with any of the above stipulations will be sufficient cause for the suspension or cancellation of this Certificate and/or imposition of a fine in an amount not to exceed Fifty Thousand Pesos (P50,000.00) for every violation thereof pursuant to Article IX, Section 6.0, DENR Administrative Order No. 37, Series of 1996.

Given this 15th day of Dec. Nineteen Hundred and Ninety Eight.

CLARENCE L. BAGUILAT
Regional Executive Director

Recommending Approval:

SIXTO E. TOLENTINO, JR.
OIC, Regional Technical Director
Environment Sector
ccc-pasig-marikina/ d-for


LUZON
Project Area
MINDORO
MEYCAUAYAN
CALOOCAN CITY (NORTH)
VALENZUELA
QUEZON CITY
MALABON
NAVOTAS
CALOOCAN CITY (SOUTH)
MARIKINA
SAN JUAN
CITY OF MANILA
MANDALUYONG
PASIG
MAKATI
PATEROS
MANILA BAY
PASAY CITY
PARANAQUE
LAGUNA DE BAY
LAS PIÑAS
MUNTINLUPA
LEGEND
: WATERCOURSE
: MAJOR ARTERIAL ROAD
: MUNICIPAL/CITY BOUNDARY
: TARGET STRETCH OF RIVER IMPROVEMENT
METERS

STUDY AREA

ANNEX-2: Socio-Economic Survey in Project Affected Area

1. Survey Area

2. Survey Results

2-1 BACKGROUND OF THE STUDY

On December 2010, Japan International Cooperation Agency (JICA) Study Team commissioned Woodfields Consultants, Inc. to conduct a social impact survey among communities living along the Pasig-Marikina River (Manggahan to Napindan stretch) to determine the potential impact of the construction of flood control structures and the possible total closure of the river after the construction to residents living along the river. Woodfields conducted the survey from January 7 to 13, 2010.

2-2 SURVEY DESIGN

Sampling size for the survey was determined at plus-or-minus 10 percent margin of error at 95 percent level of confidence. About 107 respondents proportionately selected from the 13 barangays located along Marikina River in 3 cities of Metro Manila were interviewed, distributed as follows:

City	Barangay	Sample size	Percentage allocation
Quezon	Bagumbayan	27	25.2
	Ugong Norte	3	2.8
Pasig	Ugong	7	6.5
	Bagong Ilog	5	4.7
	Mangahan	10	9.3
	Rosario	11	10.3
	Maybunga	21	19.6
	Caniogan	5	4.7
	Kapasigan	3	2.8
	San Jose	1	0.9
	Bagong Katipunan	1	0.9
	Sta. Rosa	3	2.8
Makati	West Rembo	10	9.3
	TOTAL	107	100

Actual interviews were conducted at home with the head of the household, or the spouse, or any other member of the household preferably of legal age or adult, in the sequence mentioned, with only 1 representative-respondent for each selected household. Most or 90 percent of the interview lasted from 15 to 20 minutes.
The survey study was coordinated with the local government of the city and the barangay. Local officials helped in estimating/ validating HH size were the computation and allocation of sample size was based.

The road network enclosing the river line was used to determine the

main project affected area and to demarcate the project site from which the sampling of respondents was obtained. Figure 2-1 presents the project area.
Selection of household-respondents was through systematic random sampling at estimated intervals sufficient to cover the stretch of the barangay commencing from predetermined public landmarks until the required number of samples on a certain spot has been satisfied.

The survey was conducted by trained enumerators using a pre-structured questionnaire provided by the JICA Study Team. Protocols were coded (for open-ended questions) and encoded. Generation of pre-specified data requirements was facilitated using the Statistical Package for the Social Sciences (SPSS) software.

2-3 SURVEY RESULTS

Table 3.1-1 Relationship of respondent to HH head

Relationship	Frequency	Percent
Household head	56	52.3
Spouse of HH head	40	37.4
Child of HH head	10	9.3
Sibling	1	0.9
TOTAL	107	100

Table 3.1-2 Sex of HH head

Sex	Frequency	Percent
Male	40	37.4
Female	67	62.6
TOTAL	107	100

Table 3.1-3 Marital status of HH head

Marital status	Frequency	Percent
Single	8	7.5
Married	71	66.4
Separated	13	12.1
Widower	11	10.3
Cohabitation	4	3.7
TOTAL	107	100

Table 3.1-4 Range of years of residence in current address

Years of residence	Frequency	Percent
1 to 10 years	27	25.2
11 to 20 years	18	16.8
21 to 30 years	20	18.7
31 to 40 years	15	14
41 to 50 years	16	15

61 to 70 years	2	1.9
71 to 80 years	3	2.8
TOTAL	107	100

Table 3.1-5 Place of residence prior to current

Place of residence	Frequency	Percent
Same barangay	52	48.6
Another Barangay within LGU	31	29
Other LGU within Metro Manila	12	11.2
Outside Metro Manila	12	11.2
Total	107	100

Table 3.1-6 Current tenurial status

Tenural status	Frequency	Percent
House structure owner	92	86
Rent-free occupant (RFO)	3	2.8
Renter	12	11.2
TOTAL	107	100

Table 3.1-7 Monthly rental of current dwelling

Amount	Frequency	Percent
Non-renters	95	88.8
1,200.00	1	0.9
1,500.00	1	0.9
2,000.00	2	1.9
2,500.00	1	0.9
3,000.00	4	3.7
4,000.00	2	1.9
5,000.00	1	0.9
TOTAL	107	100

Table 3.1-8 Total number of HH in structure

Number of HH	Frequency	Percent
Structure with 1 HH	97	90.7
Structure with 2 HH	6	5.6
Structure with 3 HH	2	1.9
Structure with 4 HH	1	0.9
Structure with 6 HH	1	0.9
TOTAL	107	100

Table 3.1-9 Range of total number of persons in structure

Number of persons	Frequency	Percent
Structures with 1 to 3 persons	29	27.1
Structures with 4 to 6 persons	59	55.1
Structures with 7 to 10 persons	17	15.9
Structures with 11 to 15 persons	2	1.9

Table 3.1-10 Range of number of house/structure-owner (HO) and family

HH size	Frequency	Percent
House structure owner with 1 to 3 members	22	20.6
House structure owner with 4 to 6 members	52	48.6
House structure owner with 7 to 10 members	16	15
House structure owner with 11 to 15 members	2	1.9
Total	92	86
Non structure-owner	15	14
TOTAL	107	100

Table 3.1-11 Total Number of persons living in the house/structure: Number of rent-free occupants (RFO)

Rent-free occupants	Frequency	Percent
Non-RFO	104	97.2
Rent-free occupants with 5 HH members	3	2.8
TOTAL	107	100

Table 3.1-12 Total Number of Persons living in the house/structure: Number of caregivers

Rent-free occupants	Frequency	Percent
HH with no caregivers	99	92.5
HH with 1 caregiver	5	4.7
HH with 2 caregivers	3	2.8
TOTAL	107	100

Table 3.1-13 Total Number of Persons living in the house/structure :Number of renters

HH size	Frequency	Percent
Non renters	95	88.8
HH with 2 members	2	1.9
HH with 3 members	5	4.7
HH with 5 members	1	0.9
HH with 6 members	3	2.8
HH with 10 members	1	0.9
TOTAL	107	100

Table 3.1-14 Ethnicity

Ethnicity	Frequency	Percent
Yes	31	29
No	76	71
TOTAL	107	100

QUESTION:

A9. Ethnicity, Special Clan, Indigenous people: Does your household member belong to a specific ethnic group or clan or "Indigenous people"?

Table 3.1-15 Specific ethnicity

Specific ethnicity	Frequency	Percent
Albayano	1	0.9
Bisaya	9	8.4
Pangasinense	2	1.9
Ilongo	7	6.5
Bicolano	7	6.5
Marinduqueno	1	0.9
Tagalog	1	0.9
Bulaqueño	1	0.9
Cebuano	1	0.9
Pampangueno	1	0.9
Not applicable	76	71
TOTAL	107	100

QUESTION:

A9. Ethnicity, Special Clan, Indigenous people: Does your household member belong to a specific ethnic group or clan or "Indigenous people"?

Table 3.1-16 Place of origin of respondent

Place of origin	Frequency	Percent
Albay	1	0.9
Samar	1	0.9
Pangasinan	2	1.9
General Santos	1	0.9
Iloilo	4	3.7
Sorsogon	4	3.7
Cagayan	1	0.9
Misamis Oriental	1	0.9
Negros Occidental	2	1.9
Bacolod	1	0.9
Zamboanga	1	0.9
Marinduque	1	0.9
Legaspi	2	1.9
Masbate	1	0.9
Quezon	1	0.9
Bulacan	1	0.9
Surigao	1	0.9
Cebu	1	0.9
Oriental Mindoro	1	0.9
Pampanga	1	0.9
Mindanao	2	1.9

Not applicable	76	71
TOTAL	107	100
QUESTION:		
A9. Ethnicity, Special Clan, Indigenous people: Does your household member belong to a specific ethnic group or clan or "Indigenous people"?		

Table 3.1-17 Religion

Religion	Frequency	Percent
Roman Catholic	100	93.5
Other Christian organization	2	1.9
Traditional/ indigenous belief	1	0.9
Iglesia ni Kristo	4	3.7
TOTAL	107	100
QUESTION:		
A10. What is your religion?		

Table 3.2-1 River dependency

Dependency	Frequency	Percent
None	107	100
QUESTION:		
B1.Do you depend on the Marikina river as a major resource to support your family/ self?		

Table 3.2-2 Particular dependency

Particular dependency	Frequency	Percent
None	107	100
QUESTION:		
B1.Do you depend on the Marikina river as a major resource to support family/yourself?		

Table 3.2-3 Impact of river structure construction or closing

Impact	Frequency	Percent
None	106	99.1
Don't know	1	0.9
TOTAL	107	100
QUESTION:		
B2. What do you lose if the Marikina river sides are closed for a year for a construction, or forever?		

Table 3.2-4 Impact of dredging

Impact	Frequency	Percent
None	107	100
QUESTION:		
B3. What do you lose if a large scale dredging activity takes place in the Marikina river for many months?		

Table 3.2-5 Where solid waste is disposed

Activities	Responses	
	Frequency	Percent

Collected and disposed by waste collectors	101	91
Discarded to the river	3	3
Discarded to open space	2	2
Burnt	5	5
TOTAL	111	100

QUESTION:

B4. Where do you dispose solid wastes of?

Table 3.2-6 Where wastewater is discharged

Activities	Responses	
	Frequency	Percent
Drained to pipes connected to city sewer	90	58
Drained to pipes directly connected to t	17	11
Discharged to open space/land	48	31
TOTAL	155	100

QUESTION:

B5. Where do you discharge wastewater to?

Table 3.3-1 Number of employed HH member

Household size	Frequency	Percent
HH with 1 member employed	67	62.6
HH with 2 members employed	23	21.5
HH with 3 members employed	3	2.8
HH with 6 members employed	1	0.9
HH with purely self-employed member/s	13	12.1
TOTAL	107	100

QUESTION:

C1. How many members of this household are currently working or employed?

Table 3.3-2 Number of HH members contributing to income

HH size	Frequency	Percent
HH with only 1 member contributing	20	18.7
HH with only 2 members contributing	63	58.9
HH with only 3 members contributing	22	20.6
HH with only 4 members contributing	1	0.9
HH with only 6 members contributing	1	0.9
Total	107	100

QUESTION:

C2. How many persons contribute to household income?

Table 3.3-3 Range of total income from salary

	Frequency	Percent

9,001 to 15,000	44	41.1
15,001 to 18,000	10	9.3
18,001 to 24,000	5	4.7
24,001 to 30,000	2	1.9
40,000 up	1	0.9
Total	94	87.9
Non-salary earners	13	12.1
TOTAL	107	100

QUESTION:

C3. What is the estimated <u>total</u> monthly income of your household for the <u>past month</u>? (IN PESOS) – From regular employment.

Table 3.3-4 Range of total monthly income from business

	Frequency	Percent
5,000 and below	18	16.8
5,001 to 10,000	41	38.3
10,001 to 15,000	6	5.6
20,001 and above	1	0.9
Total	66	61.7
Non-business earners	41	38.3
TOTAL	107	100

QUESTION:

C3. What is the estimated <u>total</u> monthly income of your household for the <u>past month</u>? (IN PESOS) – From business.

Table 3.3-5 Total monthly pension

Amount	Frequency	Percent
1,200.00	1	0.9
2,300.00	1	0.9
3,000.00	1	0.9
3,800.00	1	0.9
4,000.00	1	0.9
5,000.00	1	0.9
8,500.00	1	0.9
10,000.00	2	1.9
Total	9	8.4
Non-pensioner	98	91.6
TOTAL	107	100

QUESTION:

C3. What is the estimated <u>total</u> monthly income of your household for the <u>past month</u>? (IN PESOS) – From pension.

Table 3.3-6 Total monthly income from agriculture

Amount	Frequency	Percent

0	107	100

QUESTION:

C3. What is the estimated <u>total</u> monthly income of your household for the <u>past month</u>? (IN PESOS) – From agriculture.

Table 3.3-7 Total monthly remittance from the Philippines

Amount	Frequency	Percent
1,000.00	2	1.9
3,000.00	4	3.7
3,500.00	1	0.9
Total	7	6.5
Those who are not receiving	100	93.5
TOTAL	107	100

QUESTION:

C3. *What is the estimated <u>total</u> monthly income of your household for the <u>past month</u>? (IN PESOS) – From remittances (from the Philippines).*

Table 3.3-8 Total monthly remittance from OFW/s

Amount	Frequency	Percent
5,000.00	1	0.9
15,000.00	2	1.9
37,000.00	1	0.9
Total	4	3.7
Those who are not receiving	103	96.3
TOTAL	107	100

QUESTION:

C3. What is the estimated <u>total</u> monthly income of your household for the <u>past month</u>? (IN PESOS) – From remittances (OFW).

Table 3.3-9 Range of total income from other sources (loans, gifts, etc.) per annum

Amount	Frequency	Percent
5,000 and below	16	15
5,001 to 10,000	43	40.2
10,001 to 15,000	11	10.3
20,001 to 25,000	2	1.9
30,001 and above	1	0.9
Total	73	68.2
Those who are not earning from other sources	34	31.8
TOTAL	107	100

QUESTION:

C3. What is the estimated <u>total</u> monthly income of your household for the <u>past month</u>? (IN PESOS)

Table 3.3-10 Range of total monthly income both from salary and various sources (business, pension, remittances, etc

Amount	Frequency	Percent
3,000 to 9,000	14	13.1

9,001 to 15,000	41	38.3
15,001 to 18,000	29	27.1
18,001 to 24,000	16	15
24,001 to 30,000	3	2.8
30,001 to 40,000	2	1.9
40,001 up	2	1.9
TOTAL	107	100

QUESTION:

C3. What is the estimated <u>total</u> monthly income of your household for the <u>past month</u>? (IN PESOS)

Table 3.3-11 Range of total food expenses

Amount	Frequency	Percent
5,000 and below	21	19.6
5,001 to 10,000	76	71
10,001 to 15,000	9	8.4
20,001 to 25,000	1	0.9
TOTAL	107	100

QUESTION:

C4. In your estimate, how much does your household spend for the following?

(in average in PESOS per month) – Food.

Table 3.3-12 Housing/ rental expenses

Amount	Frequency	Percent
Non renters	96	89.7
1,200.00	1	0.9
1,500.00	1	0.9
2,000.00	2	1.9
2,500.00	1	0.9
3,000.00	3	2.8
4,000.00	2	1.9
5,000.00	1	0.9
TOTAL	107	100

QUESTION:

C4. In your estimate, how much does your household spend for the following?

(in average in PESOS per month) – Housing (amortization/ rent).

Table 3.3-13 Range of clothing expenses

Amount	Frequency	Percent
150 to 500	59	55.1
501 to 1,000	10	9.3
1,001 to 1,500	3	2.8
1,501 to 2,000	3	2.8

Total	75	70.1
Did not spend for clothing last year	32	29.9
TOTAL	107	100

QUESTION:

C4. In your estimate, how much does your household spend for the following?

(in average in PESOS per month)

Table 3.3-14 Range of average monthly transportation expenses

Amount	Frequency	Percent
150 to 500	41	38.3
501 to 1,000	15	14
1,001 to 1,500	15	14
1,501 to 2,000	32	29.9
2,001 to 2,500	3	2.8
25,001 to 3,000	1	0.9
TOTAL	107	100

QUESTION:

C4. In your estimate, how much does your household spend for the following?

(in average in PESOS per month) – Transportation.

Table 3.3-15 Range of education expenses

Amount	Frequency	Percent
300 to 1,000	49	45.8
1,001 to 2,000	19	17.8
2,001 to 3,000	5	4.7
3,001 to 4,000	2	1.9
4,001 to 5,000	2	1.9
5,001 and above	1	0.9
Total	78	72.9
Those who are not spending for education	29	27.1
TOTAL	107	100

QUESTION:

C4. In your estimate, how much does your household spend for the following?

(in average in PESOS per month)

Table 3.3-16 Range of monthly water bills/ expenses

Amount	Frequency	Percent
100 to 500	35	32.7
501 to 1,000	30	28
1,001 to 1,500	27	25.2
1,501 to 2,000	13	12.1
2,001 to 2,500	1	0.9

25,001 to 3,000	1	0.9
TOTAL	107	100
QUESTION:		
C4. In your estimate, how much does your household spend for the following?		
(in average in PESOS per month) – Water.		

Table 3.3-17 Range of monthly power bills/ expenses

Amount	Frequency	Percent
100 to 1,000	28	26.2
1,001 to 2,000	56	52.3
2,001 to 3,000	15	14
3,001 to 4,000	3	2.8
4,001 to 5,000	5	4.7
TOTAL	107	100
QUESTION:		
C4. In your estimate, how much does your household spend for the following?		
(in average in PESOS per month) – Electricity.		

Table 3.3-18 Range of monthly telecommunication expenses

Amount	Frequency	Percent
100 to 300	58	54.2
301 to 600	26	24.3
601 to 900	14	13.1
901 to 1,200	4	3.7
Total	102	95.3
Those who are not spending on telecom	5	4.7
TOTAL	107	100
QUESTION:		
C4. In your estimate, how much does your household spend for the following?		
(in average in PESOS per month) – Telecommunications (telephone, cell phone, internet).		

Table 3.3-19 Range of cooking fuel expenses

Amount	Frequency	Percent
90 to 500	34	31.8
501 to 1,000	68	63.6
1,001 to 1,500	3	2.8
1,501 to 1,800	2	1.9
TOTAL	107	100
QUESTION:		
C4. In your estimate, how much does your household spend for the following?		

(in average in PESOS per month) – Fuel for cooking (LPG, kerosene, charcoal, wood).

Table 3.3-20 Range of average monthly medical expenses

Amount	Frequency	Percent
50 and below	64	59.8
51 to 100	33	30.8
101 to 150	4	3.7
151 to 200	3	2.8
201 and up	3	2.8
TOTAL	107	100

QUESTION:
C4. In your estimate, how much does your household spend for the following?
(in average in PESOS per month) – Medical bills.

Table 3.3-21 Recreational expenses

Amount	Frequency	Percent
0	64	59.8
500	18	16.8
600	1	0.9
1,000.00	14	13.1
1,500.00	5	4.7
1,700.00	2	1.9
1,800.00	2	1.9
2,000.00	1	0.9
TOTAL	107	100

QUESTION:
C4. In your estimate, how much does your household spend for the following?
(in average in PESOS per month) – Entertainment/ recreation.

Table 3.3-22 Monthly remittance to relatives outside HH

Amount	Frequency	Percent
0	94	87.9
200	2	1.9
500	7	6.5
700	1	0.9
1,000.00	1	0.9
2,000.00	1	0.9
3,000.00	1	0.9
TOTAL	107	100

QUESTION:
C4. In your estimate, how much does your household spend for the following?

(in average in PESOS per month) – Remittances to relatives outside household.

Table 3.3-23 Expenses for gambling

Amount	Frequency	Percent
Those not spending for gambling	94	87.9
200	6	5.6
300	2	1.9
500	4	3.7
1,000.00	1	0.9
TOTAL	107	100
QUESTION:		
C4. In your estimate, how much does your household spend for the following?		
(in average in PESOS per month) – Gambling.		

Table 3.3-24 Expenses for cigarette/ alcohol

Amount	Frequency	Percent
Those not spending for cigarette/ alcohol	62	57.9
500	6	5.6
800	2	1.9
1,000.00	37	34.6
TOTAL	107	100
QUESTION:		
C4. In your estimate, how much does your household spend for the following?		
(in average in PESOS per month) – Cigarette/ alcohol.		

Table 3.3-25 Range of total monthly expenses

Amount	Frequency	Percent
3,000 to 9,000	20	18.7
9,001 to 15,000	35	32.7
15,001 to 18,000	27	25.2
18,001 to 24,000	20	18.7
24,001 to 30,000	4	3.7
30,001 to 40,000	1	0.9
TOTAL	107	100
QUESTION:		
C4. In your estimate, how much does your household spend for the following?		
(in average in PESOS per month).		

Table 3.3-26 Savings

Amount	Frequency	Percent
None	1	0.9

Php1,000-1,999	25	23.4
Php2,000-2,999	16	15
Php3,000-3,999	5	4.7
4,000 - 4,999	7	6.5
Php5,000-9,999	9	8.4
Php10,000 or over	5	4.7
TOTAL	107	100

QUESTION:

C5. On average, how much of your net income are you able to save in a month?

Table 3.4-1 Range of age of structure

Age of structure	Frequency	Percent
1 to 10 years	18	16.8
11 to 20 years	31	29
21 to 30 years	22	20.6
31 to 40 years	13	12.1
41 to 50 years	14	13.1
51 to 60 years	7	6.5
61 to 65 years	2	1.9
TOTAL	107	100

QUESTION:

D1. Age of Structure:

Table 3.4-2 Type of structure

Structure type	Frequency	Percent
Single-detached	82	76.6
Duplex	24	22.4
Apartment/ condo/ townhouse/ rowhouse	1	0.9
TOTAL	107	100

QUESTION:

D2. Type of Structure.

Table 3.4-3 Use of structure

Use of structure	Frequency	Percent
Residential	58	54.2
Residential-commercial	48	44.9
Residential-industrial	1	0.9
TOTAL	107	100

QUESTION:

D3. Use of Structure.

Table 3.4-4 House storey/ level

Number of level/s	Frequency	Percent
Structures with 1 level	85	79.4
Structures with 2 levels	22	20.6

TOTAL	107	100
QUESTION:		
D4. Structure Dimension.		

Table 3.4-5 Range of total gross floor area in square meter

Total gross area	Frequency	Percent
50 and below	30	28
51 to 100	63	58.9
101 to 150	9	8.4
151 to 200	4	3.7
301 to 360	1	0.9
TOTAL	107	100
QUESTION:		
D4. Structure Dimension.		

Table 3.4-6 Type of house structure

Structure type	Frequency	Percent
Type II - Light (nipa, cogon,bamboo, lightwood)	4	3.7
Semi-concrete	45	42.1
Type IV - Concrete	30	28
Type V - Mixed materials	28	26.2
TOTAL	107	100
QUESTION:		
D5. Type of House/Structure (materials dominantly used).		

Table 3.4-7 Type of wall materials

Main walling materials	Frequency	Percent
Type II - Light (nipa, cogon, bamboo, etc.)	11	10.3
Semi-concrete	66	61.7
Type IV - Concrete	2	1.9
Type V - Mixed materials	28	26.2
TOTAL	107	100
QUESTION:		
D6. Type of housing materials for walls.		

Table 3.4-8 Type of roofing materials

Main roofing materials	Frequency	Percent
Light (nipa, cogon, bamboo, lightwood)	4	3.7
Galvanized iron	99	92.5
Concrete/ cement	4	3.7
TOTAL	107	100
QUESTION:		
D7. Type of housing materials for roof.		

Table 3.4-9 Type of flooring materials

Main flooring materials	Frequency	Percent
Soil	1	0.9
Gravel/ pebbles	1	0.9
Wood	12	11.2
Concrete	88	82.2
Mixed	5	4.7
TOTAL	107	100
QUESTION:		
D8. Type of housing materials for floor.		

Table 3.4-10 Type of toilet facility

Toilet type	Frequency	Percent
Water sealed (flush or pour/ flush) connected to sewerage	10	9.3
Water sealed (flush or pour flush) connected to septic tank	96	89.7
Shared toilet	1	0.9
TOTAL	107	100
QUESTION:		
D9. Type of toilet facility that household have/use. [PROBE OR OBSERVE].		

Table 3.4-11 Primary source of water for domestic use

Water source	Frequency	Percent
Piped connection	99	92.5
Public/ street faucet	1	0.9
Water vendor	7	6.5
TOTAL	107	100
QUESTION:		
D10. Primary source(s) of water for domestic use.		

Table 3.4-12 Facility within 20 minutes walk

Facility	Responses	
	Frequency	Percent
Hospital/ clinic	75	8.90%
School	102	12.10%
Fire station	68	8.10%
Church or other religious places	58	6.90%
Market place	60	7.10%
LGU office	105	12.50%
Police station	54	6.40%
Evacuation center	106	12.60%
Barangay center	107	12.70%
Women center	106	12.60%
TOTAL	841	100.00%
QUESTION:		

D11. Do you have following facilities within 20 min of walking distance in between the river and nearest main avenue?

Table 3.5-1 Special place passed down thru generation

Special place	Frequency	Percent
None	107	100

QUESTION:

E.1 Do you have the following special places that have been passed down for generations in your barangay?

Table 3.5-2 Group/ association in the barangay related to Marikina River

Associated group	Frequency	Percent
None	107	100

QUESTION:

E.2 Does your barangay have an association or group that is closely related to Marikina River?

Table 3.5-3 Membership of any HH member to an organization/ association

Membership of any HH	Frequency	Percent
Yes	17	15.9
None	90	84.1
TOTAL	107	100

QUESTION:

E.3 Are you or any member of your household a member of an organization or association/s (in/ out of community)?

Table 3.5-4 Type of organization

	Frequency	Percent
Home owners association	10	9.3
Women's group	3	2.8
Religious organization	6	5.6
Not applicable	88	82.2
TOTAL	107	100

QUESTION:

E.4 Type of organization.

Table 3.5-5 Loss of the individual member/ organization due to closure of Marikina River

Loss	Frequency	Percent
None/ no effect at all	19	17.8
Not applicable	88	82.2
TOTAL	107	100

QUESTION:

E.6 What do you lose if you are no longer part of the organization that is given at E4 because of inaccessibility to the Marikina River?

Table 3.6-1 Highest educational attainment at respondent's household

Highest educational attainment	Frequency	Percent

Secondary - unfinished	3	2.8
Secondary - graduated	15	14
Vocational - unfinished	1	0.9
Vocational - graduated	33	30.8
College - unfinished	18	16.8
College - graduated	37	34.6
TOTAL	107	100

QUESTION:

F.1 What is the highest educational achievement at your household?

Table 3.6-2 Number of years spent in schooling

Years of schooling	Frequency	Percent
1	4	3.7
2	16	15
3	38	35.5
4	49	45.8
TOTAL	107	100

QUESTION:

F.1 What is the highest educational achievement at your household?

Table 3.6-3 Member/s of the HH who stopped schooling

Schooling HH member/s	Frequency	Percent
Those who stopped	16	15
Those who did not stop	91	85
TOTAL	107	100

QUESTION:

F.2 Are there members of the HH of schooling age (6-17 yrs.old) who stopped schooling during the past three (3) years?

Table 3.6-4 Reason for stopping schoo

Reasons	Frequency	Percent
No money	15	14
Had to work	1	0.9
Not applicable	91	85
TOTAL	107	100

QUESTION:

F.3 Why did the member (s) stopped going to school?

I

Table 3.6-5 Language used in communication with non-HH member

Language used	Frequency	Percent
Tagalog only	56	52.3
Mix of Tagalog and English	51	47.7
TOTAL	107	100

QUESTION:

F.4 What language do you use to communicate to people outside of your family members?

Table 3.7-1 Illness in the HH in the last 6 months

Illness	Frequency	Percent
Did not suffer illness in the last 6 months	66	61.7
Malaria	3	2.8
Diarrhea	35	32.7
Dengue	2	1.9
Other infectious illness	1	0.9
TOTAL	107	100

QUESTION:

G.1 In the last 6 months have you and your family member had illness stated below?

Table 3.8-1 Those who were informed regarding the flood control project

Flood control project information	Frequency	Percent
Not informed	72	67.3
Informed	35	32.7
TOTAL	107	100

QUESTION:

H.1 Have you been informed about the flood control project which will take place in your barangay?

Table 3.8-2 Date of information

Date	Frequency	Percent
Not applicable (/not informed)	72	67.3
2008	3	2.8
2009	16	15
2010	16	15
TOTAL	107	100

QUESTION:

H.1 Have you been informed about the flood control project which will take place in your barangay?

Table 3.8-3 Source of Information

Source	Frequency	Percent
Neighbor	20	18.7
Barangay chairman/ kagawad/ worker	13	12.1
Friend	1	0.9
Media	1	0.9
Not applicable (/not informed)	72	67.3
TOTAL	107	100

QUESTION:

H.1 Have you been informed about the flood control project which will take place in your barangay?

Table Frequency of information

3.8-4

Frequency	Frequency	Percent
Once	25	23.4
Twice	10	9.3
Not applicable (/not informed)	72	67.3
TOTAL	107	100

QUESTION:

H.1 Have you been informed about the flood control project which will take place in your barangay?

Table 3.8-5 Media used in informing

Media used	Frequency	Percent
At meeting	23	21.5
Rumors	10	9.3
Neighbors	1	0.9
TV	1	0.9
Not applicable (/not informed)	72	67.3
TOTAL	107	100

QUESTION:

H.1 Have you been informed about the flood control project which will take place in your barangay?

Table 3.8-6 Approval rating of the project

Project approval	Frequency	Percent
Those who do not approve	2	1.9
Those who approve	105	98.1
TOTAL	107	100

QUESTION:

H.2 Do you agree to the project?

Table 3.9-1 Flood damages since 1998

Flood damage experience	Frequency	Percent
Did not suffer	8	7.5
Did suffer	99	92.5
TOTAL	107	100

QUESTION:

I.1 Have you had flood damage since 1998?

Table 3.9-2 Date/s of flooding

Activities	Responses	
	N	Percent
Sep-09	96	83.5
Nov-07	5	4.3
Jun-05	1	0.9
Jan-04	1	0.9
Nov-00	3	2.6
Apr-00	8	7

Dec-99	1	0.9
TOTAL	115	100
QUESTION:		
I.1.4 When have you had flood?		

Table 3.9-3 Origin of floodwaters

Origin	Responses	
	N	Percent
River	99	90.8
Other than river	4	3.7
Can't specify	6	5.5
TOTAL	109	100
QUESTION:		
I.1.5 Where did the water come from?		

Table 3.9-4 Flood loss

Activities	Responses	
	N	Percent
Cash	3	3.20%
Furniture	72	76.60%
House	18	19.10%
Family member	1	1.10%
TOTAL	94	100.00%
QUESTION:		
I.1.6 What did your household lose for the flood?		

Table 3.9-5 Coping mechanism of the HH/ family

Activities	Responses	
	N	Percent
Stayed at home	64	55.20%
Escaped to the shelter	5	4.30%
Moved to somebody's House	7	6.00%
Moved to higher place	38	32.80%
Other	2	1.70%
TOTAL	116	100.00%
QUESTION:		
I.1.7 How did you cope with the flood?		

Table 3.9-6 Presence/ existence of coping mechanism of the community on flood

Attribution	Frequency	Percent
Without coping mechanisms	105	98.1
With coping mechanisms	2	1.9
TOTAL	107	100
QUESTION:		
I.1.8 Do you/ does your community have flood coping mechanism now? How?		

Table 3.9-7 Specific coping mechanism of the community

Coping mechanism	Frequency	Percent
Moved to evacuation center	2	1.9
Not applicable	105	98.1
TOTAL	107	100

QUESTION:

I.1.8 Do you/ does your community have flood coping mechanism now? How?

3.1	Basic household information	Majority or 52 percent of interviewed respondents were household head (Table 3.1-1). Most household heads or 67 percent, are female (Table 3.1-2) and are also mostly married at 66 percent (Table 3.1-3). Twenty-five percent have been in the current residence for 1 to 10 years (Table 3.1-4), while 52 percent have been living in the same barangay (Table 3.1-5). Majority or 92 percent are house/ structure-owner, while rent-free occupants and renters comprise 3 and 12 percent, respectively (Table 3.1-6). Lowest rent payment is Php1,200 while the highest is Php5,000 for those who rent dwelling units (Table 3.1-7). Majority or 97 percent of structures house only 1 household (Table 3.1-8) with mostly or 55 percent with 4 to 6 persons/ members (Table 3.1-9). Most or 49 percent of house/ structure-owner household are comprise of 4 to 6 persons too (Table 3.1-10). Household size of all 3 rent-free occupants is 5 (Table 3.1-11). Only 8 percent of all households have caregivers (Table 3.1-12). Most renters have a household size of 3 (Table 3.1-13). Majority or 76 percent of the respondents belong to no specific ethnicity or indigenous group (Table 3.1-14). Most of those belonging to a specific ethnicity are “Bisaya” and are coming from the Visayan regions (Tables. 3.1-15 and 3.1-16). Majority or 94 percent are Roman Catholic (Tables 3.1-17).
3.2	River and life	All respondents do not have any dependency/ies on the river and do not see that the construction of flood structures, dredging, and the eventual closure of the river will have impact on them (Tables 3.2-1 to 3.2-5). Solid waste of the majority or 91 percent of the respondents are collected by waste collectors (Table 3.2-6) while most or 58 percent either discharges wastewater to sewer line connection with some 31 percent discharging to open space (Table 3.2-7).
3.3	Household income profile	Majority or 67 percent of the households have only 1 member employed (Table 3.3-1) while majority or 67 percent of the households have 2 members contributing to income (Table 3.3-2). Most or 41 percent of the income come from salary ranging from Php9,001 to 15,000 (Table 3.3-3). Most or 38 percent earn a total income from business ranging from Php5,001 to 10,000 (Table 3.3-4). Lowest income from pension is Php1,200 while the highest is 10,000 (Table 3.3-5). There is no income derived from agriculture (Table 3.3-6).

		Lowest and highest income derived from remittance/s from the Philippines is Php1,000 and 3,000, respectively (Table 3.3-7), while from OFWs are 5,000 and 37,000, respectively (Table 3.3-8). Most or 40 percent of other sources of income such as loans and gifts range from Php5,001 to 10,000 (Table 3.3-9) per annum. Most or 38 percent of the respondents earn a total or combined monthly income (both from employment/ salary and various sources) of Php9,001 to 15,000 (Table 3.3-10). Most or 71 percent spend Php5,001 to 10,000 monthly for food (Table 3.3-11). Food is the single biggest cost item for almost all of the households. Majority or 55 percent spent Php150 to 500 last year on clothing (Table 3.3-13). Most or 38 percent of the respondents spend monthly from Php150 to 500 on transportation (Table 3.3-14); 46 percent from Php300 to 1,000 on education (Table 3.3-15); 33 percent from Php100 to 500 on water bills (Table 3.3-16); Php1,001 to 2,000 on power bills (Table 3.3-17); 54 percent from Php100 to 300 on telecommunications (Table 3.3-18); 64 percent from Php501 to 1,000 on cooking fuel (Table 3.3-19); 60 percent monthly average of Php50 and below on medicines/ hospital (Table 3.3-20); 60 percent did not spend anything on recreation last year (Table 3.3-21); remittance to relatives outside household is from Php200 to 3,000 monthly (Table 3.3-22); and, 88 and 58 percent does not spend anything on gambling and cigarettes/ alcohol (Tables 3.3-23 and 3.3-24). Range of total monthly expenses is highest at 33 percent at Php9,001 to 15,000 (Table 3.3-25). Thirty-six percent said that they have at least Php1,000 and or below savings per month (Table 3.3-26).
3.4	Housing conditions and basic services	Most structures or 29 percent are from 11 to 20 years old (Table 3.4-1). Most also or 77 and 54 percent are single-detached and exclusively devoted to residential use, respectively (Tables 3.4-2 and 3.4-3). Majority or 79 percent are 1-storey/ level structures and 59 percent has a gross area of 51 to 100 square meters (Table 3.4-4). Most or 42 percent of house structures are semi-concrete (Tables 3.4-5). Most or 62 percent of them are also of semi-concrete walling materials; 93 percent of galvanized iron roofing materials; and, 82 percent of concrete flooring materials (Tables 3.4-6 to 3.4-9). Majority or 90 percent of toilet facility/ies are water sealed connected to a septic tank (Table 3.4-10) and 93 percent have piped water connection (Table 3.4-11). Almost all respondents are within a 20-minute walk/ distance

		to facilities such as barangay hall/ center, school, LGU office, evacuation center, etc. (Tale 3.4-12).
3.5	Community	There is neither a special place passed down through generation nor an organization related to Marikina River (Tables 3.5-1 and 3.5-2). Most or 84 percent are not member of any organization (Table 3.5-3). Majority of those who are member of an organization belong to a homeowners association (Table 3.5-4) and all do not consider any adverse effect on them of the closure of Marikina River (Table 3.5-5).
3.6	Education	Most or 35 percent of the households have a member who has graduated from college (Table 3.6-1). Most also or 46 percent have at least 4 years of schooling (Table 3.6-2). Fifteen percent stopped schooling (Table 3.6-3) mostly for financial reasons (Table 3.6-4).
3.7	Health and hygiene	Majority or 62 percent of the households did not have any member who suffered from any illness for the past 6 months. Those who were ill consisting of 33 percent were mostly due to diarrhea (Table 3.7-1).
3.8	Awareness	Only 33 percent of households were informed regarding the flood control project (Table 3.8-1), most or 30 percent of them on 2009 and 2010 (Table 3.8-2). Main source of information are neighbors (Table 3.8-3) and most were informed only once (Table 3.8-4) through (informal) meetings (Table 3.8-5). When asked if they approve of the project, majority or 98 percent of the respondents (informed and not informed) said that they do (Table 3.8-6).
3.9	Flood damage	Majority or 93 percent of households suffered flood damage/s since 1998 (Table 3.9-1) with 90 percent of them on September 2009/ Typhoon Ondoy (Table 3.9-2). Majority or 91 percent said that flooding came from the river (Table 3.9-3) causing damage mostly to household furnitures at 92 percent (Table 3.9-4). To protect themselves, majority or 60 percent stayed at home with 36 percent moving to a higher place (Table 3.9-5). Specific coping mechanism identified at the community level by the respondents is by moving to evacuation center (Tables 3.9-6 and 3.9-7).

2 Survey Sheet

CHECK LIST

- ☐ LIST OF IHOUSEHOLDS
- ☐ MAP
- ☐ SURVEY SHEETS /QUESTIONNAIRES
- ☐ YOUR ID
- ☐ PENCILS (1 DZ)
- ☐ ERASER
- ☐ CLIPBOARD
- ☐ CALCULATOR
- ☐ WATCH
- ☐ WATER PROOF BAG TO KEEP ALL SURVEY SHEETS IN

SOCIO-ECONOMIC SURVEY OF HOUSEHOLDS
AFFECTED BY THE
PASIG-MARIKINA RIVER CHANNEL IMPROVEMENT PROJECT

General Guidelines for Conducting the Interview

1. Choose a setting with little distraction. Avoid loud lights or noises, ensure the interviewee is comfortable (you might ask them if they are), etc. Often, they may feel more comfortable at their own places of work or homes.
2. Explain the purpose of the interview.
3. Address terms of confidentiality. Explain who will get access to their answers and how their answers will be analyzed. You might also need to inform that "Rest assured that your answers will be kept confidential and that your name will not be associated with your responses in this interview."
4. Explain the format of the interview. Explain the type of interview you are conducting and its nature. If you want them to ask questions, specify if they're to do so as they have them or wait until the end of the interview.
5. Indicate how long the interview usually takes.
6. Tell them how to get in touch with you later if they want to.
7. Ask them if they have any questions before you both get started with the interview.
8. Explain definition of HOUSE HOLD and make sure that answers are given based on a household.
9. Please check in an appropriate box when applicable. Follow the instructions given in each of the section. Do not leave any item blank. Write NAP if the question does not apply.
10. During interview read ALL the choices of answers that the interviewee can chose from before he/she give you answer.

Interviewer:

Name: Mr/Ms/_____

Respondent:

HH ID No. _____

Name: Mr/Ms/Mrs_____

Address:_____

City:_____

Barangay:_____

Telephone: _____

Instruction: Please ✓ appropriate box and do not leave any item blank. Write **NAP** if the question does not apply.

SECTION A. BASIC HOUSEHOLD INFORMATION

NAME OF HOUSEHOLD HEAD (LAST NAME, FIRST NAME, MIDDLE NAME); USE PRINT CAPITAL LETTER

A1. Relationship of Respondent to the HH Head:
[ ] ***1*** Household Head [ ] ***2*** Spouse of HH head [ ] ***3*** Child of HH head
[ ] ***4*** Parent of HH head [ ] ***5*** Sibling
[ ] ***6*** Other Relative
[ ] ***7*** No relation (maid, friend, etc.)

A2. Sex of HH Head: [ ] ***1*** Male [ ] ***2*** Female
[ ] ***3*** Transgender

A3. Marital Status of HH Head: [ ] ***1*** Single [ ] ***2*** Married
[ ] ***3*** Separated
[ ] ***4*** Widow/er [ ] ***5*** Common Law Spouse [ ] ***6*** Cohabitation

A4. Number of years household has been residing in current address: _____ years
(Note if he/she moved here after 1998 survey)

A5. Place of residence prior to current place of residence:
[ ] ***1*** Same barangay [ ] ***2*** Another barangay within LGU [ ] ***3*** Other LGU within Metro Manila
[ ] ***4*** Outside Metro Manila [ ] ***5*** Others, _____

A6. Current Tenurial status: [ ] ***1*** House/Structure Owner (HO) [ ] ***2*** Rent-Free Occupant (RFO)
[ ] ***3*** Renter, **Monthly rent:** _____
[ ] ***4*** Other**:** _____

A7. Total Number of households in the house/structure: _____

A8. Total Number of Persons living in the house/structure: _____
House/Structure Owner (HO) & family _____
Rent-Free Occupants (RFO) _____
Caregivers _____
Renters _____

A9. Ethnicity, Special Clan, Indigenous people: Does your household member belong to a specific ethnic group or clan or "Indigenous people"? [ ] 1 Yes [ ] 2 No,
If YES, what is it? Please specify here: originated from: _____

A10. What is your religion? [ ] ***1*** Roman Catholic, [ ] ***2*** Other Christianity, [ ] ***3*** Islam
[ ] ***4*** Traditional/Indigenous belief: Specify _____ , [ ] ***5*** Others: Specify_____ __ _____

SECTION B. RIVER AND LIFE

B1.Do you depend on the Marikina river as a major resource to support family/yourself?

[ ] ***1*** No, [ ] ***2*** Yes, If YES please answer the following: **My life is depending on:**

[ ] ***3*** the fish and other aquatic creatures from the river, [ ] ***4*** Vegetables and fruits cultivated on the river side, [ ] ***5*** Operating or using a boat, [ ] ***6*** Water, [ ] ***7*** Trades or other commercial activities that take place on the river, ***8*** Others, Specify: _____

B2. What do you lose if the Marikina river sides are closed for a year for a construction, or forever?

[ ] ***1*** Nothing, [ ] ***2*** Source of major income, [ ] ***3*** Time(need extra time to perform daily tasks), [ ] ***4*** Religious activity, [ ] ***5*** Important place for a cultural activity, [ ] ***6*** Recreational place,

[ ] ***7*** A connection to my family, relatives and friends, [ ] ***8*** Others, Specify: _____

B3. What do you lose if a large scale dredging activity takes place in the Marikina river for many months?

[ ] ***1*** Nothing, [ ] ***2*** Source of major income, [ ] ***3*** Mean of transportation,

[ ] ***4*** Others, Specify: _____

B4. Where do you dispose <u>solid wastes</u> of?

[ ] ***1*** Collected and disposed of by wastes collectors [ ] ***2*** Discard to the river [ ] ***3*** Discard to open space/ land [ ] **4** Burn [ ] ***5*** Don't know [ ] ***6*** Others, specify _____

B5. Where do you discharge <u>wastewater</u> to?

[ ] ***1*** Drain pipes that are connected to city sware [ ] ***2*** Drain pipes that are directly connected to the river

[ ] ***3*** Discharge to open space/ land [ ] **4** Don't know [ ] ***5*** Others, specify _____

SECTION C. HOUSEHOLD ECONOMIC PROFILE

C1. How many members of this household are currently working or employed? _____

C2. How many persons contribute to household income? _____

Income	Expenditures	Savings
C3. What is the estimated total monthly income of your household for the past month? (IN PESOS) **From regular employment ("salary"):** _____ _____ **From other sources:** Business _____ Pension _____ Agriculture _____ Remittances (from Phil) _____ Remittances (OFW) _____ Others _____	**C4.** In your estimate, how much does your household spend for the following? (in average in PESOS per month) Food _____ Housing (amortization/ rent) _____ Clothing _____ Transportation _____ Education _____ Utilities a. Water _____ b. Electricity _____ c. Telecommunications (telephone, cell phone, internet)_____ d. Fuel for cooking (LPG, kerosene, charcoal, wood) _____ Medical bills _____ Entertainment/recreation _____ Remittances to relatives outside household _____ Gamble _____ Cigarette/alcohol _____ Others, (e.g., TV cable) specify _____	**C5.** On average, how much of your net income are you able to save in a month? [ ] ***1*** None [ ] ***2*** Less than P1000 [ ] ***3*** P 1000 – 1999 [ ] ***4*** P 2000 – 2,999 [ ] ***5*** P 3,000 - 3,999 [ ] ***6*** P 4,000 – 4,999 [ ] ***7*** P 5,000 – 9,999 [ ] ***8*** P10,000 or over

SECTION D. HOUSING CONDITIONS AND BASIC SERVICES

D1. Age of Structure:

_____ years

D2. Type of Structure:_____

[ ] ***1*** Single-Detached [ ] ***2*** Duplex
[ ] ***3*** Apartment/Condo/Townhouse/Row House
[ ] **4** Commercial/Industrial building [ ] ***5*** Others, specify _____

D3. Use of Structure:

[ ] ***1*** Residential [ ] ***2*** Residential-Commercial [ ] ***3*** Residential-Institutional [ ] ***4*** Residential-Industrial
[ ] ***5*** Commercial [ ] ***6*** Institutional
[ ] ***7*** Industrial [ ] ***8*** Others _____

D4. Structure Dimension

Storeys/Floors (*Encircle No. of Storeys*)	**Length and Width** (in meters)	**Gross Floor Area = L x W** (in sq. meters)
1	L = W=	
2	L = W=	
3	L = W=	
Total Gross Floor Area		

D5. Type of House/Structure (Materials dominantly used)

**For observation and recording by the interviewer*

[ ] **Type I** Salvaged (plastic, tin, cardboard)

[ ] **Type II** Light (nipa, cogon, bamboo, light wood)

[ ] **Type III** Semi-concrete

[ ] **Type IV** Concrete

[ ] **Type V** Mixed materials

D6. Type of housing materials for walls: [ ] ***1*** Salvaged (plastic, tin, cardboard)
For observation and recording by the interviewer* [ ] ***2* Light (nipa, cogon, bamboo, light wood) [ ] ***4*** Semi-concrete
[ ] ***3*** Concrete (hollow blocks/bricks) [ ] ***5*** Mixed

D7. Type of housing materials for roof: [ ] ***1*** Salvaged (plastic, tin, cardboard)

[ ] ***2*** Light (nipa, cogon, bamboo) [ ] ***3*** Galvanized iron
For observation and recording by the interviewer* [ ] ***4* Concrete/Cement
[ ] ***5*** Others, specify _____

D8. Type of housing materials for floor: [ ] ***1*** Soil
[ ] ***2*** Gravel/Pebbles [ ] ***3*** Wood
**For observation and recording by the interviewer*
[ ] ***4*** Concrete [ ] ***5*** Mixed

D9. Type of toilet facility that household have/use: [PROBE OR OBSERVE]

[ ] ***1*** Water-sealed (flush or pour/flush) connected to sewerage system

[ ] ***2*** Water-sealed (flush or pour/flush) connected to septic tank [ ] ***6*** Non-water sealed (open pit privy, overhang)

[ ] ***3*** Water-sealed (flush or pour/flush) connected to pit [ ] ***7*** Shared toilet

[ ] ***4*** Water-sealed (flush or pour/flush) connected to drainage [ ] ***8*** Public toilet

[ ] ***5*** Non-water sealed (ventilated improved pit, sanitary pit privy, closed pit) [ ] ***9*** No toilet (wrap and throw, arinola, bush, lake, creek, river)

D10. Primary source(s) of water for domestic use

[ ] ***1*** Piped connection [ ] ***5*** Rain

[ ] ***2*** Public/Street faucet [ ] ***6*** Water vendors (e.g, bottled water, container, peddlers)

[ ] ***3*** Deep or shallow well [ ] ***7*** Others; Specify: _____

[ ] ***4*** Pasig or Marikina River

D11. Do you have following facilities within 20 min of walking distance in between the river and nearest main avenue?

[ ] ***1*** Hospital /Clinic [ ] ***5*** Market place [ ] ***8*** Evacuation centre

[ ] ***2*** School [ ] ***6*** LGU office [ ] 9 Barangay center

[ ] ***3*** Fire station [ ] ***7*** Police station [ ] 10 Women's center

[ ] ***4*** Church or other religious places you and your family member attend [ ] 11 Others (Specify if there is a significant places):

SECTION E. COMMUNITY

E1. .Do you have following special places that have been passed down for generations **in your Barangay?**
[ ] ***1*** Sacred place [ ] ***2*** Nature worshipping site, Animism [ ] ***3*** indigenous religious site
[ ] ***4*** traditional/heritage site [ ] ***5*** other, specify:

E2. Does your barangay have an association or group that closely related to Marikina River?
[ ] 1 Yes [ ] 2 No, If YES please specify:

E3. Are you or any member of your household a member of an organization or association/s (in/out of community):
[ ] ***1*** Yes [ ] ***2*** No
If YES please specify:

E4. Type of organization:
[ ] ***1*** Home Owners Association, [ ] ***2*** Cooperative, [ ] ***3*** Women's group, [ ] ***4*** Savings group,
[ ] ***5*** Religious organization, [ ] ***6*** Others _____

E6. What do you lose if you are no longer a part of the organization that is given at E4 because of inaccessibility to the Marikina River?
[ ] ***1*** No effect at all, [ ] ***2*** social support, [ ] ***3*** privilege , [ ] ***4*** income source,
[ ] ***5*** mental and moral support, [ ] ***6*** Others _____

SECTION F. EDUCATION

F1. What is the highest educational achievement at your household?
Chose "UF" for "unfinished", "G" for "graduated" in below table.

		Primary		Secondary		Vocational		College(4yr)		Master		Doctor	
	No education	UF	G	UF	G	UF	G	UF	G	UF	G	UF	G
check													
No. of years													

F2. Are there members of the HH of schooling age (6-17 yrs. old) who stopped schooling during the past three (3) years?
[ ] 1 Yes [ ] 2 No, If YES go to F3

F3. Why the member(s) stopped going to school?
[ ] 1 No money [ ] 2 Had to work [ ] 3 school is too far from home
[ ] 4 Others, pls. specify

F4. What language do you use to communicate to people out side of your family members?
[ ] ***1*** Tagalog only, [ ] ***2*** English only, [ ] ***3*** Mix of Tagalog and English
[ ] ***4*** Other: Specify

SECTION G. HEALTH and HYGIENE

G 1. In last 6 month have you and your family member had illness stated below?

[ ] ***1*** Malaria, [ ] ***2*** Diarrhoea, [ ] ***3*** Dengue, [ ] 4 HIV/AIDS, [ ] ***5*** Other STDs

[ ] ***6*** Other inflectional illness; Specify: _____

SECTION H. AWARENESS

H1. Have you been informed about the Flood control project which will take place in your Barangay?

[ ] ***1*** No, [ ] ***2*** Yes: If Yes, then ; When were you informed first time? : _____

Whom did you get informed by? : _____ How often?: _____

How was the message emitted, type of media? (e.g. at meeting, by TV, by Ads, by radio): _____

H2. Do you agree to the project?

[ ] ***1*** No, [ ] ***2*** Yes

SECTION I. Flood damage

I1. Have you had flood damages since 1998?

[ ] ***1*** No, [ ] ***2*** yes; If YES please answer the following questions:

3. How many times?

4. When have you had flood? (year /month)	5. Where did the water come from?	6. What did your household lose for the flood? (count only within where you live)	7. How did you cope with the flood? (If #4 is chosen, pls specify)
	[ ] ***1*** River [ ] ***2*** Other than River (e.g. pipe) [ ] ***3*** Can't specify	[ ] ***1*** Cash [ ] ***2*** Furniture [ ] ***3*** House [ ] ***4*** Family member [ ] ***5*** Other	[ ] ***1*** Stay at house [ ] ***2*** Escaped to the shelter [ ] ***3*** Move to somebody's house [ ] ***4*** Moved to higher place [ ] ***5*** Other
	[ ] ***1*** River [ ] ***2*** Other than River (e.g. pipe) [ ] ***3*** Can't specify	[ ] ***1*** Cash [ ] ***2*** Furniture [ ] ***3*** House [ ] ***4*** Family member [ ] ***5*** Other	[ ] ***1*** Stay at house [ ] ***2*** Escaped to the shelter [ ] ***3*** Move to somebody's house [ ] ***4*** Moved to higher place [ ] ***5*** Other
	[ ] ***1*** River [ ] ***2*** Other than River (e.g. pipe) [ ] ***3*** Can't specify	[ ] ***1*** Cash [ ] ***2*** Furniture [ ] ***3*** House [ ] ***4*** Family member [ ] ***5*** Other	[ ] ***1*** Stay at house [ ] ***2*** Escaped to the shelter [ ] ***3*** Move to somebody's house

			[ ] ***4*** Moved to higher place [ ] ***5*** Other
	[ ] ***1*** River [ ] ***2*** Other than River (e.g. pipe) [ ] ***3*** Can't specify	[ ] ***1*** Cash [ ] ***2*** Furniture [ ] ***3*** House [ ] ***4*** Family member [ ] ***5*** Other	[ ] ***1*** Stay at house [ ] ***2*** Escaped to the shelter [ ] ***3*** Move to somebody's house [ ] ***4*** Moved to higher place [ ] ***5*** Other
8. Do you /Does your community have flood coping mechanism now? How? [ ] ***1*** No [ ] ***2*** ***Yes, If YES please specify:***			

End of Survey