DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
THE REPUBLIC OF THE PHILIPPINES

JAPAN INTERNATIONAL COOPERATION AGENCY

# THE PREPARATORY STUDY
# FOR
# PASIG-MARIKINA RIVER CHANNEL IMPROVEMENT PROJECT (PHASE III)
# IN
# THE REPUBLIC OF THE PHILIPPINES

## FINAL REPORT

## Volume 3 Supplement Documents

**October 2011**

CTI ENGINEERING INTERNATIONAL CO., LTD

| GED |
| --- |
| CR |
| 11-136 |

# VOLUME III TABLE OF CONTENTS

# 1. Implementation Program (DRAFT)

# IMPLEMENTATION PROGRAM

# FOR

# PASIG-MARIKINA RIVER CHANNEL

# IMPROVEMENT PROJECT

# (PHASE III)

**OCTOBER 2011**

Pasig-Marikina River Channel Improvement Project (Phase III)

## Particular Conditions On Preparation of Implementation Program

This Implementation Program (I/P) for Reference was prepared to assist the DPWH in preparation of his I/P in accordance with the DPWH's proposal for implementation of Phase III.

For the improvement of Pasig River Channel, the DPWH intends to implement all the Potential Areas including the Priority-3 Group and to complete the Phase III in June 2016.

In details, there are major differences between the results of JICA Preparatory Study and DPWH's proposal, as follows:

a) Scope of Works of Phase III

| | JICA Preparatory Study | DPWH's Proposal |
|---|---|---|
| Improvement of Pasig River | Priority-1 and -2 Groups. | All Potential Areas (Proority-1, -2 and -3 Groups) |
| Improvement of Lower Marikina River | There is no difference. | |

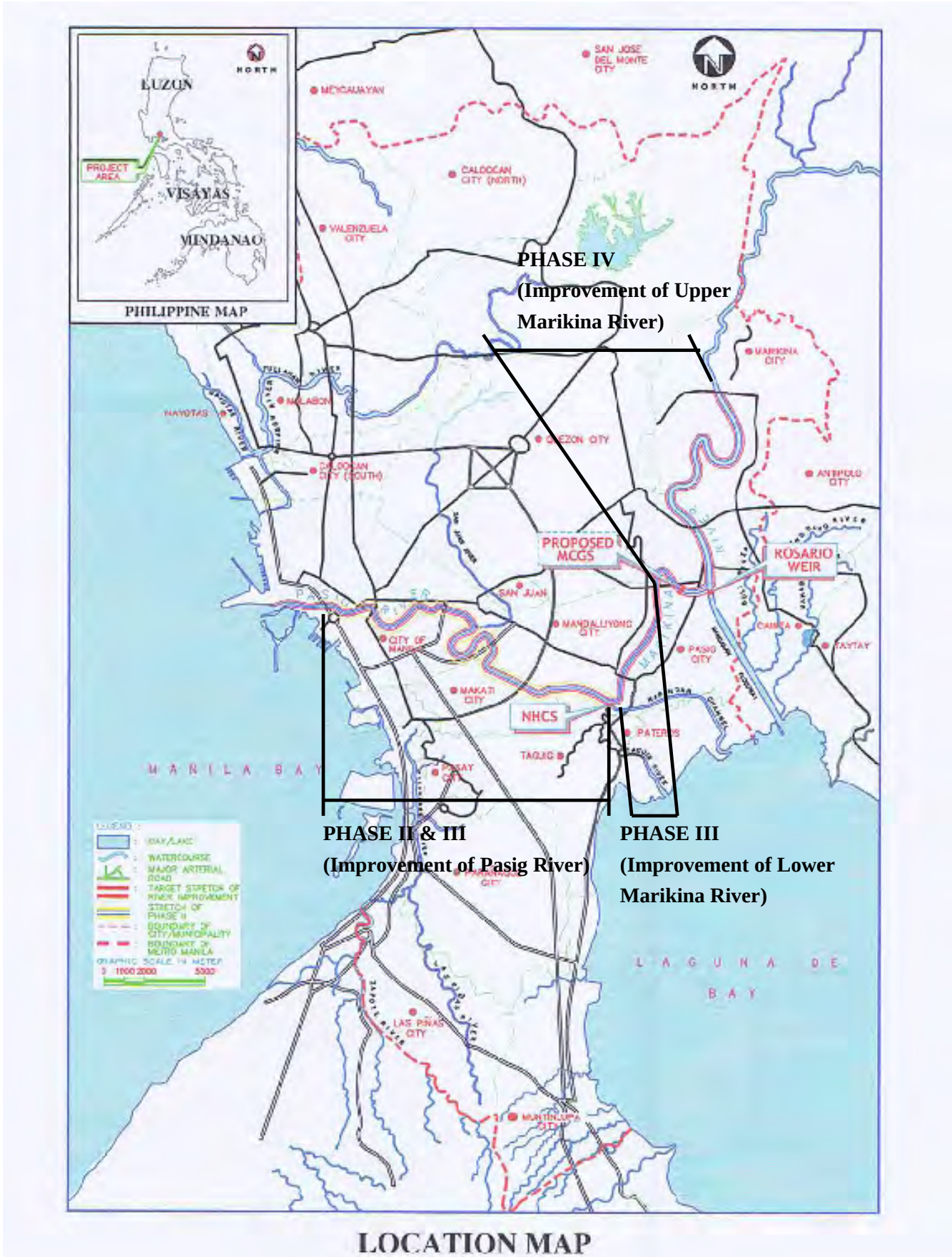
b) Implementation Schedule of Phase III

| | JICA Preparatory Study | DPWH's Proposal |
|---|---|---|
| Procurement of DPWH Consultant | March 2012 to February 2013 (12 months) | March 2012 to August 2012 (6 months) |
| Procurement of Contractors | March 2013 to April 2014 (14 months) | September 2012 to June 2013 (10 months) |
| Construction Time | May 2014 to April 2017 (36 months) | July 2013 to June 2016 (36 months) |

c) Project Cost of Phase III

| JICA Preparatory Study | DPWH's Proposal |
|---|---|
| P7,361.5 million | P8,008.69 million |

It is assumed that JICA loan in this Implementation Program be provided for the DPWH's proposed Phase III including Priority-3 Group of Pasig River Improvement.




LOCATION MAP

**PASIG-MARIKINA RIVER CHANNEL IMPROVEMENT PROJECT**
**(PHASE III)**

**IMPLEMENTATION PROGRAM**

**TABLE OF CONTENTS**

# CHAPTER 1 INTRODUCTION

## 1.1 Background and Necessity 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 in 2010, is the economic, political and cultural center of the Philippines.

A master plan of flood control for the Pasig-Marikina River including the drainage in Metro Manila was prepared in 1952. In line with the flood control plan, the improvement works of the Pasig River, consisting mainly of river walls and revetments of the channel, were constructed in the 1970's. In addition, the Manggahan Floodway having a design flow capacity of 2,400 $m^3/s$ for diversion of flood from Marikina River to Laguna Lake was completed in 1988 to mitigate the flood damage due to the overflow of the lower Marikina River and Pasig River.

However, even though the completion of Manggahan Floodway, flood damages along the Pasig-Marikina River have been frequently experienced in last 25 years from 1986 to 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 including 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 in the entire Philippines.

To cope with such existing flood problems in Metro Manila, the necessity of river channel improvement of Pasig-Marikina River has been further 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 updating/review of the F/S for the river channel improvement project through the Special Assistance for Project Formation (SAPROF) of JICA in 1998, the "Pasig-Marikina River Channel Improvement Project (PMRCIP)" was proposed for the implementation in the following four phases under the financial assistance of Japanese ODA:

| | |
|---|---|
| (1) Phase I: | Detailed Design for the Overall Project (29.7 km) from Delpan Bridge to Marikina Bridge |
| (2) Phase II: | Channel Improvement Works for Pasig River (Delpan Bridge to Napindan River; 16.4 km) |
| (3) Phase III: | Channel Improvement Works for Lower Marikina River including Construction of Marikina Control Gate Structure (MCGS) (Junction with Napindan River to Manggahan Floodway; 7.2 km) |

(4) Phase IV: Channel Improvement Works for Upper Marikina River (Manggahan Floodway to Marikina Bridge; 6.1 km)

Following the SAPROF study, the Government of Japan through the JICA has decided to extend its loan to finance for the Phase I of the Project under 23rd Loan Package in June 1999. Thus, the Detailed Design (D/D) was carried out from October 2000 to March 2002.

On the other hand, since 1994, a flagship project named the Pasig River Rehabilitation Program (PRRP) has been implemented as a multi-agency undertaking to retrieve the beauty and lush greenery of the Pasig River as it used to be as early as the 15th century. In particular, the DPWH has been appointed for the civil works for flood mitigation, especially channel improvement. Both the National Housing Authority (NHA) and the concerned LGUs have undertaken to relocate all the informal settlers living along the banks of Pasig River and its tributaries under the Pasig River Rehabilitation Commission (PRRC).

After the completion of the detailed design, the implementation of the Phase II Project for the Pasig River was approved by the ICC-Technical Board (TB) on July 26, 2002 and by the ICC-Cabinet Committee (CC) on August 01, 2002. Subsequent approval of the same by the NEDA Board was done September 03, 2002. Due to the change in project cost, re-approval of ICC-TB and ICC-CC was attained on March 06, 2003 and March 13, 2003, respectively. NEDA Board confirmation on the subject Project was given on May 06, 2003.

After the confirmation of ICC Board, a meeting among JICA, DPWH, MMDA and NEDA was held on July 22, 2004 at the office of MMDA. The Chairman of MMDA still had a lot of queries that had to be addressed. This led to the conduct of a Value Engineering Study (VES) by the University of the Philippines-National Hydraulic Research Center (UP-NHRC) from June to September 2005. Results of the VES had been presented on March 10, 2006 to NEDA and MMDA wherein project approval has been made. ICC-CC during its meeting on August 16, 2006 approved the updated scope and cost of the Phase II Project.

The construction of Phase II Project has been requested for financing under the 26th JICA Yen Loan Package (STEP: Special Term Economic Partnership). After the Loan Agreement for the Phase II Project dated February 27, 2007, pre-construction stage consisting of design review, pre-qualification of the contractors and tendering has started in December 2007. The construction has commenced in July 2009 targeting the completion of the Project by June 2012. As of the end of March 2011 the construction works have achieved a great progress at 89.58% (schedule 62.09%), ahead of schedule by 27.49%.

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 ongoing Phase II Project, it is proposed to implement the Phase III Project which is the Lower Marikina River Channel Improvement Works in total of 5.4 km from the immediate vicinity of NHCS (Napindan Hydraulic Control Structure) to the downstream of the junction with the Manggahan Floodway, excluding the construction of proposed MCGS. 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. These sections were not covered by the on-going Phase (II) Project.

To support for formulation of a Yen-Loan Project as "Phase-III", the JICA has executed the Preparatory Study starting in September 2010 until July 2011 to review the existing Pasig-Marikina River Channel Improvement Plan, focusing on river improvement stretch covered by Phase III, in the course of the study for the whole river improvement stretch (from river mouth to Marikina Bridge) in Pasig-Marikina River Basin including the present river conditions reflecting

recent river basin development, recent flood damage conditions and impacts to flood damage by future climate change.

## 1.2 National Policy and Direction for Flood Control

The flood control policy and direction are derived from the Medium-Term Philippine Development Plan (2004-2010) and the Medium-Term DPWH Infrastructure Development Plan (2004-2010). Also, Flood and Drainage Management in newly issued Philippine Development Plan 2011-2016 is excerpted.

### 1.2.1 Medium-Term Philippine Development Plan (2004-2010)

Medium-Term Philippine Development Plan (MTPDP) for 2004-2010 is a detailed roadmap towards achieving the common goal of reducing poverty through job creation and enterprise.

As for natural disaster prevention, strategies are mainly divided into two; namely, (1) non-structural measures and (2) structural measures:

**(1) Non-Structural Measure**

a) Complete the geo-hazard mapping of the remaining 13 regions;

b) Conduct soil stability measures for land slide-vulnerable areas; and

c) Ensure integration of disaster preparedness and management strategy in the development planning process at all levels of governance. This shall be done through the following activities, namely, among others: periodic risk assessments, updating of respective land use policy based on the assessment, conduct of disaster management orientation/training among LGU officials and concerned local bodies, institutionalization of community-based mechanisms for disaster management (e.g., inclusion of legitimate disaster management organization at various Disaster Coordinating Councils), and advocating for the bill on "Strengthening the Philippine Disaster Management Capability".

**(2) Structural Measures**

a) Keep at the optimum conveyance capacities of existing river channel, floodways, drainage canals, esteros through riverbanks protection, dredging/de-silting, observance of river easements, relocation of informal settlers, proper disposal of garbage, and efficient maintenance in coordination with LGUs; and

b) Provide adequate flood control and drainage facilities in all flood/sediment disaster prone areas to mitigate flooding as well as rehabilitate and improve existing facilities.

The points to be understood in the MTPDP 2004-2010 policy are summarized as follows:

1. Flooding shall be mitigated through the complex enhancement between government policies, organizations, laws, physical countermeasures, etc, under the philosophy that flooding cannot be completely controlled by human techniques.

2. In addition, flood management shall be considered as one of Integrated Water Resources Management.

In accordance with the policy, the 11 priority flood management projects have been scheduled, including the Pasig-Marikina River Channel Improvement Project (Phase II).

### 1.2.2 Medium-Term DPWH Infrastructure Development Plan (2005 – 2010)

The DPWH had set 9 tasks to be solved or improved for the implementation of effective flood and landslide disaster mitigation since the previous Medium-Term Plan (1999-2004), as follows:

(1) Formulation of an overall Master Plan of flood control adopting the principle of management and river basin approach;

(2) Pursuance of comprehensive planning of prioritized major and principal river basins, giving priority to maintenance rather than new construction;

(3) Provision of adequate flood control and drainage facilities in all flood/sediment disaster prone areas to mitigate flooding within tolerable levels;

(4) Pursuance to non-structural measures to mitigate floods, such as flood forecasting and warning and monitoring system, evacuation plan, hazard mapping and reforestation;

(5) Keeping of optimum conveyance capacities of river channel floodways, drainage canals, esteros, etc., through riverbank protection, dredging/de-silting, observance of river easement, and efficient management in coordination with Local Government Units (LGUs);

(6) Establishment of database of river information, including existing flood control drainage, and sabo structures;

(7) Strengthening and maximizing the capacity of the Flood Control and Sabo Engineering Center (FCSEC) to conduct basic and applied researches and development, engineering programs and human resources development;

(8) Strengthening of the flood management capabilities of DPWH, LGUs and other concerned agencies; and

(9) Establishment of the National Flood Mitigation Management Committee (NFMC) as the inter-agency organization and policy governing body to integrate and lead all efforts on disaster mitigation and flood management, and formulate guidelines.

### 1.2.3 Philippine Development Plan (2011-2016)

Chapter 5 of the Plan (Accelerating Infrastructure Development) aims to accelerate the provision of physical infrastructure to support the economic sectors, and ensure equitable access to infrastructure services especially health, education and housing.

<u>Flood and Drainage Management</u>

(1) Assessment, Issues, and Challenges

a) Inadequate disaster mitigation and response

b) Lack of financing

c) Unsustainable operations and maintenance of structural and nonstructural infrastructures

(2) Strategic Plan and Focus

To reduce adverse effects of flooding occurrences by maintaining watersheds and providing efficient and adequate infrastructure, the following strategies will be pursued:

a) Prioritize the construction of flood management structures in highly vulnerable areas, involving the development of hazard maps.

b) Apply Climate Change Adaptation (CCA) and Disaster Risk Reduction and Management (DRRM) strategies in the planning and design of flood management structures.

c) Develop a mechanism to expedite immediate financing for the rehabilitation of flood management structures.

d) Increase local government and community participation

## 1.3 Objectives of the Project

The objectives of the Pasig-Marikina River Channel Improvement Project are to mitigate the flood damage caused by channel overflow of the Pasig-Marikina River, to facilitate the urban development and to enhance the favorable environment along the river.

(1) To mitigate the frequent inundation or massive flooding caused by the overflowing of Pasig-Marikina River resulting in severe damages to lives, livestock, properties and infrastructure with the aim of alleviating the living and sanitary conditions in Metro Manila including parts of Rizal Province.

(2) To create a more dynamic economy by providing a flood-free urban center as an important strategy for furthering national development.

(3) To rehabilitate and enhance the favorable environment and aesthetic view along the riverside areas by providing with more ecologically stable condition which will arrest the progressive deterioration of environmental conditions, health and sanitation in Metro Manila.

The proposed Pasig-Marikina River Channel Improvement Project will make a significant contribution to the achievement of urban environment for Metro Manila by means of rehabilitation of revetments along the Pasig Riverbanks in addition to the main purpose of flood control. The project activities including drainage outlet improvement along the river channel will bring about urban improvements in living conditions and public health standards for riverside communities.

# CHAPTER 2 PRESENT CONDITIONS OF THE PROJECT AREA

## 2.1 Project Location

The area of overall Pasig-Marikina River Channel Improvement Project is delineated in the most significant portion in Metro Manila; the Pasig River from Delpan Bridge up to the junction of Napindan River, the Lower Marikina River from the junction of Napindan River to the diversion point of the Marikina River to Manggahan Floodway, and the Upper Marikina River from the Manggahan Floodway to St. Niño Bridge. The beneficial areas of the overall Project include in 8 cities and 1 municipality in Metro Manila (Manila, Mandaluyong, Makati, Pasig, Quezon, Taguig, Pateros, Marikina and San Juan) and 2 municipalities in Rizal Province (Cainta and Taytay).

Out of the above overall beneficial area, the project site area of Phase III is located in Manila, Mandaluyong, Makati and Pasig Cities in Metro Manila.

## 2.2 Climate Condition

The project area, except the western area of the Laguna Lake, belongs to Type I of the four (4) Philippine climatological regions. The Type I climatological region is characterized by a dominant rainy season from May to October and a dominant dry season for the rest of the months. The annual rainfall distribution shows the annual rainfall of 3,000 mm, more or less, over the Marikina River's mountainous basin-head area where the high Sierra Madre Mountain range is located. On the other hand, the annual rainfall of approximately 2,000 mm spreads over the rainfall zone of the Manila Bay area to the Laguna Lake Basin.

The total rainfall from May to October accounts for about 80% of the annual rainfall, which is brought mainly by the wet southwestern monsoon, plus the occasional typhoons. The monthly rainfall distribution over the western area of the Laguna Lake has a longer rainy season up to December. This is because of the influence of the northeast monsoon affecting the area due to the low terrain of the Sierra Madre ranges bordering the first and the second climatological zones.

## 2.3 Pasig-Marikina-San Juan-Napindan-Manggahan Channel System

The Pasig-Marikina River flows through the City of Manila to the Manila Bay. Its total catchment area is measured at around 621 $km^2$, about 20% of which is situated in Metro Manila and 80% in Rizal Province. At the confluence with the Napindan River, the river is known as the Marikina River in the upper reach and the Pasig River in the lower reach (17.1 km long from Manila Bay). The San Juan River with a catchment area of 91 $km^2$ joins the Pasig River at its meandering section in Sta. Ana, Manila City and drains the plateau on which Quezon City stands. The Napindan River which flows on the flat area is only one natural outlet of Laguna Lake. The Manggahan Floodway has been completed in 1988 to divert floodwaters from the Marikina River into the Laguna Lake at the design discharge of 2,400$m^3$/s under the condition of the regulated flood flow by the proposed Marikina Control Gate Structure (MCGS).

## 2.4 Laguna Lake

The major area of Laguna Lake Basin is situated in Region IV. The northwestern portion of the basin is flanked by the National Capital Region including Marikina, Pasig, Taguig, Muntinlupa, Pasay, Caloocan, Quezon, Manila and Pateros and the northeast-southeastern borders are bounded by the provinces of Bulacan, Rizal, and Quezon; whereas, the south and southwestern portions are bordered by the provinces of Laguna, Batangas, and Cavite. The basin encompasses a total area of nearly 4,000 $km^2$. The lake has a total surface area of about 900 $km^2$, at lake water level of EL.11.5 m and an average depth of 2.8 m. It has a total volume of 3.2 billion $m^3$ with a shoreline of 220 km. There are 21 tributaries draining into the lake; 21% of the freshwater comes from Pagsanjan River while 7% from Sta. Cruz River, excluding the flood diversion of Marikina River

through the Manggahan Floodway. Laguna lakeshore area has also serious problem of flood with long duration.

## 2.5 Environmental Condition

The Pasig-Marikina River stretches over a densely populated urban part of the country. The quality of the environment in general, more specifically water quality, flora and fauna, has been significantly deteriorated in the past decades due to rapid population growth and resultant increased pollution.

### 2.5.1 Water Quality

Water quality of the surface water is measured up against DAO1990-34. The designated water use of the Pasig-Marikina River is Class-C that is for; (1) Fishery water fir the propagation and growth of fish and other aquatic resources; (2) Recreational Water Class II (boating etc); and (3) Industrial Water Supply Class I (for manufacturing process after treatment).

Overall trend of water quality of the Pasig-Marikina River is constant deterioration; historically, according to the PRRC, the Pasig-Marikina River had already been unqualified as Class-C water quality in the 1970's, all fishing activities stopped in the 1980's, and in the 1990's the River was declared "biologically dead". The major sources of the water pollution are suspected to be light to heavy industries located along the Pasig-Marikina River and regular households.

General trend in water quality is better at Marikina Bridge Sampling Station in the upper Marikina River, Marikina City. BOD, COD, TSS, Nitrates, Phosphates, Total Coliform, and Cadmium show the similar trend; starting with lower level at Marikina Bridge then increasing toward Vargas Bridge along the Lower Marikina River, Pasig City, then after joining the San Juan River it decreases toward Manila Bay. Almost all parameters for all sampling locations do not satisfy Class-C water quality level.

### 2.5.2 Flora and Fauna

#### (1) Flora

**(a) Terrestrial Flora**

The riverbanks serve as habitat for few thriving natural plants, majority of which are Ficus species. 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 occurred 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.

**(a) Aquatic Flora (Macrophytes)**

The aquatic biota is low in diversity of macrophytes in the Pasig River, which can be attributed to river pollution and concentration of population on the nearby areas. The same or similar habitat and biological characteristic can be expected in the Marikina River and its surroundings.

**(b) Phytoplankton**

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

**(2) Fauna**

**(a) Wildlife**

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

**(b) 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 species, which was brought for a research purpose from out of the country, and not a native of the Pasig-Marikina River. The most number of janitor fish caught and observed was in Guadalupe Bridge, Makati. None was caught at Lambingan Bridge, Manila.

**(c) Zooplankton**

Three groups of zooplankton were found in four sampling stations in the Pasig River. As in most tropical freshwaters, results show that 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.

**(d) Macrobenthos**

- Oligochaetes and dextral pond snails dominates 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 the 19% of the total number of collected macrobenthic organisms.
- Shrimps 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 dominancy 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.

## 2.6 Socio-economic Condition

### 2.6.1 Geographical Jurisdiction of the Concerned Cities/Municipalities

The Pasig-Marikina River traverses Metropolitan Manila stretching from Rodriguez of Rizal Province and eventually draining into Manila Bay. The inundation areas due to overflow of the Pasig-Marikina River spread over eleven cities/municipalities; 1) Makati, 2) Mandaluyong, 3) Manila, 4) Marikina, 5) Pasig, 6) Pateros, 7) Quezon, 8) San Juan and 9) Taguig in National

Capital Region (NCR), and 10) Cainta and 11) Taytay in Rizal. They are the contiguous urban areas undergoing rapid economic and population growth.

**Geographical Jurisdiction of the concerned City/Municipality**

| Region Province | City/Municipality | | | Land Area under the jurisdiction ($km^2$) |
|---|---|---|---|---|
| NCR | 1 | Makati | City | 27.36 |
| | 2 | Mandaluyong | City | 11.26 |
| | 3 | Manila | City | 40.46 |
| | 4 | Marikina | City | 21.50 |
| | 5 | Pasig | City | 31.00 |
| | 6 | Pateros | Municipality | 1.85 |
| | 7 | Quezon | City | 161.13 |
| | 8 | San Juan | City | 5.94 |
| | 9 | Taguig | City | 45.38 |
| Region IV-A Rizal Province | 10 | Cainta | Municipality | 42.99 |
| | 11 | Taytay | Municipality | 41.40 |
| Total Land Area | | | | 430.27 |

Source: The area of total land were compiled on the basis of the Comprehensive Land Use Plan of each city/municipality except for the Cainta and Taytay that were derived from Rizal Provincial Physical Framework Plan.

### 2.6.2 Demography and Population

The rapid population growth of the area is expected to continue in the coming decades, however, with slower and varying paces. The figure below presents population growth on a log scale for the Philippines and the NCR over the five decades since 2000 based on the medium assumption in 2000. The table summarizes the computed average annual growth rate of the same period.

The population in NCR was expected to grow approximately at 1.5 % per annum until 2010 as against the national rate of 2.0 %. Rizal province is projected to grow at 2.5% until 2010. The total number of population of NCR remains the largest among the regions and most likely continues to grow at a slower pace in the coming decades until 2040 with an annual growth rate at 0.9% until 2025 and 0.3% until 2040. The provinces in the vicinity will likely grow more rapidly but with declining growth rates over the decades. Overall, the population growth is slowing down in NCR but continues to grow very fast in immediate periphery.

**Computed Average Annual Population Growth**

| Country / Region | 2001-2010 | 2010-2025 | 2026-2040 |
|---|---|---|---|
| PHILIPPINES | 2.0% | 1.6% | 1.1% |
| NCR | 1.5% | 0.9% | 0.3% |
| RIZAL | 2.5% | 1.7% | 1.0% |

Source: Regional and Provincial Projected Population by Sex, and by Single-Calendar Years: Philippines: 2000-2010 (Medium Assumption)

The population of the concerned cities/Municipalities in 2010 was estimated at 7,958 thousands in total. It was computed by extrapolating the 2007 Census data and the population projection under the medium scenario published in 2000. Use of the projected population growth rate of NCR was initially considered to estimate the population in Taytay and Cainta due to geographical contiguity and resultant commonality in demographic dynamics. However, it was rejected because there remain unused land area in the municipalities.

**Regional Projected Population in 2000 (Medium Assumption)**

| Region | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|
| NCR | 11,099,800 | 11,252,700 | 11,403,300 | 11,552,100 |
| Region IV-A | 11,152,800 | 11,402,800 | 11,653,000 | 11,904,100 |
| Philippines | 88,706,300 | 90,457,200 | 92,226,600 | 94,013,200 |

Source: Regional and Provincial Projected Population by Sex, and by Single-Calendar Years: Philippines: 2000-2010 (Medium Assumption)

**Population Estimate in 2010**

| City/Municipality | Census 2007 | Estimate under the Medium Scenario | | |
|---|---|---|---|---|
| | 2007* | 2008 | 2009 | 2010 |
| NCR | 11,566,325 | 11,725,651 | 11,882,581 | 12,037,635 |
| Manila | 1,660,714 | 1,683,590 | 1,706,123 | 1,728,386 |
| Makati | 567,349 | 575,164 | 582,862 | 590,468 |
| Mandaluyong | 305,576 | 309,785 | 313,931 | 318,028 |
| Pasig | 627,445 | 636,088 | 644,601 | 653,012 |
| Quezon | 2,679,450 | 2,716,359 | 2,752,714 | 2,788,634 |
| Marikina | 424,610 | 430,459 | 436,220 | 441,912 |
| Taguig | 613,343 | 621,792 | 630,114 | 638,336 |
| San Juan | 125,338 | 127,065 | 128,765 | 130,445 |
| Pateros | 61,940 | 62,793 | 63,634 | 64,464 |
| Taytay | 262,485 | 268,369 | 274,257 | 280,167 |
| Cainta | 304,478 | 311,303 | 318,134 | 324,989 |
| Total within the concerned | 7,632,728 | 7,742,768 | 7,851,354 | 7,958,840 |

Note: The values in the line of "Total" indicate the summation of each year of the eleven cities and municipalities.
Source1: 2007 Census of Population, Population by Province, City/Municipality and Barangay, National Capital Region, Report No.1-N
Source2: 2007 Census of Population, Population by Province, City/Municipality and Barangay, Calabarzon-Region IVA, Report No.1-D

On the basis of the above, the population in each city/municipality was projected until 2040 as summarized in the table below.

**Population Projection until 2040**

(Unit: 1000)

| City/Municipality | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 |
|---|---|---|---|---|---|---|---|
| NCR | 12,038 | 12,734 | 13,313 | 13,772 | 14,115 | 14,318 | 14,368 |
| Manila | 1,728 | 1,828 | 1,911 | 1,977 | 2,027 | 2,056 | 2,063 |
| Makati | 590 | 625 | 653 | 676 | 692 | 702 | 705 |
| Mandaluyong | 318 | 336 | 352 | 364 | 373 | 378 | 380 |
| Pasig | 653 | 691 | 722 | 747 | 766 | 777 | 779 |
| Quezon | 2,789 | 2,950 | 3,084 | 3,190 | 3,270 | 3,317 | 3,328 |
| Marikina | 442 | 467 | 489 | 506 | 518 | 526 | 527 |
| Taguig | 638 | 675 | 706 | 730 | 749 | 759 | 762 |
| San Juan | 130 | 138 | 144 | 149 | 153 | 155 | 156 |
| Pateros | 64 | 68 | 71 | 74 | 76 | 77 | 77 |
| Taytay | 280 | 309 | 338 | 366 | 392 | 415 | 436 |
| Cainta | 325 | 359 | 392 | 425 | 455 | 482 | 505 |
| Total | 7,959 | 8,447 | 8,863 | 9,204 | 9,469 | 9,644 | 9,718 |

### 2.6.3 Regional Economy and Related Development Plans

#### (1) Overview of the Regional Economy

In 2009, the Philippine economy remained resilient as it managed to grow by 1.1 percent despite the adverse impact of the global economic crisis and the onslaught of super typhoons "Ondoy" and "Pepeng", which constituted 2.7 percent of national GDP. These disasters have had a substantial impact on the economies of the affected regions. For example, the regional damages and losses accounted for as much as 10 percent of Region I's GDP, 9 percent of Region II and IV-A's GDP, and 7 percent of Region III's GDP.

NCR on the economic growth rate suffered a reversal from positive 4.7 percent in 2008 to negative 0.4 percent in 2009. This was brought about by the slump in the industry sector and the deceleration of the service sector. The economy of CALABARZON suffered a reversal of 1.6 percent in 2009 from a 1.9 percent growth in 2008 as the Industry and Agriculture, Fishery, and Forestry posted negative growth rates while services decelerated.

**GDP Growth Rates at Constant (1985) Prices**

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|
| Philippines | 4.4 | 3.0 | 4.3 | 4.6 | 6.2 | 4.9 | 5.4 | 7.1 | 3.7 | 1.1 |
| NCR | 5.8 | 3.1 | 3.1 | 5.2 | 8.4 | 7.4 | 6.7 | 7.8 | 4.7 | -0.4 |
| IV-A (CALABARZON) | (3.5)* | (2.8)* | N.A* | 2.8 | 4.0 | 2.6 | 4.6 | 5.3 | 1.9 | -1.6 |

The data for IVA Calabarzon from 2000 to 2003 adopted those for Southern Tagalog. Source: National Statistical Coordination Board.

The percentage share of NCR's GDP continued to account for the largest share with a 32.5 percent in 2009 with an approximate increase by 2 % from 2000. Urban regions account for increasing amount of economic activities and values; these regions are clearly establishing themselves as drivers of economic growth.

**Percentage share of Regional GDP to National GDP**

| | 2000 | 2005 | 2009 |
|---|---|---|---|
| NCR | 30.7% | 32.0% | 32.5% |
| IV-A (CALABARZON) | - | 12.4% | 11.6% |

Source: Source National Statistical Coordination Board

The per capita Gross Regional Domestic Product of NCR stands at 2.96 times higher than the national average. The value in Calabarzon on average stands at 69 thousands peso that is equivalent to 83% of the national average and 28 % of NCR.

**Per Capita Gross Regional Domestic Product at Current Prices**

| | 2009(Peso in Current Price) | Comparative term |
|---|---|---|
| PHILIPPINES | 83,261 | 1.00 |
| NCR | 246,753 | 2.96 |
| IV-A (CALABARZON) | 68,895 | 0.83 |

Source: National Statistical Coordination Board

According to a study in 2005, more than 10 % of the population lives below the poverty line in six (6) districts in Manila and one (1) in Rizal Province: they are Quiapo, San Miguel, Tondo, San Nicolas, Intramurons, Port Area and Taytay. The study adopted the international poverty line that is $1.08 in 1993 value, converted to local currency using the current Purchasing Power Parity rate.

**Poverty Indicators of the concerned City/Municipality**

| City/Municipality | Districts | Poverty Incidence | Poverty Gap | Poverty Severity |
|---|---|---|---|---|
| Manila | Binondo | 0.0274 | 0.0051 | 0.0015 |
| | Ermita | 0.0587 | 0.0117 | 0.0036 |
| | Intramurons | 0.2588 | 0.0629 | 0.0222 |
| | Malate | 0.0856 | 0.0176 | 0.0056 |
| | Paco | 0.0729 | 0.0146 | 0.0045 |
| | Pandacan | 0.0801 | 0.0158 | 0.0049 |
| | Port Area | 0.5011 | 0.1621 | 0.0701 |
| | Quiapo | 0.1009 | 0.0212 | 0.0068 |
| | Samplaloc | 0.0425 | 0.0079 | 0.0023 |
| | San Andres Bukid | N.A. | N.A. | N.A. |
| | San Miguel | 0.1091 | 0.0235 | 0.0077 |
| | San Nicolas | 0.2278 | 0.0576 | 0.0210 |
| | Santa Anna | 0.0774 | 0.0155 | 0.0048 |
| | Santa Cruz | 0.0756 | 0.0153 | 0.0048 |
| | Santa Mesa | N.A. | N.A. | N.A. |
| | Tondo | 0.1601 | 0.0362 | 0.0122 |
| Makati | | 0.0374 | 0.0069 | 0.0022 |
| Mandaluyong city | | 0.0725 | 0.0143 | 0.0044 |
| Pasig | | 0.0533 | 0.0098 | 0.0028 |
| Quezon | | 0.0714 | 0.0140 | 0.0042 |
| Marikina | | 0.0552 | 0.0102 | 0.0030 |
| Taguig | | 0.0893 | 0.0179 | 0.0056 |
| San Juan | | 0.0292 | 0.0052 | 0.0015 |
| Pateros | | 0.0823 | 0.0167 | 0.0053 |
| Taytay | | 0.1221 | 0.0255 | 0.0081 |
| Cainta | | 0.0772 | 0.0151 | 0.0046 |

N.A. stands for Not Available

Note: Poverty incidence for a given area is defined as the proportion of individuals living that area who are in households with an average per capita expenditure below the poverty line. Poverty gap is the average distance below the poverty line, being zero for those individuals above the line. It thus represents the resources needed to bring all poor individuals up to a basic level. Poverty severity measures the average squared distance below the line, thereby giving more weight to the very poor.

Source: Estimate of Local Poverty in the Philippines, November 2005, National Statistical Coordination Board. Retrieved as of February 7, 2011, at http://www.nscb.gov.ph/poverty/sae/NSCB_LocalPovertyPhilippines.pdf.

### (2) Relevant Development Plans

The Medium Term Philippine Development Plan (MTPDP) 2011-2016 is unavailable because it is currently under the final stage of the preparation. The draft MTPDP comprises of macroeconomic policy, competitive industry and services sectors, competitive and sustainable agriculture and fisheries, accelerating infrastructure development, financial sector, good governance and rule of law, social development, peace and security and conservation, protection and rehabilitation of environment and natural resources towards sustainable development.

Comprehensive Land Use Plan (CLUP) serves as the primary and dominant bases for the future use of land resources. Preparation of CLUP is a mandate of LGU as set forth in the Local Government Code of 1991.

The table below presents numerical summary of existing and future land use of the concerned cities and municipalities based mainly on each of the latest CLUP. Rizal Provincial Physical Framework Plan was also referred in preparing the table. Due to inaccessibility to or unavailability of the report, numerical data of land use in Taguig and those in Rizal are missing in the table. Base years of the CLUP differ among the cities and municipalities. The different

categories of the land use are integrated into a common format of presentation to enable comparison among the cities and municipalities.

Notable features of the land use changes between existing and proposed are: 1) minimal change in residential area except Manila city that has adopted a policy to encourage a clustered development style for multi-family and commercial development; 2) accelerated relocation of industries except Marikina city that has a Heavy Industrial Zone in the north eastern side of the city and undergone relocation of several manufacturing firms within the city including a shoe accessories manufacturing; 3) varying degree but consistent rise among the cities and municipalities in the land area earmarked for commercial and business activities; and 4) diminished open and unused land area, included in other land, that may have impact on infiltration capacity.

**Existing and Future Land Use**

| City /Municipality | | Manila* | Makati | Mandaluyong | Pasig | Quezon | Marikina | Taguig | San Juan | Pateros | Taytay | Cainta |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | | | 1998 | 1990 | 2002 | | 1999 | | | | 1999 | |
| Existing | Residential | 1,450 | 1,031 | 443 | 1,865 | 7,779 | 813 | - | 377 | 111 | 1,192 | 2,493 |
| | Commercial | 544 | 416 | 89 | 220 | 1,309 | 133 | - | 53 | 16 | 38 | 43 |
| | Industrial | 213 | 39 | 146 | 470 | 1,025 | 281 | - | 30 | - | 117 | 258 |
| | Institutional | 488 | 390 | 107 | 31 | 1,352 | 73 | - | 40 | 9 | 29 | 129 |
| | Other | 1,351 | 860 | 342 | 514 | 4,646 | 851 | - | 94 | 49 | 1,336 | |
| | Total | 4,046 | 2,736 | 1,126 | 3,100 | 16,112 | 2,150 | - | 594 | 185 | 2,712 | 2,923 |
| Year | | 2005-2020 | | | | | 2010 | 2000 - 2020 | | | | |
| Proposed | Residential | 870 | 1,183 | 469 | 2,015 | 7,779 | 801 | 2,411 | 354 | 115 | - | - |
| | Commercial | 1,713 | 556 | 211 | 680 | 1,309 | 244 | 302 | 99 | 34 | - | - |
| | Industrial | 97 | 0 | 90 | 215 | 1,025 | 296 | 280 | 5 | - | - | - |
| | Institutional | 784 | 339 | 46 | 25 | 1,352 | 95 | 436 | 42 | 10 | - | - |
| | Other | 728 | 657 | 310 | 165 | 4,646 | 714 | 1,109 | 94 | 26 | - | - |
| | Total | 4,192 | 2,736 | 1,126 | 3,100 | 16,112 | 2,150 | 4,538 | 594 | 185 | - | - |
| Changes | Residential | 0.60 | 1.15 | 1.06 | 1.08 | - | 0.99 | - | 0.94 | 1.03 | - | - |
| | Commercial | 3.15 | 1.34 | 2.37 | 3.09 | - | 1.84 | - | 1.87 | 2.07 | - | - |
| | Industrial | 0.45 | 0.00 | 0.62 | 0.46 | - | 1.05 | - | 0.17 | - | - | - |
| | Institutional | 1.61 | 0.87 | 0.43 | 0.81 | - | 1.31 | - | 1.03 | 1.16 | - | - |
| | Other | 0.54 | 0.76 | 0.91 | 0.32 | - | 0.84 | - | 1.01 | 0.54 | - | - |
| | Total | 1.04 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | - | 1.00 | 1.00 | - | - |

Manila*: The total land area of Manila differed between and the existing and proposed land use due to potential land reclamation that may take place before 2020.

## 2.7 Flooding Condition

Metro Manila suffered from serious flood damage in 1948, 1966, 1967, 1970, 1972, 1977, 1986, 1988, 1995, 1998, 1999, 2000, 2002, 2004, and 2009. Floods were caused by overflow of Pasig-Marikina—Napindan-San Juan River as well as inland drainage. Once, this type of flooding occurs, low-lying areas in Metro Manila along the Manila Bay and the Laguna Lake are totally submerged. In additional to this type of flooding, local inundation takes place at a number of low-lying spots in every heavy rain.

Flood levels of the Marikina River have been observed and recorded at Sto. Niño, Marikina City. The following table shows the recorded flood levels and estimated flood discharges. The flood

level above EL. 18.0 m approximately causes the serious inundation/damage along the area of Pasig-Marikina River:

**Annual Maximum Flood Level at Sto. Niño, Marikina City, upper Marikina River**

| Year | Water Level (EL. m) | Estimated Flood Discharge ($m^3/s$) | Year | Water Level (EL. m) | Estimated Flood Discharge ($m^3/s$) |
|---|---|---|---|---|---|
| 1958 | 14.78 | 507 | 1978-1985 | Not Available | - |
| 1959 | Not Available | - | 1986 | 20.92 | 2,650 |
| 1960 | 18.06 | 1,562 | 1987-1993 | Not Available | - |
| 1961 | 16.82 | 1,161 | 1994 | 16.33 | 980 |
| 1962 | 17.10 | 1,261 | 1995 | 18.40 | 1,676 |
| 1963 | 16.19 | 931 | 1996 | 16.08 | 893 |
| 1964 | 17.45 | 1,367 | 1997 | 17.16 | 1,279 |
| 1965 | 15.48 | 702 | 1998 | 18.41 | 1,680 |
| 1966 | 19.40 | 2,036 | 1999 | 18.30 | 1,642 |
| 1967 | 18.20 | 1,609 | 2000 | 19.02 | 1,895 |
| 1968 | 16.68 | 1,107 | 2001 | 16.31 | 972 |
| 1969 | 17.45 | 1,367 | 2002 | 17.94 | 1,523 |
| 1970 | 20.48 | 2,464 | 2003 | 17.76 | 1,464 |
| 1971 | 14.50 | 438 | 2004 | 19.08 | 1,917 |
| 1972 | 18.05 | 1,559 | 2005 | 16.03 | 876 |
| 1973 | 13.95 | 318 | 2006 | 16.37 | 994 |
| 1974 | 13.98 | 324 | 2007 | 16.90 | 1,192 |
| 1975 | 13.70 | 269 | 2008 | 16.74 | 1,130 |
| 1976 | 16.90 | 1,192 | 2009 | 22.16 | 3,211 |
| 1977 | 19.44 | 2,051 | 2010 | Not Available | - |

Base on the information/data of Office of the Civil Defense (OCD), Department of Social Welfare and Development (DSWD), daily newspapers, etc., the situation and damage of major recent floods occurred are summarized as follows:

(1) Typhoon 'Rosing' in November 1995 brought strong winds and heavy rainfall that flooded the Marikina Valley and the low-lying shoreline areas of Laguna Lake because of the overflowing of the Marikina River and the high Laguna Lake water stage. The flood killed 21 persons and injured 253. Affected families were 109,254 or 519,030 persons. Damage for infrastructure was estimated at 71 million pesos.

(2) More than 900 families living along the Pasig River, Pateros Creek, Marikina River and Napindan River were swamped by flood occurred by Typhoon 'Loleng' in October 1998, measuring 1 to 2 m. At least 18 low-lying barangays on or near the Pasig River and its tributaries were submerged under waist- and knee-high floodwaters.

(3) The extensive flood was brought about by Typhoon 'Seniang' in early November 2000. the depth of inundation was ranged from 0.2 m to 6 m. the highest flood levels in the following municipalities were Marikina City where flood waters ranged from 1 m to 5.5 m, Quezon City where 16 barangays were suffered from floods of more than 1 m with the highest at 6 m, San Juan City where the flood waters were ranged from 1 m to 3 m, Rodriguez where 5 of 8 Barangays are under 1.5 m deep of water level at the deepest of 6 m. The flood affected total of 22,174 families or 93,961 persons with 10 people confirmed dead and 10 injured. Number of evacuated families were 10,055 (53,310 person). Total damage was estimated at 129 million pesos.

(4) Massive floods and landslides occurred on August 25, 2004 resulted from the continuous heavy rains accompanying typhoon 'Aere' and typhoon 'Chaba' affected 13 cities and 2 towns in Metro Manila, mostly in Quezon City, in addition to nearby provinces. The flood affected total of 4,392 families or 24,108 persons with 8 people confirmed dead and 3 injured. For two consecutive days, Metro Manila experienced moderate to heavy rains that caused the submergence of lowland areas.

(5) Tropical Storm 'Ondoy' brought a heavy rain and caused devastating flood disasters in Regions I, II, III, IV-A, IV-B, V, VI, IX, XII, ARMM, CAR and NCR (Metro Manila) on September 26, 2009. The heavy rainfall of 455 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 as shown in the table below:

(as of Nov. 12, 2009)

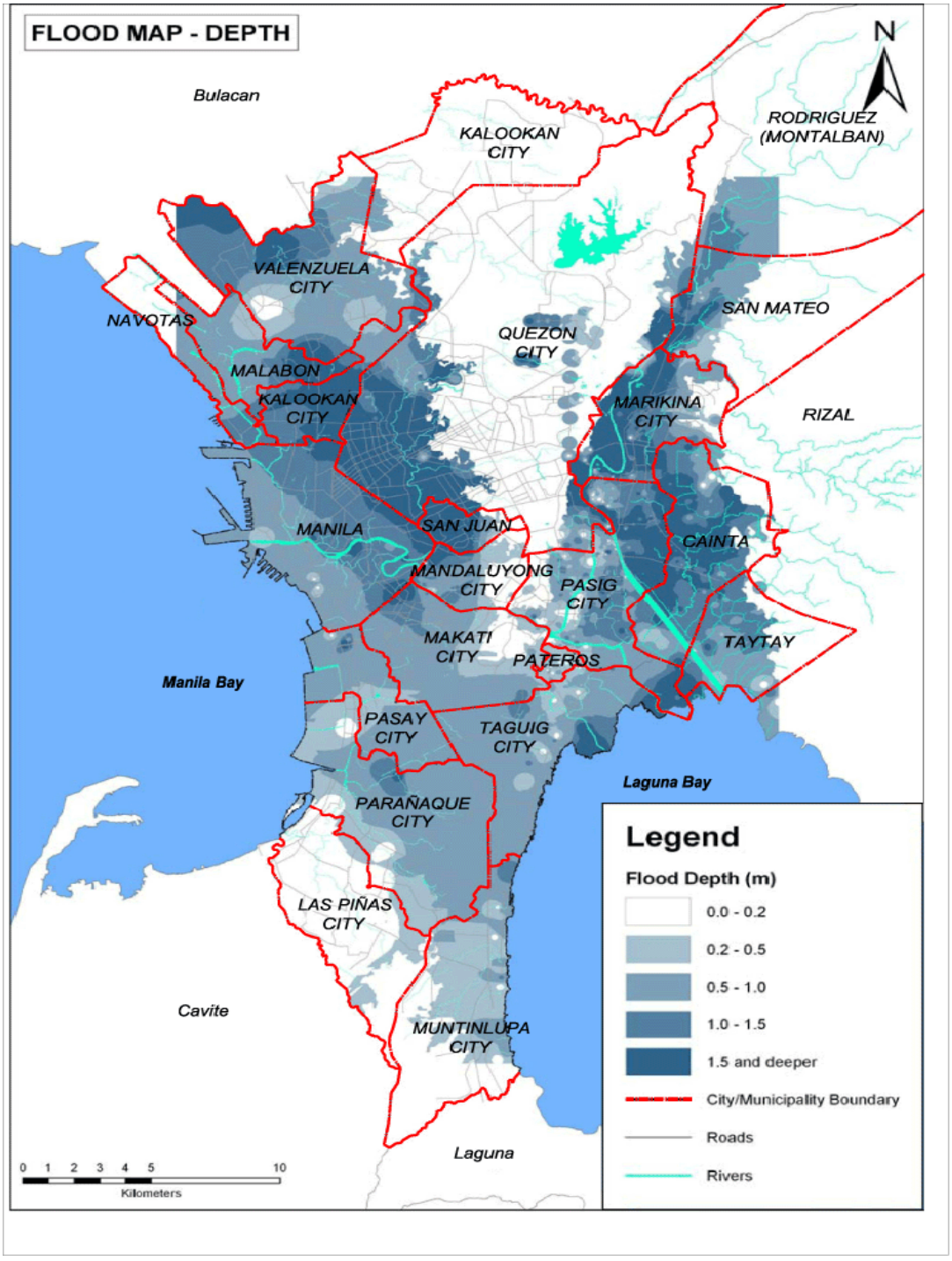
| | No. of Affected | | Casualties | | | No. of Damaged House | | | Total Damage (mill. pesos) |
|---|---|---|---|---|---|---|---|---|---|
| | Family | Person | Dead | Injured | Missing | Totally | Partially | Total | |
| (1) Entire Affected Area | | | | | | | | | |
| | 993,227 | 4,901,234 | 464 | 529 | 37 | 30,082 | 154,922 | 185,004 | 11,060 |
| (2) LGUs with Inundation Area along the Pasig-Marikina River | | | | | | | | | |
| Makati | 679 | 3,395 | 7 | | - | 317 | 11,000 | 11,317 | 15 |
| Mandaluyong | 4,085 | 19,660 | 3 | | - | 1 | 1 | 2 | 7 |
| Manila | 1,158 | 5,790 | 9 | 7 | - | - | - | - | 1 |
| Marikina | 35,789 | 178,985 | 73 | 108 | - | 1,355 | 6,783 | | 40 |
| Pasig | 43,030 | 215,150 | 23 | 28 | - | - | - | - | 37 |
| Quezon | 22,678 | 113,420 | 105 | 27 | - | 140 | 2,968 | | 58 |
| San Juan | 520 | 2,234 | 3 | | - | - | - | - | 25 |
| Taguig | 26,507 | 132,630 | - | 1 | - | 48 | 70 | 118 | 10 |
| Pateros | 6,187 | 32,320 | - | | - | | | | |
| Cainta | 150,000 | 750,000 | 1 | | - | - | 49,942 | 49,942 | - |
| Rodriguez | 5,632 | 27,096 | 10 | | - | 239 | 40 | 279 | - |
| San Mateo | 37,361 | 142,805 | 5 | | - | 2,493 | 3,818 | | - |
| Taytay | 38,033 | 224,432 | 7 | | - | 59 | 64 | 123 | - |
| Sub-Total | 371,659 | 1,847,917 | 246 | 171 | - | | | | - |

*(Source: NDCC Situation Reports No. 43, 48 & 51)*


Pasig City which is located on the left bank of Marikina River was one of the severely devastated areas. Flash flood made by Tyhoon Ondoy placed 80% of the Pasig City under flood waters for 21 days. From the height of almost 20 feet (6 m) along the Marikina riverbanks of Barangay Santolan to at least 10 feet (3 m) of water in some parts of Barangays Sta. Lucia, Rosario, Manggahan and Pinagbuhatan *(source: Pasig City Disaster Risk Reduction Management Plan for Year 2010 – 2013)*. A photo taken after 23 days from Ondoy shows temporary passageway constructed above flooding in Pasig City area.

Marikina City was the most devastated area; almost all of the city's area was submerged in water up to 3 m and tons of knee-deep mud. During the flood, the Marikina River overflowed on banks and transformed streets into waterways.

On the other hand, the DSWD has been implementing the relocation of families affected by 'Ondoy' from Marikina, Quezon and Pasig Cities in coordination with HUDCC and LGUs. As of December 1, 2009, a total 1,713 families have been transferred to the relocation sites in Laguna and Bulacan.




**Flooded Area by "Ondoy"**

## 2.8 PRRC Project

The Pasig River Rehabilitation Commission (PRRC) was created under the Executive Order 54 and 65 in 1999 in order to rehabilitate the Pasig River environmental conditions. Member are DENR, MMDA, OES, DPWH, HDUCC, DOT, DOF, DILG, DTI, DOTC, DND, GMA, ABS-CBN and Unilever. The PRRC has, in principle, the following tasks:

a) Resettlement of informal settlers along the river course
b) Riverbank Development in a manner of construction of liner parks, greenbelts and walkways comprising the Environmental Preservation Areas (EPAS) and Urban Renewal Areas (URAs).
c) Pasig River Ferry Service (PRFS)
d) Flood Control
e) Improvement of the water quality of the Pasig River

The member agencies are organized into five Technical Working Committees (TWCs) representing the sectoral concerns of the Commission. The following are in relation with the implementation of the flood control project.

(1) Housing and Resettlement Committee

Headed by the Housing and Urban Development Coordinating Council its member agencies is responsible for the relocation, housing and resettlement of qualified informal settlers and other unauthorized and unlawful occupants along the banks of the Pasig River System with priority given to those occupying the danger zone along its riverbanks.

(2) Riverbank Development

Headed by the MMDA its member agencies is responsible for ensuring that the easements provided for by the following are observed within the Pasig River and its tributaries and other waterways that drain into it including the esteros.

a) Civil Code of the Philippines (R.A. No. 386)
b) Water Code of the Philippines (P.D. No.1067)
c) Metro Manila Comprehensive Zoning Ordinance (MMC Ordinance No. 81-01)
d) Adapting a Uniform Easement Provision along the Pasig River System including its Tributaries, Maintaining a Linear Park at the minimum Setback of Ten (10) Meters from Existing Shoreline, Banks or Streams and Three (3) meters from Existing Esteros and Canals… (MMDA Resolution No. 3 Series of 1996)

(3) Flood Control Committee

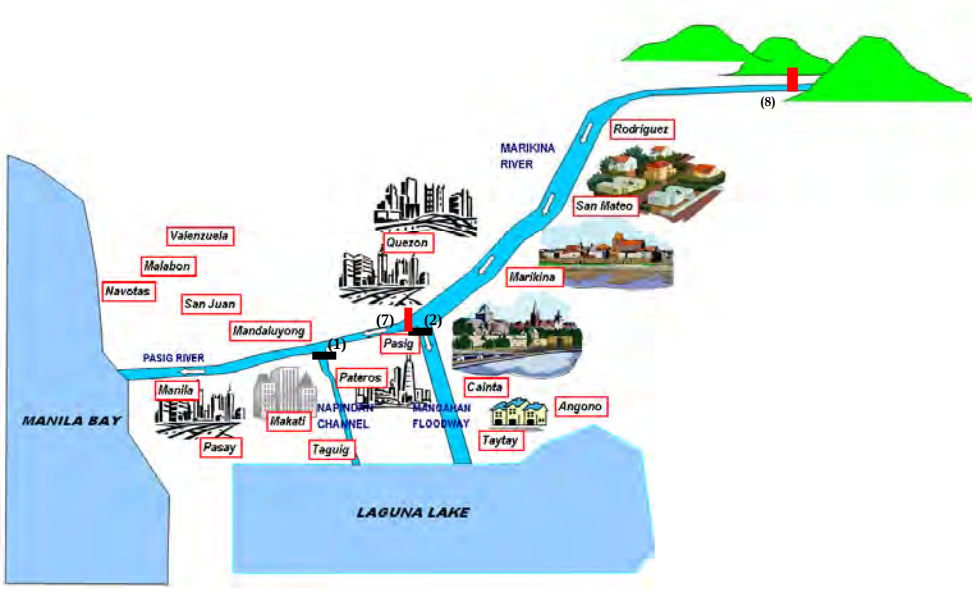
Headed by the DPWH its member agencies is responsible for undertaking civil works to control Metro Manila's perennial flooding problems. Projects include dredging, clearing of structures. Construction of revetment and parapet walls and other infrastructure for river protection. It also initiates campaigns to clear the Pasig River, the Marikina River and the San Juan River of debris, dirt and pollutants.

# CHAPTER 3 THE OVERALL FLOOD CONTROL PLAN FOR PASIG-MARIKINA RIVER

## 3.1 Major Plans and Existing/Proposed Flood Control Facilities

At present, there are existing/proposed major facilities related to the flood control of the Pasig-Marikina River as shown below:

(1) Napindan Hydraulic Control Structure (NHCS) : Completed in 1983
(2) Rosario Weir : Completed in 1983
(3) Manggahan Floodway : Completed in 1988
(4) Pasig River Channel Improvement (Phase II) : Ongoing (target completion in 2012)
(5) Lower Marikina River Channel Improvement : Under Preparation for Construction
(6) Upper Marikina River Channel Improvement : Proposed
(7) Marikina Control Gate Structure (MCGS) : Proposed
(8) Marikina Multi-purpose Dam : Proposed



### 3.1.1 BPW Master Plan for the Drainage of Manila and Suburbs (1952)

For the control of the flood flow of the Pasig River, the necessity of the above facilities of (2) Rosario Weir, (3) Manggahan Floodway, (4) Pasig River Channel Improvement, and (7) MCGS was studied and proposed in the "Plan for the Drainage of Manila and Suburbs" prepared by River Control Section, Bureau of Public Works in 1952 stated on the control of the flood flow of the Pasig River.

In the Plan, three alternatives were studied and the diversion of flood into Laguna Lake by the construction of Manggahan Floodway and construction of low river walls along the Pasig River were proposed.

The following are extracts from the Report:

"This report embodies the results of studies made by the Bureau of Public Works on the ways and means by which the City of Manila may be adequately drained. ……..……..The scheme recommended in this report seeks to control the flood flow of the Pasig River with a minimum of interference with the present regime of the stream and the maximum security to life and property. This scheme contemplates retardation of the overbank the volume of flow in the channel proper, hence no lowering in the maximum experienced flood heights in the channel proper under past and present conditions. Low river walls will be constructed on both banks to prevent overflow and floodgates will be provided at the entrance of all esteros to check backwater…….

"**(Flood Control Schemes)** Floods in Manila being caused by the overflow of Pasig River, and the flood flow of the Pasig River in turn coming from Marikina River, it appears logical, that proper control of the flood flow of the Marikina River would be one way of solving the problem. Such control may consist of strong or retarding the flood flow of the Marikina River and limiting the volume of flow down to Manila to an amount that will not overtop the river banks in the city. Another solution is to dispense with storage and simply confine the present flood flow of the Pasig River within the channel proper, by the construction of high walls on both banks of the stream from Makati to its mouth on the Manila Bay. A third scheme is a combination of the two ways mentioned above."

"(**Scheme I - Retardation**) The flood waters of the Marikina River may be stored or retarded in two places, namely: (a) in the mountain section by construction of retarding reservoirs* and (b) in the Laguna Lake by the construction of a diversion channel**." *Note: * means Marikina Dam and low dams. ** means Manggahan Floodway.*

"(**Scheme IA – Storage in the Mountain Section**)……"

"(**Scheme IB - Storage in the Laguna Lake***) ……The mere opening of the diversion channel should not be expected to stop immediately the overflow of the Pasig River in Manila. Control works will have to be built at the head of the diversion channel at Sitio Manggahan to limit the flow down the Marikina River whose cross-section will still be much greater than the initial section of the new channel. ……" *Note: * means Manggahan Floodway.*

"…..The most serious obstacle to the realization of this scheme will be the objections of towns bordering the lake, based on the fear that the lake level will rise substantially as a result thereof. It should be pointed out that it is not intended to close the Marikina River and divert its flow completely into the lake. The proposed channel will not be excavated to the same depth as the bed of the Marikina River. The bottom of the channel at the point of diversion* will be kept permanently at elevation 13.00 m or 3 meters above the bed of the Marikina River. Only when the flow in the Marikina River exceeds this depth, will there be flow in the proposed channel. The towns of Pasig, Pateros and Taguig, where maximum experienced flood heights are due to flood waves of the Marikina River, will be directly benefited inasmuch as the opening of the new channel will make it possible for the greater bulk of flood flow to pass directly into the lake where it can spread harmlessly over a vast area, producing only a small and almost negligible rise in the lake level." *Note: * means Rosario Weir.*

"**(Scheme II – River Walls (No Storage)**) Confinement of the present flood flow of the Pasig and San Juan

Rivers in the channel proper of main stream, by the construction of walls on both banks, will raise the flood profile by approximately one meter above maximum experienced flood heights. ….Upstream from the Ayala Bridge, the greater height of the wall required, may interfere with docking operations. In such cases the wall may be constructed along a set back location following property lines and existing walls as much as possible…."

"(**Scheme III – Partial Storage and Low River Walls**) ….Under Scheme III, a combination of Scheme I-B and Scheme II is proposed, whereby it is sought to solve the flood control problem with a minimum of interference with the natural regimen of the stream and least danger to life and property. …. With a freeboard of one meter, the height of wall that will be needed between Makati and Ayala bridge will be average 2 meters….."

"(**Recommendation**) For the purpose of controlling the flood flow of the Pasig River, it is recommended that the following projects be undertaken:

(1) Construction of a 250 meter diversion channel from sitio Manggahan on the Marikina River to the Laguna Lake.
(2) Construction of a highway bridge to span the proposed channel.
(3) Construction of the Makati – Sta. Ana Road dike and river wall.
(4) Construction of a flood gate for the Santa Clara Creek in Sta. Ana.
(5) Construction of low river walls on bank lines or set back locations along the Pasig River.
(6) Construction of flood gates on various esteros."

### 3.1.2 Manggahan Floodway

#### (1) Feasibility Study

A Feasibility Study for "The Manggahan Floodway Project", the USAID assisted project, was accomplished by the Department of Public Works, Transportation and Communications, with the engineering assistance of DMJM of America in February 1975. This Manggahan Floodway Project included the construction of the MCGS and Rosario Weir. The study said that:

(a) Most Marikina floods are of short duration – one or two days in length – and their volume is a relative minor portion of the total lake flow and lake storage. After Manggahan Floodway is constructed, the Pasig River must continue to carry bankful but non-flood stage flows. Thus, only excess flows that would have flooded Manila will be released thru the Manggahan Floodway. While the diversions are critical to the prevention of flooding in Manila, they are nominal when compared with the size of Laguna de Bay.
(b) Design Flood Discharge after Diversion to Floodway (2,400 $m^3/s$)
(c) Floodway Channel with 9.0 km long (1.15 km Concrete-lined Channel, 1.0 km Rock-lined Channel and 6.85 km Unlined Channel)

#### (2) Present Status of Floodway

Latest JICA Preparatory Study in 2011 shows that the flow capacity of the Manggahan Floodway is much lower than the design capacity of 2,400 $m^3/s$ because of the existence of many structures of informal settlers inside of the channel. Estimated present flow capacity is 2,000 $m^3/s$ which is equivalent to about 80 % of design discharge.


(Manggahan Floodway; 2 days after "Ondoy". There are existing structures of informal settlers inside of channel between the both roads on the banks.)

### 3.1.3 Rosario Weir

**(1) Original Purpose of Rosario Weir**

BPW Master Plan for the Drainage of Manila and Suburbs (1952) stated that "The most serious obstacle to the realization of this scheme (construction of floodway) will be the objections of towns bordering the lake, based on the fear that the lake level will rise substantially as a result thereof. It should be pointed out that it is not intended to close the Marikina River and divert its flow completely into the lake. The proposed channel will not be excavated to the same depth as the bed of the Marikina River. The bottom of the channel at the point of diversion will be kept permanently at elevation 13.00 m or 3 meters above the bed of the Marikina River *(by construction of Rosario Weir at the entrance of Floodway).* Only when the flow in the Marikina River exceeds this depth, will there be flow in the proposed channel".

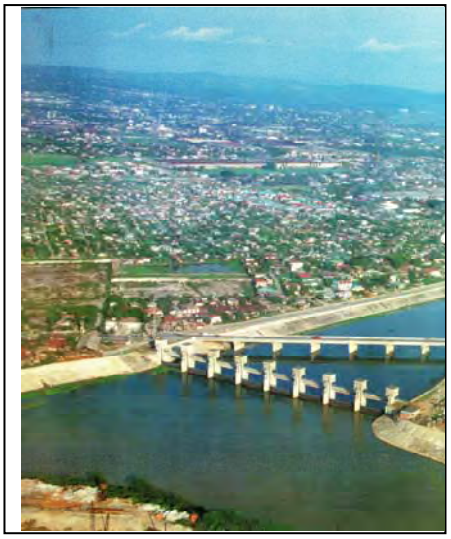
**(2) Original Structural Design under the Feasibility Study of Manggahan Floodway Project**

The original design of Rosario Weir is a concrete ogee shape crest weir that will pass 2,400 $m^3/s$ with a head over the weir of 3.85 m. by building the weir crest at elevation 14.0 m, and by operating the MCGS properly, a water surface upstream from the weir of 17.85 m is provided. The ogee weir crest is 126 m long.

**(3) Deferment of Construction of MCGS and Re-design of Rosario Weir**

In 1979, Ministry of Public Works (MPW) determined the indefinite deferment of the construction of the MCGS related to the navigation in the Marikina River and instead, its function of controlling diversion of the floodwater of the Marikina River, achieved by the operation of a re-designed Rosario Weir with movable full gate, up to 2,000 $m^3/s$ floods even without the MCGS before the improvement of Upper Marikina River.

Also, the re-design to a fully movable gate structure was intended to examine the function of Rosario Weir in lowering the flood level in the Laguna Lake by allowing reverse flow through the floodway channel.



As a solution to alleviate flooding conditions of long duration that cause heavy damage to the lakeshore areas, the MPW conceived of the idea of reversing the flow of water from Laguna Lake to Marikina River during high lake water stages and will, therefore, necessitate the redesign of the Rosario Weir. Outflow discharge from Laguna Lake are estimated at about 730 $m^3/s$ at lake stage 14.0 m and 540 $m^3/s$ at lake stage 13.0 m. Lake flood duration decreases 25 days from 59 days without reverse flow to 34 days with reverse flow through Manggahan Floodway.

### 3.1.4 Marikina Control Gate Structure (MCGS)

**(1) Original Design of MCGS (Feasibility Study in 1975)**

The gated MCGS can limit, by properly regulating the gate openings, the flood flows to lower Marikina-Pasig River channel capacity. The Manggahan Floodway carries the remaining portion of the flood discharge to Laguna Lake for temporary storage.

The MCGS is a gated check dam structure 68 m in length. Each of 5 bays contains a top seal radial gate 12 m in width by 5 m high, with sill elevation of 10.0 m. During the dry season additional fresh water storage in Laguna Lake will be beneficial. This can be provided by the diversion of upstream Marikina River flows through two sluice gates 10 m wide overflow type on the right side of Rosario weir. Operated in coordination with the MCGS, these gates will be able to divert fresh water from Marikina River to Laguna de Bay during dry season with limited ponding of water. In addition, these sluice gates may be opened during extreme floods of very high stages. The overflow type sluice gates are used to provide maximum protection against operational error since the gates will act as an overflow weir if the sluice gates are accidentally left closed.

**(2) Hydraulic Model Test of the Manggahan Floodway Project (1983)**

The Hydraulic model Test was conducted by the MPWH through the National Hydraulic Research Center (NHRC) in 1983 to confirm the flow condition at the bifurcation of flood from the upstream of Marikina River into Manggahan Floodway and the lower Marikina River, without construction of the MCGS, and consequently determining the necessity of the MCGS in achieving the Pasig-Marikina River Flood Control Program.

Scope of Test are the following:

a) Investigate the diversion discharges into the Manggahan Floodway and the lower Marikina River under varying discharges of the upper Marikina River and the changing water levels of Laguna Lake and Manila Bay.
b) Determine the required number of gates to be operated such that flow towards the lower Marikina River is less than its bankful capacity of 900 $m^3/s$.
c) Observe the flow pattern and investigate problem area.

Conclusion of the Test is:

i) The present channel condition at the junction of Marikina River and Manggahan Floodway has a capacity of 2,000 $m^3/s$. This flow can be successfully diverted into the floodway even without the MCGS such that the discharge into the lower Marikina River is less than its bankful capacity of 900 $m^3/s$.
ii) For a design flood of 3,300 $m^3/s$ at upper Marikina River, the diversion discharge into the lower Marikina River exceeds the bankful capacity by 300 $m^3/s$, even with all gates of the Rosario Weir fully open and without the MCGS. This means 2,100 $m^3/s$ to floodway and 1,200 $m^3/s$ to the Lower Marikina River.
iii) The MCGS is necessary to regulate diversion discharge into the lower Marikina River below the design flood discharge.
iv) The reverse flow of NHCS is effective to reduce the excess discharge flowing into the Pasig River.

**(3) Revised Design of MCGS (Detailed Design in 2003)**

The main body of MCGS is located at Sta. M+6.3 km, which is only 200m away toward the downstream from the existing Rosario Weir. The MCGS is a movable weir with twin roller gates of which each size is 20.0 m wide and 11.0 m height. The sill elevation on the riverbed is set at EL.+8.0 m, which is lower by 2.5 m compared with the Rosario Weir. Design discharge is 500 $m^3/s$ and design water level is EL.17.4 m upstream and EL.14.74 m downstream.

(Image of Proposed MCGS)

**(4) Proposed Deferment of Construction of MCGS in Phase III Project**

From the hydraulic aspect, the construction of the MCGS is necessary to ensure the safety from flood damage due to overflow of Pasig and Lower Marikina Rivers for the Metro Manila.

On the other hand, due to present existence of a number of informal settlers inside of Manggahan Floodway, the design flow capacity of 2,400 $m^3/s$ has been lowering to only about 2,000 $m^3/s$ or less. Also, there are three open portions of left side bank of Manggahan Floodway to receive the flow from the Caint, Buli, and Maho Rivers. Some amount of flood discharge of the floodway may spill through the openings towards the inland areas along these rivers, resulting in the increase in flood inundation damage. Therefore, to assure the safety of diversion of design discharge 2,400 $m^3/s$ to the Manggahan Floodway, these issues of opening and informal settlers should be resolved before the construction of the MCGS.

In addition, the residents who have presently serious flood problem along the upstream from the MCGS desire the smooth flow of flood and the urgent improvement of Upper Marikina River before construction of MCGS.

In view of the above, the deferment of construction of MCGS in this Phase III Project is proposed.

### 3.1.5 Napindan Hydraulic Control Structure (NHCS)

The following are extracts from the Final Report for Construction Supervision of the NHCS (1983).

"The Feasibility Study undertaken for the development of the Laguna Lake area have revealed the urgency of implementing the NHCS Project at the mouth of the Napindan River opening to the Pasig River, the four irrigation projects with the conjunctive use of the lake water and surface and underground water, and the study on two interceptors for lake water management and quality control. The NHCS Project was implemented by the Ministry of Works and Highway (MOWH) with financial assistance from the ADB and completed in 1983. The other two components were implemented by the NIA and LLDA, respectively.

Since the NHCS is a component of the Laguna Lake Development scheme, it is generally planned to satisfy the purpose for which it is intended to. The main functions of this project are (1) to improve the quality of the lake water by cutting off the backflow of saline and polluted water from the Pasig River in order to make it usable for irrigation, industry water supply, domestic use, etc, (2) to control the lake storage to firm up discharge of water supply with max. 50 $m^3/s$ throughout the year, and (3) to protect Manila area and suburbs adjacent to the Pasig River from being flooded by the overbank flow of the lower Pasig River. The last function is fulfilled in coordination with the Manggahan Floodway.

Under the existing condition, during the dry season when the lake is at its lowest elevation (lower than the tide level at Manila Bay), saline water flows into the lake thru the Napindan River. During intense rainfall on the Marikina Watershed, flood water from the Marikina River flows down to the Pasig River and a portion reverses to the lake thru the Napindan River, it overflows its banks and floods the adjacent Manila area. On the other hand, when the lake water exceeds its highest allowable level, it also floods the area around the lake periphery. The lake water will flow down thru the Napindan River to the lower Pasig River only when the water level at the junction becomes lower than that of the lake. Taking into account also that the Napindan River is the only access for watercrafts coming from the Pasig River going to the lake and vice versa, the NHCS was planned to include a Navigation Lock to provide passage for watercrafts plying to and from the lake.

The general concept of the NHCS as planned, in coordination with the Manggahan Floodway, is that when flood occurs in the upper Marikina River, the flow going down to the Pasig River is regulated so that the maximum bankful capacity of the lower Pasig River will not be exceeded. The excess Marikina flood flow is diverted to the lake thru the Manggahan Floodway, utilizing the lake as temporary retarding basin. When floodwater in the lake is then discharged gradually thru the spillway gates without overtopping the lower Pasig River. The spillway gates are remained closed when impounding water in the lake and when Manila tide level is higher than lake level.

The NHCS is capable of carrying the excess discharge of 300 $m^3/s$ although Napindan Channel at its present state seems not to accommodate such an excess discharge. The reverse flow of NHCS is effective to reduce the excess discharge flowing into the Pasig River when the flood exceeding the

design discharge occurs and flood water level exceeds the design high water level at the Pasig-Napindan junction."

## 3.2 Updating M/P and F/S for Flood Control of Pasig-Marikina River (JICA)

### 3.2.1 Updated M/P

The Master Plan which was formulated in the "Study on Flood Control and Drainage Project in Metro Manila; JICA, completed in March 1990" is premised on the project scale of a 100-year return period for the flood control of Pasig-Marikina River

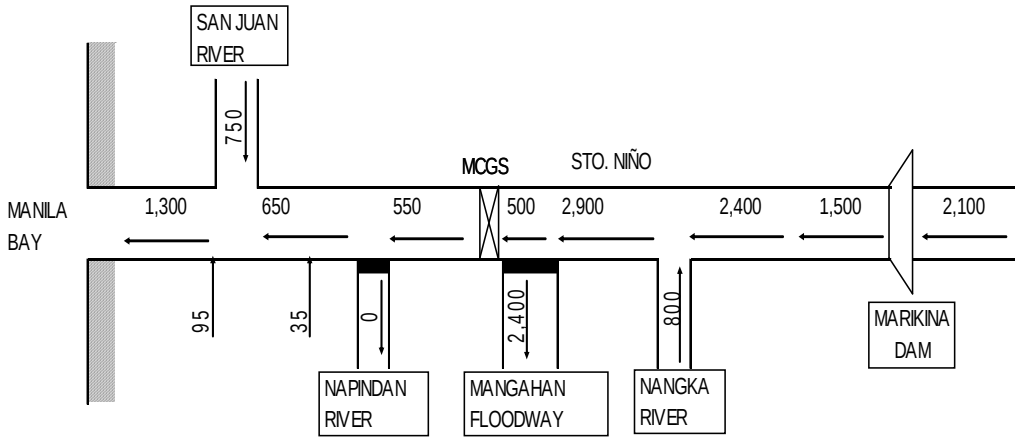
The Master Plan is structurally composed of:

a) River Improvement Works of Pasig, Marikina and San Juan Rivers

b) Construction of Marikina Control Gate Structure (MCGS)

c) Marikina Multipurpose Dam.

Design flood discharge distribution of 100-year return period is shown below:




it: $m^3/s$)

**Design Flood Discharge Distribution (100-Year Return Period)**

### 3.2.2 Proposed Marikina Multipurpose Dam

First study on the proposed Marikina Dam was carried out by the National Power Corporation in 1953 to 1955. The F/S was carried out under the Presidential Inter-Agency Committee to Re-study the Marikina River basin Project (PICOREM) in 1978.

In the updated M/S by JICA, the Marikina Multipurpose Dam was proposed to be a concrete gravity type with a height of 70 m and top length of 85 m to impound the water of 25,000,000 $m^3$ and to regulate the inflow flood of 2,100 $m^3/s$ by 600 $m^3/s$ and down to 1,500 $m^3/s$.

At present, the DPWH proposes the detailed F/S for the Marikina Multipurpose Dam Project including the possibility of doing the Project via the Public-Private Partnership (PPP) scheme.

Once the completion of the Marikina Multipurpose Dam together with the Pasig-Marikina River Channel Improvement Project, the safety scale for flood control will achieve the target 100-year return period.

(Image of Proposed Marikina Dam)

### 3.2.3 Protection Level on Flood Control by Pasig-Marikina River Channel Improvement

For the flood control of Pasig-Marikina River, safety degree of 100-year return period was determined in the updated M/P, with Marikina Dam and River Improvement Works.

In the M/P, between a dam and river improvement works, the most economical allocation is a 30-year return period for the river channel, under the conditions of rehabilitation of existing river low walls of Pasig River of 1 to 1.5 m high and avoidance of land acquisition and house evacuation in the urban area.

Design features of the river channel improvement composed of high water level, alignment, longitudinal profile, and cross-section is almost limit for the Pasig-Marikina River and difficult to further improvement and thus it will be difficult to increase flow capacity in a manner of river channel improvement.

(1) In case that channel improvement works of the Pasig River within the existing channel width would be done with a scale of 50 to 100 year return period, the height of necessary river walls for protection of overflow would be 1.5 to 2.5 m due to increase in design discharge. This high wall may not be socially acceptable.
(2) Also, increase of design high water level will affect on the function of such existing facilities along the channel as 12 pumping stations, 13 floodgates, 13 bridges, etc.
(3) Area along the Pasig-Marikina River course has been highly developed, where the area is fully utilized with residences, factories, commercial building, etc., so that the widening of channel is almost impossible without drastically set-back of existing buildings/facilities.
(4) Pasig River, which is situated near Manila Bay, remarkably receives tidal influence and the flow capacity is not expected to increase so much in a manner of dredging.

Before the completion of the Marikina Dam which usually needs the long time for realization, therefore, the safety degree of the prior scheme, Urgent Flood Control Project, of river channel improvement works is considered at a 30-year return period.

## 3.3 Urgent Flood Control Project of Pasig-Marikina River (DPWH)

### 3.3.1 Project Area

The Project Area is delineated in the most significant portion of the Pasig-Marikina River, i.e., the Pasig River from the river mouth to the Napindan Junction, the Lower Marikina River from the Napindan Junction to the effluent point of the Manggahan Floodway, and the Upper Marikina River from the Manggahan Floodway to Marikina Bridge (St. Niño). This delineation considers the flood control effect as well as the social significance that the river passes through the core of Metro Manila.

### 3.3.2 Project Scope

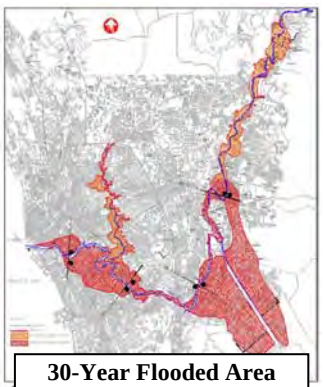
Based on the above Master Plan, the implementation of urgent flood control project is proposed. Aiming at increasing the flow capacity and mitigating overflow of the Pasig-Marikina River, the urgent project consists of the improvements of Pasig River, the lower Marikina River and the upper Marikina River (for a stretch of 29.7 km from the river mouth to Marikina Bridge, Marikina City) and the construction of MCGS.

The construction of Marikina Multipurpose Dam and the improvement of the San Juan River is not included in the Project.

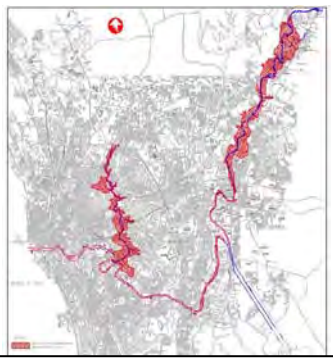
| Channel Stretch | Design Discharge | Major Works |
|---|---|---|
| Lower Pasig River: 9.2 km (Delpan Bridge to Lambingan Bridge) | 1,200 $m^3/s$ | Raising of existing parapet wall and rehabilitation of revetment. |
| Upper Pasig River: 7.2 km (San Juan to Napindan Channel) | 600 $m^3/s$ | Raising of existing parapet wall and rehabilitation of revetment. |
| Lower Marikina River: 7.2 km (Napindan Channel to Manggahan Floodway) | 550 $m^3/s$ | Dredging/excavation, provision of new parapet wall, rehabilitation of embankment and construction of MCGS. |
| Upper Marikina River: 6.1 km (Manggahan FW to Marikina Bridge) | 2,900 $m^3/s$ | Excavation/dredging, revetment, raising of embankment. |

### 3.3.3 Project Scale and Inundation Area

As described in previous Section 3.2.3, project scale of the urgent flood control project is to be a 30-year return period. The following map shows the estimated inundation area for 30-year return period flood without the overall project and inundation area after the completion of Urgent Flood Control Project.



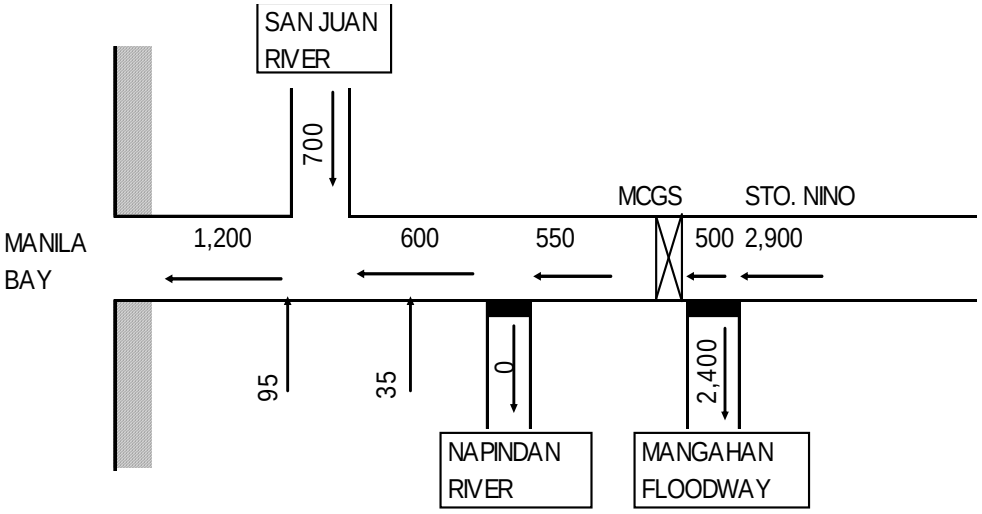
**30-Year Flooded Area (without Project)**



**After Completion of River Channel Improvement With MCGS**

### 3.3.4 Design Flood Discharge

The design flood discharges of Master Plan (JICA, 1990) were reviewed in the Detailed Engineering Design (2000 – 2003) and modified slightly for the Pasig River. The design flood discharge distribution is shown below:




**Design Flood Discharge Distribution for Urgent Flood Control Plan**

Unit: m³/s

(30-Year Return Period)

### 3.3.5 River Channel Improvement Plan

#### (1) Design Channel Alignment

The design alignment of the channel shall conform to the existing channel course because of the difficulty of land acquisition and house evacuation in the urban area. Cut-off of meandering channel of the Pasig River at Sta. Ana, Manila City, is not planned.

#### (2) Design Longitudinal Profile

No dredging work is proposed for the river improvement of the Pasig River. In the Marikina River, the riverbed profile primarily follows the average of the existing lowest riverbed to lower the high water level. The design high water level is determined from the result of hydraulic calculation (refer to figures showing Longitudinal Profiles in the next pages).

To set the crown elevation of river wall and dike, the following freeboard corresponding to the design discharge is employed in accordance with "the DPWH Design Guidelines Criteria and Standards".

| River | Design Discharge | Freeboard |
|---|---|---|
| Lower Pasig River<br>(Delpan Bridge to Lambingan Bridge) | 1,200 $m^3/s$ | 1.0 m |
| UpperPasig River<br>(Lambingan Bridge to Napindan Channel) | 1,200 $m^3/s$ | 1.0 m |
| Lower Marikina River<br>(Napindan HCS to MCGS) | 550 $m^3/s$ | 1.0 m |
| Upper Marikina River<br>(MCGS to Marikina Bridge) | 2,900 $m^3/s$ | 1.2 m |

LEGEND
DHWL
LOWEST RIVERBED
RIGHT BANK ELEVATION
HORIZONTAL
VERTICAL
LONGITUDINAL PROFILE OF PASIG RIVER IMPROVEMENT 30-yr. FLOOD

LONGITUDINAL PROFILE OF MARIKINA RIVER IMPROVEMENT 30-yr. FLOOD

### (3) Cross Section

For the Pasig River, the existing cross section is employed, because land acquisition and house evacuation are difficult. Likewise, no dredging work is employed. Widening of the Pasig and the Lower Marikina River is especially difficult because of the densely built-up residential, commercial and industrial areas.

In the Lower Marikina River, single trapezoidal section is basically applied to ensure the stability of channel slope. Widening of the channel is also difficult because of the densely built-up residential and industrial areas. The side slope of 2 (horizontal) is to 1 (vertical) is adopted.

In the Upper Marikina River, there are some open spaces being utilized for agriculture along the river channel except some stretches where factories and houses occupy the riverbanks. Widening of river channel is planned to confine the design flood discharge in agricultural areas. However, channel widening in house-congested areas is avoided as much as possible to reduce the number of houses to be evacuated.

## 3.4 Revised Implementation Schedule for Urgent Project Works

Taking into account the situations mentioned in the above 3.1.4, the implementation of the Urgent Project is revised as follows. Construction of the MCGS is deferred to the Phase IV.

| Implementation Phase | Stretch | Length to be Improved (Design Discharge) |
|---|---|---|
| II | Pasig River (Delpan Bridge to Napindan Channel) | 13.1 km on both banks (1,200 /600 $m^3$/s) |
| III | Lower Marikina River (Napindan Channel to downstream of MCGS) | 5.4 km channel length (550 $m^3$/s) |
| | Pasig River (Remaining Sections) (Delpan Bridge to Napindan Channel) | 9.9 km on both banks (1,200 /600 $m^3$/s) |
| IV | Upper Marikina River & MCGS (MCGS to Marikina Bridge) | 7.9 km channel length (2,900 $m^3$/s) |

## 3.5 Protection Scale of Improved Channel after Completion of Phase II and Phase III

Upon the completion of Phase II and Phase III (without the MCGS), flood protection scale become the following:

a) Protection scale of the lower Pasig River between River-mouth and San Juan River is about 20-year return period.
b) Protection scale of the upper Pasig River between San Juan River and Napindan River is about 10-year return period.
c) Protection scale of the lower Marikina River between Napindan River and Floodway is about 2-year return period.

## 3.6 Impact of Climate Change

In the JICA Preparatory Study, the fluctuation of rainfall intensity around Metro Manila is evaluated by using the result of 19 GSM models and the AGCM (Atmospheric Global Climate Model developed by the Meteorological Research Institute, Japan). According to the AGCM result, after 10 years, rainfall intensity over the Pasig-Marikina River Basin is roughly estimated at 10% increase compared with the period from 1980 to 2000. Inundation area will also increase by about 60%, even after the river channel improvement.

(1) Summary of Climate Change Impact on Flood Condition (Flood Damage, Flood Area and Inundation Depth)

| Item | Condition of Hydrology | | Flood damaged (peso) | Flood area (ha) | Inundation Depth (m) |
|---|---|---|---|---|---|
| | 2-day rainfall (mm) | Tidal level rising (cm) | | | |
| Present Condition (2011) | 586.6 | - | 190 bil. | 5,503 | - |
| Consideration of Climate Change Impact (2025) | 645.3 | +12 cm | 265 bil. | 7,579 | - |
| Increment or Increment Ratio | 10% | - | 39% | 37% | 10～100 cm |

(2) Inundation Area, Depth and Salient Characteristics per City/Municipality in the Basin

| No. | City | Inundation Area (ha) | | | | Average Water Depth (m) | | | Salient Characteristics | | Stretch |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | -1 w/ CC | -2 w/o CC | Increment | Rate of increment (%) | -1 w/ CC | -2 w/o CC | Increment (m) | Increment flood area | Increment of water depth | |
| 1 | Makati | 7 | 4 | 3 | 175 | 0.23 | 0.15 | 0.08 | O | - | Pasig River |
| 2 | Mandaluyong | 73 | 54 | 19 | 135 | 0.52 | 0.52 | 0 | O | - | |
| 3 | Manila | 655 | 416 | 239 | 157 | 0.5 | 0.5 | 0 | O | - | |
| 4 | San Juan | 94 | 92 | 2 | 102 | 1.34 | 1.28 | 0.06 | - | - | |
| 5 | Angono | 162 | 134 | 28 | 121 | 1.46 | 1.07 | 0.39 | - | O | Lower Marikina River |
| 6 | Cainta | 972 | 438 | 534 | 222 | 0.92 | 0.92 | 0 | O | - | |
| 7 | Pasig | 1499 | 1100 | 399 | 136 | 0.88 | 0.88 | 0 | O | - | |
| 8 | Taguig | 474 | 427 | 47 | 111 | 1.09 | 0.62 | 0.47 | - | O | |
| 9 | Taytay | 1221 | 764 | 457 | 160 | 0.81 | 0.57 | 0.24 | O | O | |
| 10 | Rodriguez | 141 | 118 | 23 | 119 | 2.88 | 2.72 | 0.16 | - | O | Upper Marikina River |
| 11 | San Mateo | 742 | 659 | 83 | 113 | 2.15 | 1.89 | 0.26 | - | O | |
| 12 | Marikina | 925 | 758 | 167 | 122 | 1.93 | 1.92 | 0.01 | O | - | |
| 13 | Quezon | 614 | 539 | 75 | 114 | 2.93 | 2.79 | 0.14 | - | O | |
| ○ : The area where measures adapted due to significant influence | | | | | | | | | | | |

(3) Non-Structural Measures corresponding to Flood Characteristics

To adapt to the impact in future, it is prerequisite to conduct the non-structural measures.

| Adaptation Measures | | | Component A (adaptation to increment of depth) | Component B (adaptation to increment of flood area) |
|---|---|---|---|---|
| Flood Evacuation and Warning System | Preparedness | Revision of flood hazard map and Expansion of information dissemination range | ○ | ○ |
| | | Installment of additional evacuation center and rearrangement of evacuation route | ○ | ○ |
| | | Examination of quality and quantity of critical materials | ○ | ○ |
| | Communication/information dissemination | Strengthening and promoting of communication system | | ○ |
| | | Installment of flood information board | | ○ |
| | Monitoring and Warning | Installment of additional warning post | | ○ |
| | | Strengthening of CCTV network | | ○ |
| Land Use regulation | | Land use regulation considering hazard maps by LGUs | ○ | ○ |
| | | Heightening of road and residents area | ○ | ○ |
| | | Improvement of legal system regarding preservation of retention function of basins. (for example, flood water detention pond). | ○ | ○ |
| | | ○: Measures to be adapted | | |

(4) Component of Adaptation Measures

| No. | City | Variation of Flood Condition | | | Component of Adaptation Measures |
|---|---|---|---|---|---|
| | | Increment of Flood Area | Increment of Inundation Depth | Both | |
| 1 | Makati | ○ | | | A |
| 2 | Mandaluyong | ○ | | | A |
| 3 | Manila | ○ | | | A |
| 4 | San Juan | | | | C |
| 5 | Angono | | ○ | | B |
| 6 | Cainta | ○ | | | A |
| 7 | Pasig | ○ | | | A |
| 8 | Taguig | | ○ | | B |
| 9 | Taytay | ○ | ○ | ○ | A, B |
| 10 | Rodriguez | | ○ | | B |
| 11 | San Mateo | | ○ | | B |
| 12 | Marikina | ○ | | | A |
| 13 | Quezon | | ○ | | B |
| A: Measrures for increment of Water Depth, B: Increment of Areas, | | | | | |
| C: Impact by climate change is very small | | | | | |

## 3.7 With/Without MCGS and Higher Flood Protection Level

As described in Section 3.1.4 (4), the construction of MCGS is proposed to be deferred to next Phase IV. Also, in Section 3.2.3, discussion are made on the limit of present channel improvement with 30-year return period with MCGS.

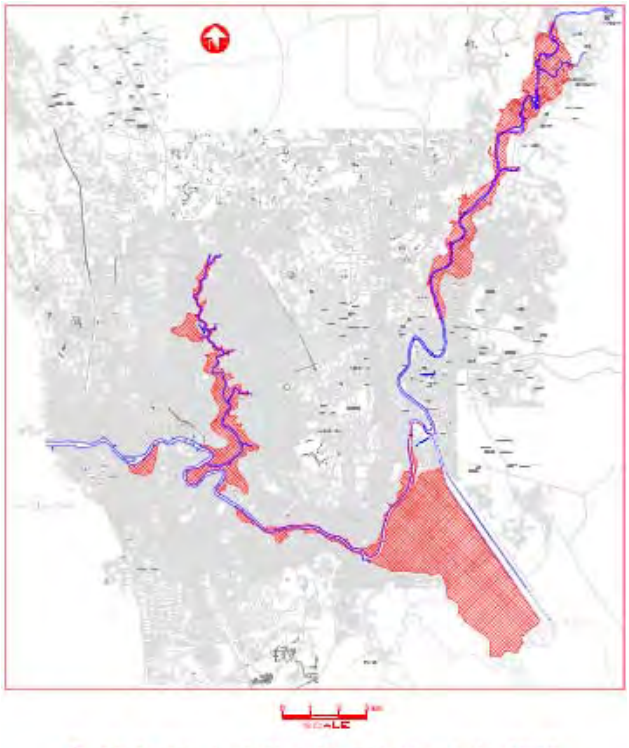
### (1) Flood Protection Level with or without MCGS under Present River Improvement

In case of "with" or "without" MCGS, protection level of present River Channel Improvement Works is summarized as follow:

| River | | Implementation Phase | Protection Level (Year Return Period) | |
|---|---|---|---|---|
| | | | Without MCGS | With MCGS |
| 1) Pasig River | Lower | II & III | 20 | 30 |
| | Upper | II & III | 10 | 30 |
| 2) Marikina River | Lower | III | 2 | 30 |
| | Upper | IV | 30 | 30 |

Flood protection level of improvement of Upper Marikina River does not depend on the construction of MCGS. However, Pasig River and Lower Marikina River needs the construction of MCGS to achieve the planned protection level of 30-year return period.

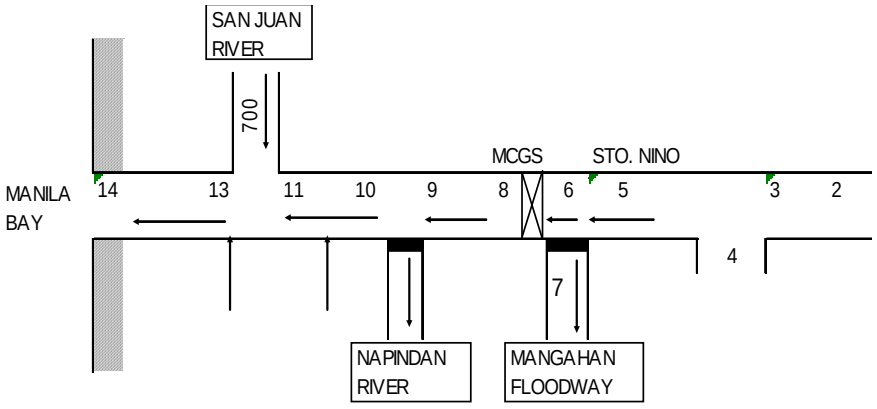
The following map shows the remaining flood inundation area in case of "without" MCGS, upon the completion of overall river channel improvement with 30-year return period. Area of left bank of Lower Marikina River still remains wide inundation area.



The following table shows flow discharge distribution with/without MCGS which was computed in the JICA Preparatory Study. Without MCGS, discharge of about 400 $m^3/s$ exceeds the design discharge in case of 30-year return period flood level in the sections of Upper Pasig River and Lower Marikina River.

(Unit: $m^3/s$)

| No. | Location | Present Design Discharge for River Improvement | Without MCGS | With MCGS | Difference |
|---|---|---|---|---|---|
| 1 | Proposed Marikina Dam | No Improvement | 1,590 | Same discharge as "Without MCGS" | 0 |
| 2 | Rodriguez Bridge | | 2,110 | | 0 |
| 3 | Before Nangka River | | 2,420 | | 0 |
| 4 | Nangka River | | 640 | | 0 |
| 5 | Sto. Niño | 2,900 | 2,740 | | 0 |
| 6 | Rosario (before Floodway) | 2,900 | 2,730 | | 0 |
| 7 | Manggahan Floodway | 2,400 | 1,820 | 2,230 | +410 |
| 8 | Upstream of Lower Marikina | 500 | 910 | 500 | (-) 410 |
| 9 | Downstream of Lower Marikina | 550 | 920 | 530 | (-)390 |
| 10 | Junction with Napindan | 600 | 920 | 540 | (-)380 |
| 11 | Before San Juan River | 600 | 955 | 575 | (-)380 |
| 12 | San Juan River | 700 | 690 | 690 | 0 |
| 13 | After San Juan River | 1,200 | 1,115 | 1,115 | 0 |
| 14 | Near Manila Bay | 1,200 | 1,210 | 1,160 | (-)50 |




Unit: $m^3/s$

### (2) Protection Level with 50- or 100-Year Return Period "with" MCGS

The following table shows discharge distribution of 50- and 100-year return period with MCGS at each location:

(Unit: $m^3/s$)

| No. | Location | Design Discharge For R/I | 30-Year Return Period | | 50-Year Return Period | | 100-Year Return Period | |
|---|---|---|---|---|---|---|---|---|
| | | | Probable Discharge | Difference | Probable Discharge | Difference | Probable Discharge | Difference |
| | | a | b | c = b-a | d | e = d-a | f | g = f-a |
| 1 | Proposed Marikina Dam | No Improvement | 1,590 | - | 1,710 | - | 1,890 | - |
| 2 | Rodriguez Bridge | | 2,110 | - | 2,270 | - | 2,500 | - |
| 3 | Before Nangka River | | 2,420 | - | 2,600 | - | 2,850 | - |
| 4 | Nangka River | | 640 | - | 680 | - | 730 | - |
| 5 | Sto. Niño | 2,900 | 2,740 | (-) 160 | 2,940 | 40 | 3,210 | 310 |
| 6 | Rosario (before Floodway) | 2,900 | 2,730 | (-) 170 | 2,930 | 30 | 3,220 | 320 |
| 7 | Manggahan Floodway | 2,400 | 2,230 | (-) 170 | 2,430 | 30 | 2,720 | 320 |
| 8 | Upstream of Lower Marikina | 550 | 500 | (-) 50 | 500 | (-) 50 | 500 | (-) 50 |

| No. | Location | Design Discharge For R/I | 30-Year Return Period | | 50-Year Return Period | | 100-Year Return Period | |
|---|---|---|---|---|---|---|---|---|
| | | | Probable Discharge | Difference | Probable Discharge | Difference | Probable Discharge | Difference |
| | | a | b | c = b-a | d | e = d-a | f | g = f-a |
| 9 | Downstream of Lower Marikina | 550 | 530 | (-) 20 | 530 | (-) 20 | 530 | (-) 20 |
| 10 | Junction with Napindan | 600 | 540 | (-) 60 | 540 | (-) 60 | 550 | (-) 50 |
| 11 | Before San Juan River | 600 | 575 | (-) 25 | 575 | (-) 25 | 585 | (-) 15 |
| 12 | San Juan River | 700 | 690 | (-) 10 | 720 | 20 | 770 | 70 |
| 13 | After San Juan River | 1,200 | 1,115 | (-) 255 | 1,195 | (-) 5 | 1,245 | 45 |
| 14 | Near Manila Bay | 1,200 | 1,160 | (-) 40 | 1,240 | 40 | 1,310 | 110 |

R/I: River Improvement.

From the above table prepared in the JICA Preparatory Study based on hydrological review incorporating recent available data, in the section of river improvement (from No.5 to No.14), it can be said that present Channel Improvement Works of Pasig-Marikina River is at the protection level of about 50-year return period, in case of "with MCGS".

### (3) Protection Level with 50- or 100-Year Return Period "without" MCGS

The following table also shows discharge distribution in case of "without MCGS":

(Unit: $m^3/s$)

| No. | Location | Design Discharge For R/I | 30-Year Return Period | | 50-Year Return Period | | 100-Year Return Period | |
|---|---|---|---|---|---|---|---|---|
| | | | Probable Discharge | Difference | Probable Discharge | Difference | Probable Discharge | Difference |
| | | a | b | c = b-a | d | e = d-a | f | g = f-a |
| 1 | Proposed Marikina Dam | No Improvement | Same discharges as the table above. | | | | | |
| 2 | Rodriguez Bridge | | | | | | | |
| 3 | Before Nangka River | | | | | | | |
| 4 | Nangka River | | | | | | | |
| 5 | Sto. Niño | 2,900 | | | | | | |
| 6 | Rosario (before Floodway) | 2,900 | | | | | | |
| 7 | Manggahan Floodway | 2,400 | 1,820 | (-) 580 | 1,930 | (-) 470 | 2,100 | (-) 300 |
| 8 | Upstream of Lower Marikina | 550 | 910 | 360 | 1,000 | 450 | 1,120 | 570 |
| 9 | Downstream of Lower Marikina | 550 | 920 | 370 | 1,010 | 460 | 1,130 | 580 |
| 10 | Junction with Napindan | 600 | 920 | 320 | 1,010 | 410 | 1,120 | 520 |
| 11 | Before San Juan River | 600 | 955 | 355 | 1,045 | 535 | 1,155 | 555 |
| 12 | San Juan River | 700 | 690 | (-) 10 | 720 | 20 | 770 | 0 |
| 13 | After San Juan River | 1,200 | 1,115 | (-) 85 | 1,195 | (-) 5 | 1,305 | 105 |
| 14 | Near Manila Bay | 1,200 | 1,210 | 10 | 1,290 | 90 | 1,400 | 200 |

R/I: River Improvement.

Without MCGS, protection level of present River Improvement Works is less than 30-year return period as mentioned in (1) above.

### (4) Further Study/Discussion for Various Issues on Construction of MCGS

In addition to the Section 3.1.4 (4) – Proposed Deferment of Construction of MCGS in Phase III Project, various issues related to the construction and operation of Marikina Control Gate Structure (MCGS) shall be furthermore studied/discussed during the implementation of Phase III in order to obtain the consensus.

# CHAPTER 4 DESCRIPTION OF THE PROPOSED PHASE III PROJECT

## 4.1 Ongoing Phase II Project

At present, the construction of channel improvement works of the Pasig River (Phase II) has been implemented by the DPWH. Its target completion is in June 2012. The present progress of construction works attains remarkable accomplishment of 89.58% as of March 2011, ahead of schedule by 27.49%.

On the other hand, the channel improvement works such as construction of revetments, river walls, and river linear parks at the some channel sections have been implemented under the projects of PRRC, DPWH and participated LGUs.

### (1) Completed Channel Improvement Projects of the Pasig River

As shown in the table below, construction/rehabilitation works of revetments along the selected segments of the Pasig River have been substantially completed under the Pasig River Rehabilitation Project (PRRP) of DPWH between 2000 and 2004 and LGUs's Projects which utilized local funds, as well as the PRRC Linear Park Project in 2001 to 2008.

**Completed Other Projects for Channel Improvement of the Pasig River**

| Scheme | Remarks |
|---|---|
| (1) PRRC Linear Park Project | 12.3 km long. ADB Loan. |
| (2) PRRP Revetment Rehabilitation Project | 5.8 km long in total |
| a) PRRC Revetment Works | 1.3 km long. Local fund. |
| b) DPWH Revetment Works | 3.4 km long. Local fund. |
| c) LGUs' Revetment Works | 1.1 km long. Local fund. |

### (2) Scope of Work of on-going Phase II Project

The Phase II Project targets the 16.4 km channel stretch from Del Pan Bridge near Manila Bay to the junction with Lower Marikina River/Napindan River near C5 Bridge and composes of the following works:

| | | |
|---|---|---|
| Construction of Revetments with River Walls | 6.8 km | Out of 32.8 km on both banks, a total of 13.1 km will be developed in Phase II Project. |
| Construction of only River Walls | 6.3 km | |
| Total | 13.1 km | |

(Completed Revetment and River Wall)

### (3) Financial Arrangement for Phase II Project

Necessary fund for the implementation of Phase II Project with the approved project cost of Php4,608 million is financed from the Japan's ODA STEP Loan (Special Term Economic Partnership in 26th JICA Yen Loan Package) and GOP counterpart fund.

The Japanese "Waterjet Technology" is utilized as excellent construction method for pile driving into hard strata along the Pasig River Channel other than standard method (vibrating hammer driving method) and to minimize vibration/noise of construction activities. The total loan amount of 8,529 million Japanese Yen is less than 85% limit of the total project cost (9,909 million Japanese Yen or Php4,608 million), in accordance with STEP Loan condition.

The following is the summary of Loan Agreement No. PH-P239 dated February 27, 2007 for the Phase II Project:

| Category | Amount of Loan Allocated<br>(in million Japanese Yen) | % of Eligible Expenditure to be Financed |
|---|---|---|
| (A) Civil Works | 7,196 | 100 |
| (B) Consulting Services | 973 | 100 |
| (C) Contingencies | 360 | - |
| Total | 8,529 | |

Notes: Exchange Rate: P1.0 = Y2.15. 0.75% interest rate per annum, 40 years repayment period and 12-year grace period. Final disbursement not later than 8 years after the effective date of Loan Agreement (February 27, 2015).

### (4) Present Status of On-going Construction of Phase II Project

The construction works of Phase II Project are divided into two contract packages; Contract Packages No. 1 (Lower Pasig River: 9.2 km from Delpan Bridge to Lambingan Bridge. Original Contract Price Php2,366,201,513.93) and No. 2. (Upper Pasig River: 7.2 km from Lambingan Bridge to C5 Bridge. Original Contract Price Php1,693,143,411.84). Both contractors have mobilized on July 1, 2009 with the target completion of the contract works by June 29, 2012. As of the end of March 2011 the both contract packages have made a great progress at 89.78% (target 64.16%) for CP No. 1-A and 89.29% (target 59.19%) for CP No. 1-B, respectively. Overall accomplishment is 89.58% (target 62.09%).

It can be said that this notable achievement is the results of the following:

- Cooperation of residents and factories/offices along the project area through effective and efficient information campaign and publicity.
- Advantage good weather in 2010 for construction activities.
- Effectiveness and efficiency of adopted Waterjet Technology for driving steel piles into hard strata.
- Less acquisition of right-of-way required and relocation of structures affected by the project.

## 4.2 Proposed Channel Improvement for the Remaining Sections of the Pasig River

### 4.2.1 Remaining Section of the Pasig River Channel

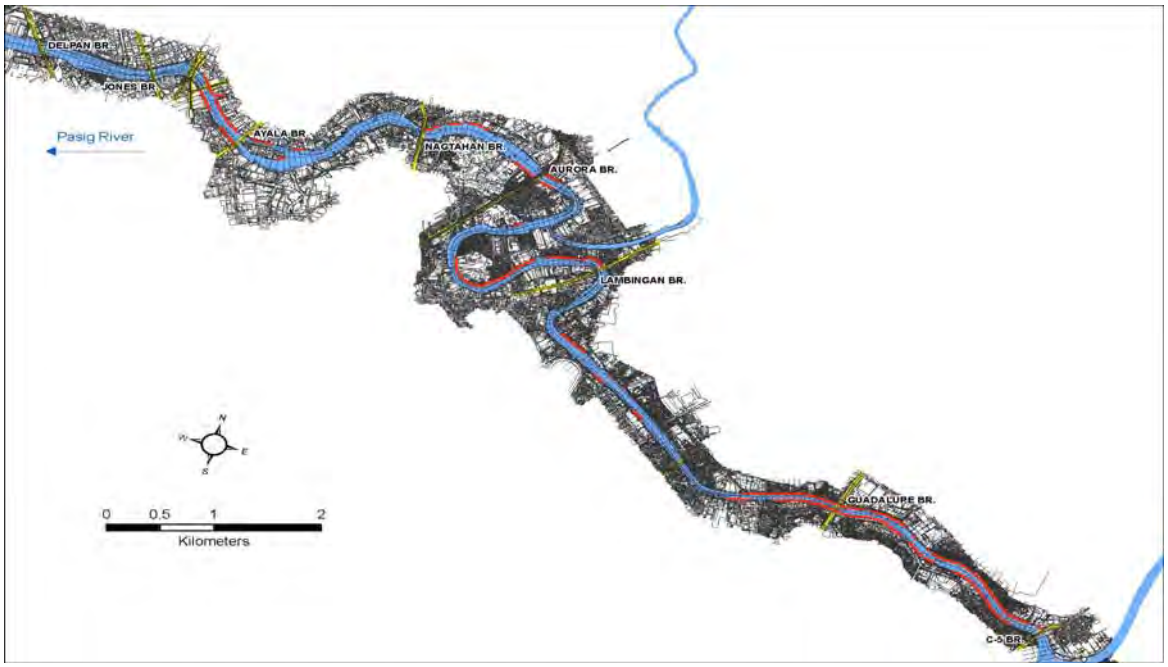
Originally, out of the three rivers above, the Phase II Project targets the Pasig River and Phase III Project targets the Lower Marikina River.

Before starting of the Phase II Project, about 5.8 km revetment construction at some bank sections of the Pasig River has been completed under the projects of DPWH-PRRP, PRRC and participated LGUs as mentioned in section 4.1.(1).

The Phase II Project targets 13.2 km long only on 28.9 km long both banks for improvement proposed in the Detailed Design because of shortage of project fund due to the substantial price increase of construction materials; in particular steel material which is major material of the Project.

On the other hand, the heavily deteriorated existing riparian structures at the remaining areas proposed in the Detailed Design have been severely damaged by the flood occurred by Typhoon 'Ondoy' on September 26, 2009. There were also overflow on the banks because of low existing River Walls. In view of the above, the urgent rehabilitation works are necessary for protection of the future flood.

The sections excluding the ones of Phase II Project for improvement proposed in the Detailed Design are called the Remaining Sections. Out of 28.9 km on both banks of Detailed Design, the remaining section (or Potential Areas) are a total of about 9.9 km at 42 sections on both banks, as shown in table and figure below.




**Remaining Sections for Improvement of the Pasig River**

## Remaining Sections for Improvement of Pasig River

| No. | Channel Bank (Right or Left) | Station | | Length of Bank (m) | Administration |
|---|---|---|---|---|---|
| | | Sta. | Sta. | | |
| 1 | R | 2+283 | 2+540 | 350 | Manila City |
| 2 | L | 2+406 | 2+651 | 258 | Manila City |
| 3 | R | 2+550 | 2+950 | 400 | Manila City |
| 4 | L | 2+850 | 3+076 | 238 | Manila City |
| 5 | R | 3+160 | 3+280 | 108 | Manila City |
| 6 | R | 3+300 | 3+400 | 91 | Manila City |
| 7 | L | 3+480 | 3+560 | 82 | Manila City |
| 8 | R | 3+645 | 3+753 | 105 | Manila City |
| 9 | R | 5+030 | 5+217 | 171 | Manila City |
| 10 | R | 5+270 | 5+410 | 164 | Manila City |
| 11 | R | 5+543 | 5+630 | 102 | Manila City |
| 12 | L | 6+119 | 6+219 | 101 | Manila City |
| 13 | L | 6+248 | 6+269 | 27 | Manila City |
| 14 | R | 6+350 | 6+510 | 150 | Manila City |
| 15 | L | 6+360 | 6+515 | 166 | Manila City |
| 16 | L | 7+344 | 7+439 | 96 | Manila City |
| 17 | R | 7+518 | 8+220 | 632 | Manila City |
| 18 | R | 8+220 | 8+500 | 280 | Manila City |
| 19 | R | 8+510 | 9+341 | 827 | Manila City |
| 20 | R | 9+430 | 9+722 | 301 | Manila City |
| 21 | R | 9+750 | 9+790 | 41 | Manila City |
| 22 | R | 9+810 | 9+950 | 202 | Manila City |
| 23 | R | 10+957 | 11+263 | 320 | Mandaluyong City |
| 24 | L | 11+500 | 11+628 | 128 | Makati City |
| 25 | R | 11+602 | 11+653 | 52 | Mandaluyong City |
| 26 | R | 11+787 | 11+802 | 15 | Mandaluyong City |
| 27 | L | 12+024 | 12+173 | 149 | Makati City |
| 28 | R | 13+534 | 14+397 | 863 | Mandaluyong City |
| 29 | L | 13+806 | 14+442 | 636 | Makati City |
| 30 | R | 14+450 | 14+730 | 280 | Mandaluyong City |
| 31 | R | 14+837 | 14+944 | 107 | Mandaluyong City |
| 32 | R | 14+985 | 15+072 | 87 | Mandaluyong City |
| 33 | R | 15+196 | 15+246 | 50 | Pasig City |
| 34 | L | 15+236 | 15+424 | 188 | Makati City |
| 35 | R | 15+410 | 15+439 | 29 | Pasig City |
| 36 | L | 15+443 | 15+547 | 104 | Makati City |
| 37 | R | 15+477 | 15+505 | 28 | Pasig City |
| 38 | R | 15+505 | 16+469 | 970 | Pasig City |
| 39 | L | 15+747 | 15+870 | 123 | Makati City |
| 40 | L | 15+965 | 16+562 | 597 | Makati City |
| 41 | R | 16+469 | 16+722 | 253 | Pasig City |
| 42 | R | 16+776 | 16+828 | 52 | Pasig City |
| Total | | | | 9,923 | |

Improvement of the Pasig River is classified into the following:

a) Channel improvement in order to protect the flood overflow and bank erosion/collapse (construction of revetments and/or floodwall)
b) Channel improvement from environmental aspect which is led by PRRC (construction of revetment for Linear Parks), in addition to existing deteriorated bank revetments.

The above Remaining Sections (Potential Areas) are divided into the following three groups in implementation priority of structures from the viewpoint of flood control.

| | |
|---|---|
| Priority 1 Group | Flood prone area spreads widely from 2 km downstream of the end of Pasig River, where is around the Makati-Mandaluyong Bridge (refer to Fig.3.2.2). This group of Remaining Sections is located in the wide flood prone area.<br>(Area No. 1, 3, 8, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27) |
| Priority 2 Group | Potential Areas located in the narrow flood prone area on the both banks between Makati-Mandaluyong Bridge and the end of Pasig River where there exist congested houses and roads. Or, Remaining Sections are located at the channel curves more damaged by attack of flood of Typhoon 'Ondoy'.<br>(Area No. 2, 4, 5, 6, 7, 9, 10, 11, 28, 32, 38, 40, 42). |
| Priority 3 Group | Existing revetments are severely deteriorated. However, no critical floodwater attacks at these Remaining Sections. In addition, for the PRRC environmental aspect, improvement works are necessary.<br>(Area No. 29, 30, 31, 33, 34, 35, 36, 37, 39, 41). |

Work volume and estimated construction cost of each group is shown below:

| Order of Priority Group | Combined Revetment and River Wall (m) | River Wall (m) | Total Length on both banks (m) | Construction Cost with VAT (mil. Pesos) | Remarks |
|---|---|---|---|---|---|
| 1 | 3,080 | 1,262 | 4,342 | 1,670 | |
| 2 | 2,640 | 1,143 | 3,783 | 1,196 | Groups 1+2= P2,866 mil. |
| 3 | 1,798 | - | 1,798 | 701 | |
| Total | 7,518 | 2,405 | 9,923 | 3,567 | Groups 1+2+3 |

Since the objective of the Proposed Phase III Project is "Flood Control", overflow of Pasig River must be protected by the River Walls. Then, congested houses and road network on the banks must be protected from erosion/collapse caused by attack of floodwater by provision of structurally strong revetments. In view of the above, Priority 1 and 2 Groups of Remaining Sections should be absolutely implemented in the early stage of Phase III Project, which are called the Priority Sections (8.1 km long).

The above improvement lengths on both banks are summarized below:

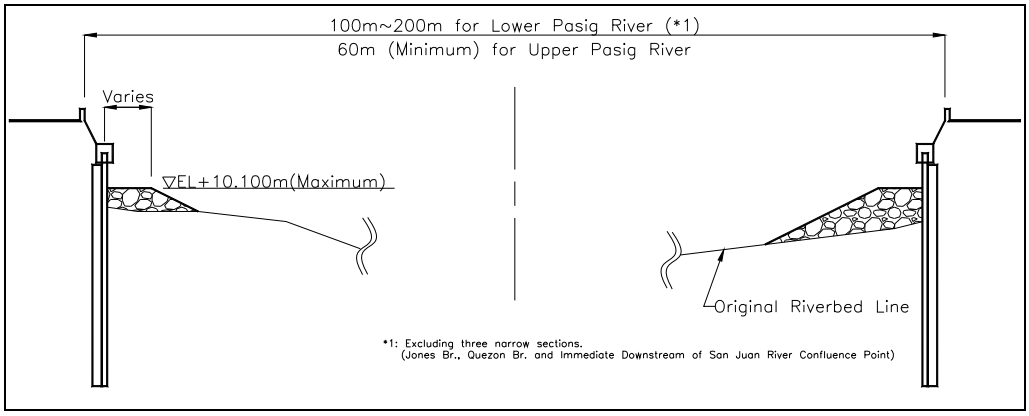
| D/D | Other Projects (DPWH-PRRP, PRRC, LGUs) | Phase II | Priority Sections for Phase III | Sections not included in Priority | Stretch of Pasig River Channel Improvement |
|---|---|---|---|---|---|
| 28.9 km | 5.8 km | 13.2 km | 8.1 km | 1.8 km | 16.4 km (32.8 km on both banks) |
| | | | 9.9 km of Remaining Sections in total | | |

### 4.2.2 Structures Proposed at Remaining Sections of Pasig River

Since improvement works of the Pasig River is presently on-going as Phase II Project, preliminary design for revetments at Priority Sections selected in the Remaining Sections (Potential Areas) follows the design of Phase II from the viewpoint of consistency.

**a) Revetment and River Wall**

New revetments compose of combined structures such as steel sheet pile foundation and inclined/vertical reinforced concrete wall on top as shown below.




Steel Sheet Pile foundation has two types; a) Steel Sheet Pile only (SP Type) and b) more strong Steel Sheet Pile combined with H-steel Beam (SP with H-Beam Type) as shown below. Each type of piles is applied base on the subsoil condition.

(Steel Sheet Pile : SP Type)

(SP with H-Beam Type)

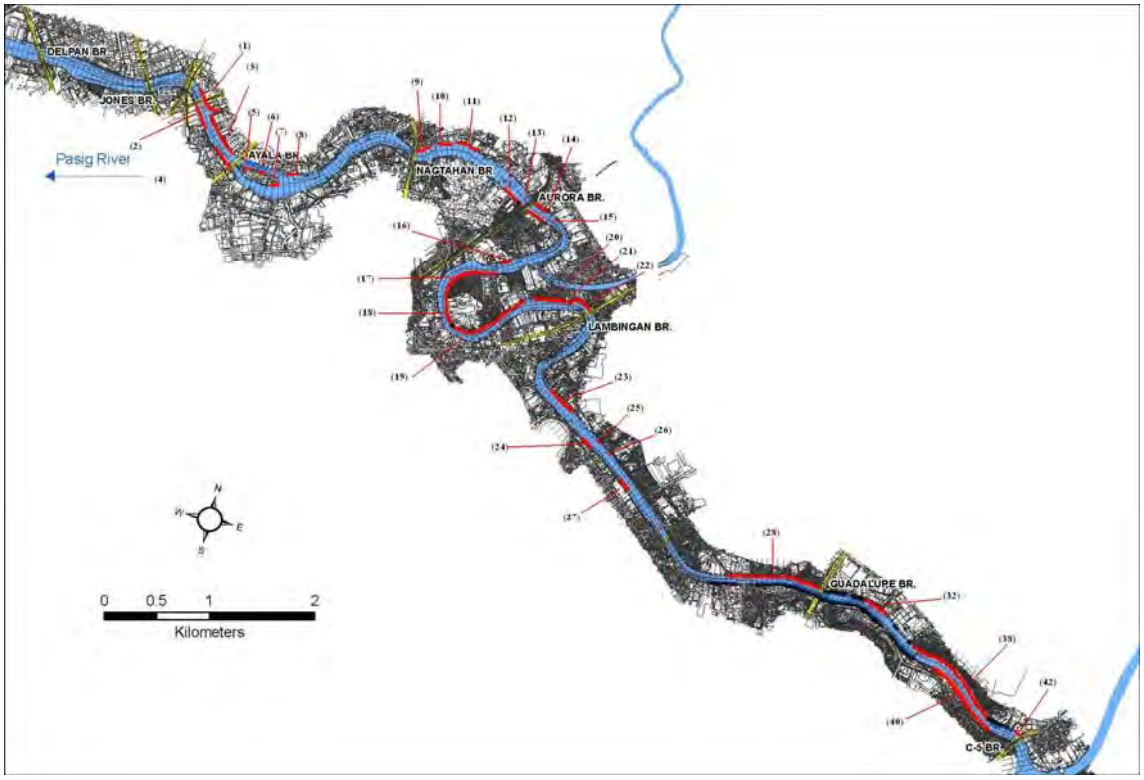
**Cross-section of Steel Sheet Pile Foundation**

The following table shows the result of preliminary design of revetments of all Remaining Sections. Number in parentheses ( ) means the Priority Sections (Priority No. 1 and 2 Group).

**Preliminary Design for Revetments at Remaining Sections of Pasig River**

| No. | Channel Bank (Right or Left) | Station | | Length of Bank (m) | Foundation Type | |
|---|---|---|---|---|---|---|
| | | Sta. | Sta. | | Type | Pile Length (m) |
| I. Priority 1 Group | | | | | | |
| 1A | R | 2+283 | 2+341 | 65 | Revetment (SP) | 12.5 |
| 1B | R | 2+341 | 2+530 | 230 | Reinforced Concrete Floodwall | - |
| 1C | R | 2+530 | 2+540 | 55 | Revetment (SP) | 12.0 |
| 3 | R | 2+550 | 2+950 | 400 | Reinforced Concrete Floodwall | - |
| 8 | R | 3+645 | 3+753 | 105 | Revetment (SP) | 10.0 |
| 12 | L | 6+119 | 6+219 | 101 | Revetment (SP) | 10.0 |
| 13 | L | 6+248 | 6+269 | 27 | Revetment (SP) | 9.5 |
| 14 | R | 6+350 | 6+510 | 150 | Revetment (SP) | 12.5 |
| 15 | L | 6+360 | 6+515 | 166 | Revetment (SP) | 9.0 |
| 16 | L | 7+344 | 7+439 | 96 | Revetment (SP) | 11.0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 17 | R | 7+518 | 8+220 | 632 | Reinforced Concrete Floodwall | - |
| 18 | R | 8+220 | 8+500 | 280 | Revetment (SP) | 11.0 |
| 19A | R | 8+510 | 8+800 | 286 | Revetment (SP with H-Beam) | 12.5 |
| 19B | R | 8+800 | 9+150 | 350 | Revetment (SP) | 10.5 |
| 19C | R | 9+150 | 9+200 | 50 | Revetment (SP with H-Beam) | 18.0 |
| 19D | R | 9+200 | 9+341 | 141 | Revetment (SP) | 10.5 |
| 20 | R | 9+430 | 9+722 | 301 | Revetment (SP) | 11.0 |
| 21A | R | 9+750 | 9+770 | 20 | Revetment (SP) | 9.5 |
| 21B | R | 9+770 | 9+790 | 21 | Revetment (SP with H-Beam) | 15.5 |
| 22 | R | 9+810 | 9+950 | 202 | Revetment (SP) | 11.0 |
| 23 | R | 10+957 | 11+263 | 320 | Revetment (SP with H | 20.0 |
| 24 | L | 11+500 | 11+628 | 128 | Revetment (SP with H | 12.0 |
| 25 | R | 11+602 | 11+653 | 52 | Revetment (SP with H | 14.0 |
| 26 | R | 11+787 | 11+802 | 15 | Revetment (SP) | 11.0 |
| 27 | L | 12+024 | 12+173 | 149 | Revetment (SP with H-Beam) | 19.0 |
| II. Priority 2 Group | | | | | | |
| 2 | L | 2+406 | 2+651 | 258 | Revetment (SP) | 12.0 |
| 4 | L | 2+850 | 3+076 | 238 | Revetment (SP) | 12.0 |
| 5 | R | 3+160 | 3+280 | 108 | Revetment (SP) | 12.0 |
| 6 | R | 3+300 | 3+400 | 91 | Repair of Stone Revetment | - |
| 7 | L | 3+480 | 3+560 | 82 | Repair of Stone Revetment | - |
| 9 | R | 5+030 | 5+217 | 171 | Revetment (SP with H-Beam) | 13.5 |
| 10 | R | 5+270 | 5+410 | 164 | Revetment (SP with H-Beam) | 13.5 |
| 11 | R | 5+543 | 5+630 | 102 | Revetment (SP) | 12.0 |
| 28A | R | 13+534 | 14+700 | 166 | Revetment (SP) | 10.5 |
| 28B | R | 13+700 | 13+800 | 100 | Revetment (SP) | 10.0 |
| 28C | R | 13+800 | 14+000 | 200 | Revetment (SP) | 10.5 |
| 28D | R | 14+000 | 14+100 | 100 | Revetment (SP) | 10.0 |
| 28E | R | 14+100 | 14+250 | 150 | Revetment (SP) | 10.5 |
| 28F | R | 14+250 | 14+397 | 147 | Revetment(SP with H-Beam) | 11.5 |
| 32 | R | 14+985 | 15+072 | 87 | Revetment(SP with H-Beam) | 13.0 |
| 38 | R | 15+505 | 16+469 | 970 | R.C. Floodwall only | - |
| 40 | L | 15+965 | 16+562 | 597 | Revetment (SP with H-Beam) | 12.0 |
| 42 | R | 16+776 | 16+828 | 52 | Revetment (SP) | 9.0 |
| III. Priority 3 Group | | | | | | |
| 29A | L | 13+806 | 14+250 | 444 | Revetment (SP) | 11.0 |
| 29B | L | 14+250 | 14+442 | 192 | Revetment(SP with H-Beam) | 12.5 |
| 30 | R | 14+450 | 14+730 | 280 | Revetment(SP with H-Beam) | 13.0 |
| 31 | R | 14+837 | 14+944 | 107 | Revetment(SP with H-Beam) | 14.5 |
| 33 | R | 15+196 | 15+246 | 50 | Revetment(SP with H-Beam) | 11.5 |
| 34 | L | 15+236 | 15+424 | 188 | Revetment(SP with H-Beam) | 9.5 |
| 35 | R | 15+410 | 15+439 | 29 | Revetment (SP with H-Beam) | 17.0 |
| 36 | L | 15+443 | 15+547 | 104 | Revetment (SP) | 11.0 |
| 37 | R | 15+477 | 15+505 | 28 | Revetment (SP with H-Beam) | 14.0 |
| 39 | L | 15+747 | 15+870 | 123 | Revetment (SP) | 11.5 |
| 41A | R | 16+469 | 16+593 | 124 | Revetment (SP) | 10.5 |
| 41B | R | 16+593 | 16+722 | 129 | Revetment (SP) | 9.0 |
| Total of Potential Areas | | | | 9,923 m | 42 Locations | |




**Locations of Prioritized Remaining Sections**

### b) Improvement of Existing Drainage Outlets

Corresponding to the construction of new revetments, existing drainage outlets are also to be improved. Size of drainage outlets ranges mainly from 0.3m to 1.52 m of reinforced concrete pipes. Flapgates attached to the outlets are proposed at the low-bank area between Del Pan Bridge and Guadalupe Bridge to protect reverse flow from Pasig River.

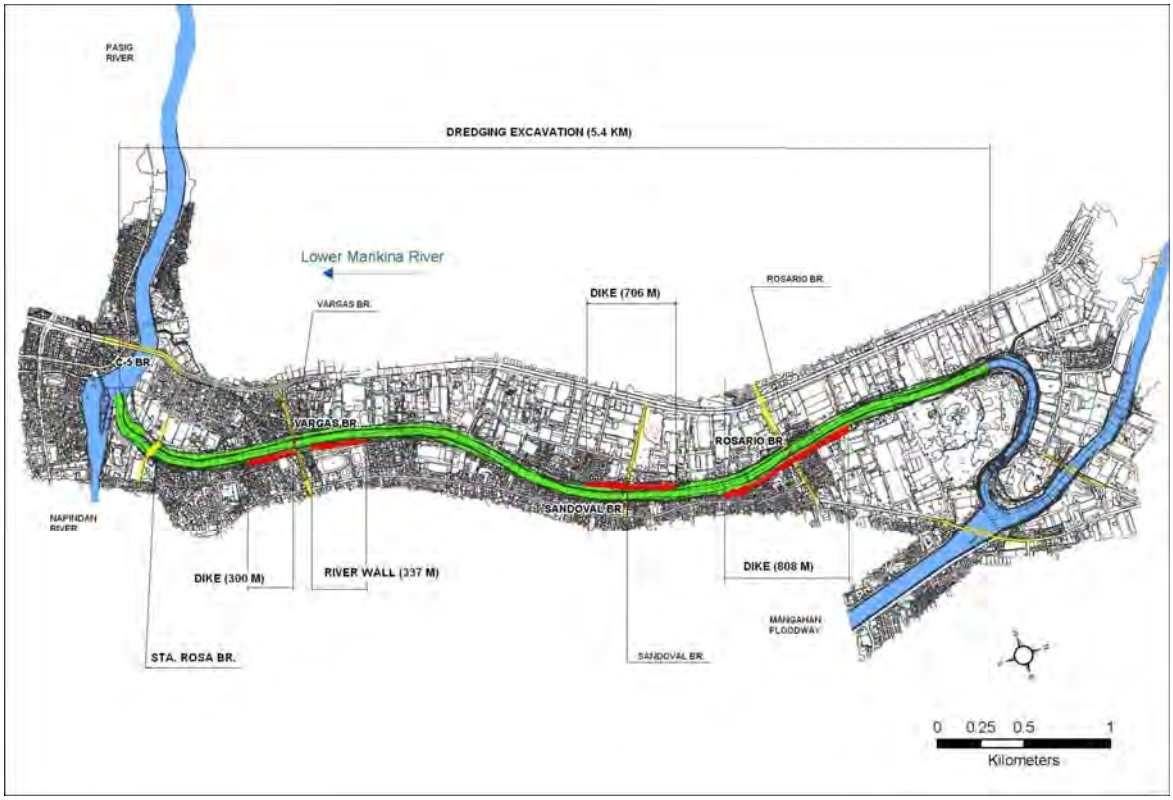
## 4.3 Proposed Channel Improvement of the Lower Marikina River

Lower Marikina River Channel Improvement of Phase III Project targets the 5.4 km long from the junction with the Pasig River to the upstream, except the construction area of the proposed MCGS.

There are no flood control facilities such as revetments and river walls along the Lower Marikina. The following are the proposed flood control structures for Lower Marikina River:

a) Dredging/Excavation of Riverbed
b) Dike
c) River Wall
d) Boundary Bank
e) Bridge Pier Protection

Layout plan for proposed channel improvement is shown in the figure below and the proposed structures are described:




**Layout Plan of Lower Marikina River Channel Improvement**

### a) Dredging/Excavation of Riverbed

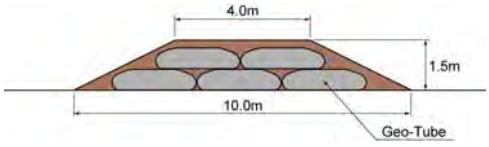
Sampling of riverbed materials of Lower Marikina River conducted in the Detailed Design shows that riverbed composes of sandy and silty clay. Typical cross-section of dredging is designed to have 40 m wide bottom. Design dredged riverbed elevation is EL.+6.500 m (DHWL: EL.+14.036 m) and design longitudinal riverbed elevation slope is 1/4300 (design longitudinal high water level slope: 1/9000). Necessary dredging/excavation volume of Lower Marikina River is estimated at approximately 612,000 $m^3$ (refer to figure showing typical section of dredging in next page).

### b) Dike and River Wall

Dikes made of earth embankment and River Wall are proposed for protection of four public areas. Dikes with 3 m wide concrete paved top and revetment covering riverside slope from erosion are constructed at the existing promenades (3 locations; 1,814 m long in total consisting of 300 m, 706 m and 808 m). Proposed 337 m long concrete River Wall raising the existing wall protects the area of school (refer to typical sections of proposed structures in next page).

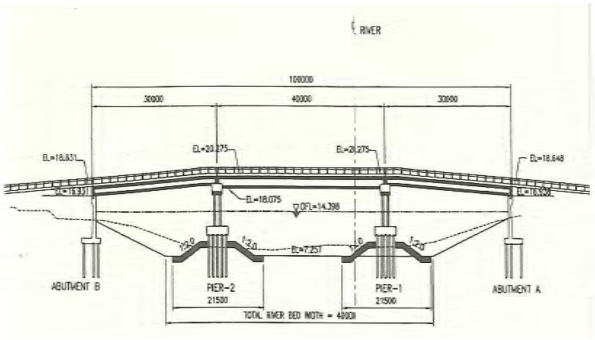
### c) Boundary Bank

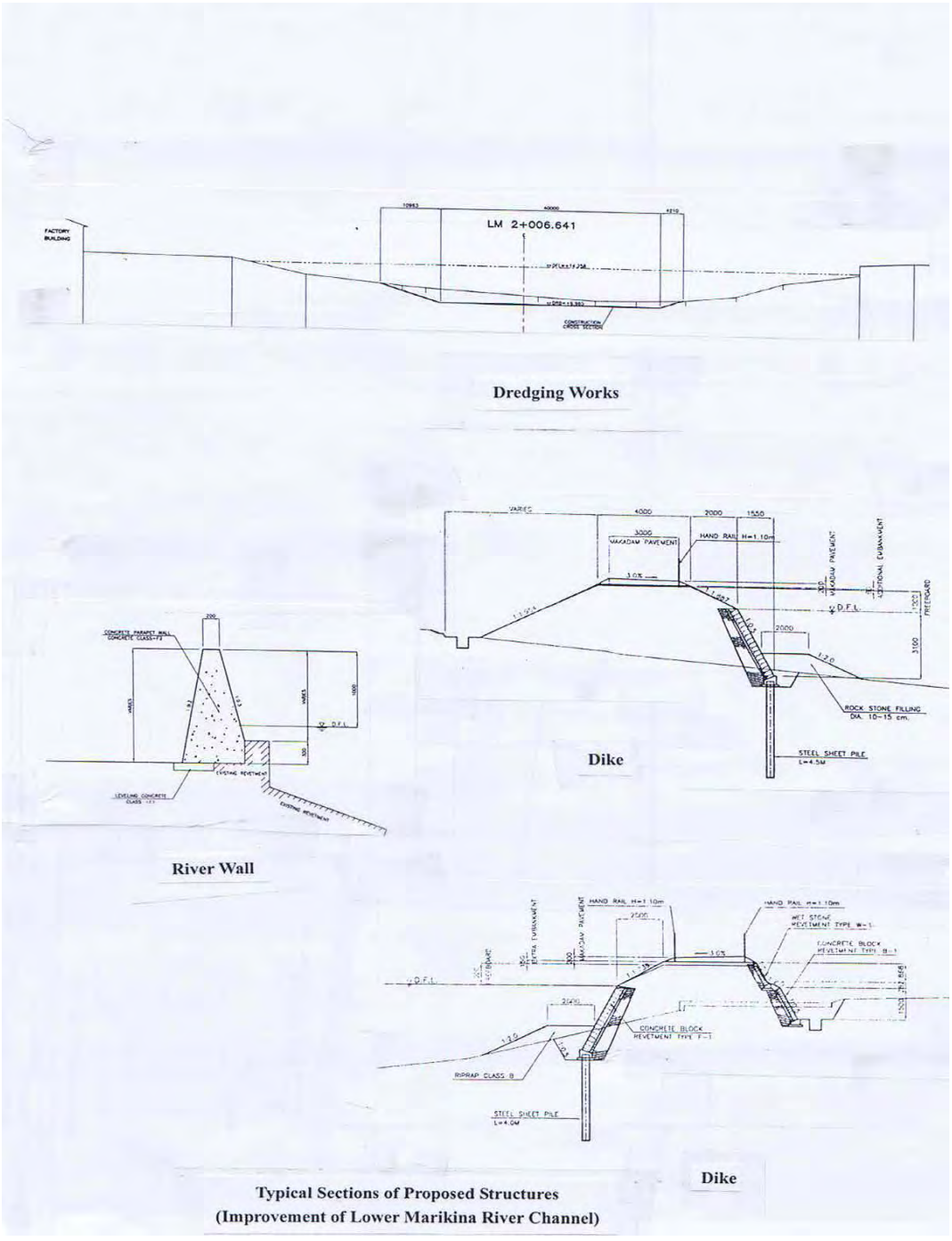
Along the Lower Marikina River flowing in the urban area, there are almost no roads. To assure boundary between river area and private property and also provide maintenance roads along the river channel as much as possible, it is proposed to provide the Boundary Bank as shown on figure. Boundary Bank is low embankment to reuse the dredged materials, filling materials in geo-textile tubes with filtration effect. Geo-tube should be covered with soil because geo-tube is not strong against sunshine. Detailed structure is to be designed in the next stage, Detailed Design.



**d) Bridge Pier Protection**

There are four existing bridges within the proposed dredging section (Sta. Rosa, Vargas, Sandoval and Rosario Bridges). To ensure the stability of existing bridge piers from dredging (excavation of riverbed), it is proposed to provide the reinforcement work providing stone riprap around the piers.




**Typical Sections of Proposed Structures**
**(Improvement of Lower Marikina River Channel)**

## 4.4 Non-Structural Measures

### 4.4.1 General

The non-structural measures to be implemented for the construction period of Phase III are selected in consideration of the criteria as follows: (1) Measures to facilitate the construction of Phase III and to enable a deepening of understanding of necessity and effectiveness of flood mitigation measures, (2) Fact-acting measure for a flood risk reduction and (3) Expansive measures for other cities and region. In addition, a duplication with the measures in the projects conducted by donors is avoided for the selection of measures and the measures which has a possibility to be utilized the result in future are selected.

**Selection of Non-Structural Measures**

| Criteria | Measures |
|---|---|
| To facilitate the construction of Phase III and to enable a deepening of understanding of necessity and effectiveness of the flood mitigation measures | - Implementation of Information Campaign and Publication(around construction site)<br>- Overseas Training |
| Fact-acting measure for a flood risk reduction | - Establishment of Website to disseminate information regarding activities of FMC and water level of Pasig-Marikina River |
| Expansive measures for other cities and region | - Preparation of hazard maps with information of evacuation centers, evacuation route, means for evacuation and so on (Pasig City) |

### 4.4.2 Implementation of Information Campaign and Publicity (ICP)

The main objective of Information Campaign and Publicity is to promote better understanding among neighborhood residents and stakeholders as to not only the significance of the improvement of Pasig-Marikina River but also the importance of flood mitigation measures and projects. As a result of the promotion, communities in the basin will reach acceptance of the implementation of the Pasig-Marikina River channel improvement and the construction works will proceed smoothly such as the construction of Phase II. The target area of the ICP is mainly Quezon and Pasig City which are adjacent areas of the construction site in Phase III. Major activities of the ICP are summarized as follows:

**Activities of Information Campaign and Publicity**

| Items | Activities |
|---|---|
| 1. Formulation of Campaign Plan | Detailed action plan will be formulated for ICP |
| 2. Conceptualize, design and produce information materials | To effectively convey the overall advocacy campaign and publicity for the project, creative resources materials are needed to be produced. Therefore, once the detailed campaign plan is established, the conceptualization, design and actual production of campaign materials are considered and produced. |
| 3. Conduct community-based explanatory discussion | To conduct explanatory discussion as to the Pasig-Marikina River Channel Improvement Project (Phase III) for inhabitants, direct beneficiaries of the Project by using text books or guidelines. |
| 4. Public Hearing | The mobilization of community based leaders in conducting localized discussion and elevating these issues to the higher offices like the City Councils of the respective local government units would be executed. |
| 5. Caravan operation involving schools, | Another interactive and more often cost-effective tool in campaigning the Project is through the mounting of caravans in schools, government and local |

| | |
|---|---|
| government officials, Barangay Officers | Barangay offices. With this activity, the formulated community-based leaders, motivators and organizers will be of effective use. |
| 6. Development of community-based project motivators | In choosing the prospective community-based project motivators, the followings will be implemented: (a) Conduct initial and informal or casual interviews within the neighborhood for identification of prospective leaders, (b) Conduct background checks in the LGUs for past or present community leaders, (c)Coordinate with schools, colleges and university officials to identify youth leaders who are based in the affected areas, and etc |
| 7. Establishment of community-based information centers | Community-based information centers may already be identified or located among the existing Barangay hall and/or recreation centers or offices. Educational materials regarding flood mitigation measures are lined up in Barangay Office to give the interested public special occasions for distribution and question-and-answer. |
| 8. Undertake mass media exposure and public relation activities | The PR activity for the river improvement project would be implemented to promote a favorable image intensively to various concerned stakeholders and the general public alike through medias such as Radio, TV, newspaper, print, website, on-ground event, multi media tools and so on. |
| 9. Continuous linkages with national and local government units & agencies | ICP implementation unit will work hand in hand with DPWH-PMO to establish linkages with other agencies of the government and the private sectors. |
| 10. Progress repot and Completion reports | The reports would be prepared and submitted to the DPWH-PMO periodically as required on the progress of work, the contractors' performance, quality of works and the project's financial status and forecasts. |

### 4.4.3 Establishment of Website

The establishment of website aims at information dissemination regarding activities and flood mitigation projects implemented by FMC members such as DPWH, MMDA and so on, and water level monitored by EFCOS. The equipment and apparatus to operate website would be installed in the compound of EFCOS project office of MMDA.

Objectives of the dissemination are (1) to provide the water level information for Command Centers of LGUs which strongly eager to gain the information for their quick response against a flood disaster and (2) to release the importance, significance and progress regarding river channel improvement, flood mitigation facilities and flood warning system for stakeholders in Pasig-Marikina river basin. The contents of the establishment of website are summarized in next table.

Moreover, to effectively utilize the water level information for warning and evacuation, the draft guideline would be prepared based on the result of seminars and discussions in consideration of hydrological and hydraulic character of the Pasig-Marikina River and flood plane area.

The DPWH, the representative agency of FMC, will make all the coordination and arrangement with the MMDA and LGUs concerned and provide necessary data/information to the Consultants. The equipment and apparatus to operate website would be installed in the compound of EFCOS project office of MMDA in consideration of an effective utilization of electronic devises which had already installed in the office.

**Contents of Establishment of Website**

| Items for Dissemination | Objectives | Outcomes |
|---|---|---|
| Timely Water Level Information | To provide the water level information for Command Centers of LGUs which strongly eager to gain the information for their quick response against a flood disaster | The provision of information will assist for community-based early warning and evacuation activities/systems |
| Activities and Projects regarding flood mitigation by FMC | To release the importance, significance and progress regarding river Improvement, flood mitigation facilities and flood warning system for stakeholders in Pasig-Marikina river basin | Stakeholders will be aware of an effectiveness and necessity of projects and activities as to flood risk reduction management. |
| Main Activities | | |
| ① Discussion with related agencies<br>② Collection of Information regarding activities and project implemented by related agencies<br>③ Discussion with DRRMC and LGUs as to utilization of water level information<br>④ Preparation of Draft Guideline for warning and evacuation<br>⑤ Seminar for utilization of water level information<br>⑥ Establishment of Website and Installation of Equipment | | |
| Points of Concern | | |
| - Monitoring station to disclose water levels and LGUS to be transmitted the information should be selected through discussions with DPWH, MMDA and LGUs<br>- Education and training through the Information Campaign and Publicity should be carried out to have a correct understanding of the information for the information receiver in LGUs. | | |
| Equipment to be installed | | |
| - One Server with appropriate software and one UPS | | |

### 4.4.4 Elaboration of Model Hazard Map and Guideline

The flood hazard map will be prepared by utilizing past study results by donors (for example, exposure data base and flood maps to be prepared by AusAID), and information regarding flood mitigation/evacuation facilities from relative agencies such as DPWH and LGUs. Pasig City would be nominated as a target area in which there was deeply inundated by Typhoon Ondoy and which is adjacent city of the river channel improvement project (Phase III). Furthermore, a simple guideline would be prepared to enable Pasig City to maintain the flood hazard map and to guide other LGUs for the establishment of the map.

The consultant will assist DPWH and LGUs to establish the hazard map with the description of evacuation routes, evacuation centers and means of evacuation corresponding to timing of evacuation and scale of floods. In addition, as for the evacuation, the gender issues will be also considered and reflected on the flood hazard map, for instance, in such a way that conditions as to evacuation centers and routes are described to enable vulnerabilities and feminine gender to properly evacuate to a hospitable place.

Objectives of the establishment of hazard map are as follows: (1) To serve as a model for other LGUs in Pasig-Marikina River basin, (2) To facilitate flood evacuation activities and to be utilized for review of action plan on flood disaster risk reduction in Pasig City, and (3) To assist the capacity building in respect to the efficient utilization of information for the flood risk reduction.

The contents of the elaboration and utilization of flood hazard map are described in next table:

**Activities for Elaboration of Flood Hazard Map and Guideline**

<table>
<tr><th>Item</th><th>Objectives</th><th>Outcome</th></tr>
<tr><td>Elaboration of Hazard Map</td><td>(1) To serve as a model for other LGUs in Pasig-Marikina River basin<br>(2) To facilitate flood evacuation activities and to be utilized for review of action plan on flood disaster risk reduction in Pasig City<br>(3) To assist the capacity building in respect to the efficient utilization of information for the flood risk reduction</td><td rowspan="2">(1) Community-based flood evacuation would be facilitated<br>(2) Residents will easily recognize places of evacuation center and appropriate routes.<br>(3) Stakeholders will conduct evacuation drill by using the map.<br>(4) Adjacent LGUs will be aware of effectiveness of flood hazard map</td></tr>
<tr><td>Implementation of Seminar</td><td>(1) 1st Seminar will be held to explain the methodology of making flood hazard map<br>(2) 2nd Seminar will be held to discuss the established flood hazard map and to examine an approach in the use of the map. In addition, table drill will be carried out using the flood hazard map to check problems during the evacuation</td></tr>
<tr><td colspan="3">Points of Concern and Relationship with the Proposed Non-structural Measures</td></tr>
<tr><td colspan="3">- To effectively utilize the result of past study or projects<br>- To set evacuation centers for long stay and safety routes to adapt gender issues<br>- To distribute the flood hazard map through the ICP</td></tr>
</table>

### 4.4.5 Overseas Training Course

Following the overseas training in Phase II, the training will be conducted for four times during the construction stage to visit overseas rivers which similar in hydrological characteristic to the Pasig-Marikina River. The training course is composed of site visit, presentation by and discussion with related agencies, which would be carried out to learn plans, measures and regulations for the integrated flood mitigation. For instance, the Tsurumi River basin in Kanto District, Yodo river basin with Biwa Lake in Kansai District, Tone river basin with Kasumigaura Lake and Large dams and so on. The training would be implemented for four times during construction stage and two officials are selected from DPWH each time. The detailed schedule and sites to visit are decided in the beginning of Project (Phase III).

# CHAPTER 5 RESETTLEMENT ACTION PLAN OF PHASE III PROJECT

## 5.1 Necessity of Resettlement

In November 2010, the DPWH, in coordination with local government units (LGUs) and JICA Preparatory Study Team, has conducted a census of households and tagging of structures to be affected by the Phase III Project, and registered 58 informal households (204 population) and 60 structures in total along the Pasig River, as follows. There are no households/structures to be affected by the improvement of Lower Marikina River.

**Census of Households**

| Scheme | LGU | Barangay | No. of Households | No. of Persons | No. of Structures |
|---|---|---|---|---|---|
| Pasig River Channel Improvement | Manila | 900 | 26 | 96 | 26 |
| | | 896 | 13 | 28 | 18 |
| | | 897 | 7 | 35 | 9 |
| | | 894 | 2 | 2 | 2 |
| | Makati | West Rembo | 10 | 43 | 5 |
| | ***Total*** | | ***58*** | ***204*** | ***60*** |

## 5.2 Resettlement Action Plan

The Resettlement Action Plan (RAP) is to be prepared for the above affected informal settlers. The RAP which is acceptable for JICA is a condition of loan application for the Project.

The finalized RAP will be separately prepared and submitted.

# CHAPTER 6 CONSTRUCTION PLAN AND COST ESTIMATE OF PHASE III PROJECT

## 6.1 Quantity of Major Works

The construction area for Phase III is divided in Pasig River and Lower Marikina River. Remaining Sections of Pasig River are divided into three priorities; Priority 1, 2 and 3. JICA intends to finance only Priority 1 and 2. Their lengths in meter are as follows:

| River | Main Civil Works | Priority 1 & 2 (m) | Priority 3 (m) | Total (m) |
|---|---|---|---|---|
| Pasig | Revetment work with Steel Sheet Pile | 5,720 | 1,798 | 7,518 |
| | River Wall (including repair works) | 8,125 | 798 | 9,923 |
| Lower Marikina | Dredging of Riverbed | 5,400 | - | 5,400 |
| | Dike with Revetment (Steel Sheet Pile Foundation) | 1,814 | - | 1,814 |
| | River Wall | 337 | - | 337 |
| | Boundary Bank | 7,063 | | 7,063 |

The quantities of major construction works for Phase III Project are as estimated below:

| Item | Unit | Remaining Sections of Pasig River | | | Lower Marikina River |
|---|---|---|---|---|---|
| | | Priority 1 & 2 | Priority 3 | Total | |
| Concrete | $m^3$ | 10,300 | 2,160 | 12,460 | 1,970 |
| Rebar | t | 4,190 | 150 | 4,340 | 70 |
| Structural Excavation | $m^3$ | 37,000 | 1,800 | 38,800 | 6,050 |
| Dredging | $m^3$ | - | - | - | 612,000 |
| Backfill (Common/Sand) | $m^3$ | 43,000 | 7,100 | 50,100 | 1,300 |
| Riprap / Rock fill | $m^3$ | 51,500 | 19,700 | 71,200 | 6,500 |
| Boundary Bank | $m^3$ | - | - | - | 50,100 |

## 6.2 Basic Conditions for Construction Plan

### (1) Climate

The climate at the project area is dominated by rainy season from May to October and dry season for the rest of the months. The total rainfall from May to October accounts for about 80% of the annual rainfall.

### (2) Workable Days

In determining the number of working days available for construction activities, the following factors are considered: Normal workweek, Public Holiday, Rainfall and Type of Construction Activity.

The six (6) working-day per week is adopted. All construction schedules are based on an 8-hour per working day. The 15 holidays consisting of 11 public holiday days and 4 extra non-working holidays are excluded from the working calendars.

The time lost due to rainfall is based on the rainfall data and the number of rainy days on record at the Science Garden, Quezon City for the period 1987-1998. It is recognized that the rain effect varies on different types of construction activities. The schedule of time losses for the key activities due to weather condition is summarized below:

**Average Number of Rainy Days**

| Month | J | F | M | A | M | J | J | A | S | O | N | D | Total No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rainfall Over 10mm | 0.42 | 0.25 | 0.42 | 0.92 | 4.33 | 8.00 | 11.92 | 11.92 | 11.33 | 6.25 | 3.50 | 2.75 | 62.00 |
| Rainfall Over 50mm | 0.08 | 0.00 | 0.00 | 0.00 | 0.67 | 1.50 | 2.50 | 2.58 | 2.17 | 1.42 | 0.42 | 0.33 | 11.67 |
| | Source : Science Garden, PAGASA (1987-1999) | | | | | | | | | | | | |

The total number of working days for different activities is estimated as shown in the following table:

**Workable Days**

| Work Item | Sunday | Public Holiday | Rainy day on Weekday | Suspension Day due to Rain | Workable Day |
|---|---|---|---|---|---|
| Structural Excavation | 52 | 15 | 51 | 12 | 235 |
| Dredging | 52 | 15 | 51 | | 247 |
| Embankment/Backfill | 52 | 15 | 51 | 12 | 235 |
| Concrete Works | 52 | 15 | 51 | | 247 |
| Revetment Works | 52 | 15 | 51 | | 247 |
| Repair Works | 52 | 15 | 51 | | 247 |
| Drainage Works | 52 | 15 | 51 | 12 | 235 |

### (3) Access to Construction Site

In the works, there are difficulties in approaching from landside due to house congested area. Based on the ongoing Phase II, most of the works are approached from river side because of the above problem. In the Lower Marikina River, most of construction sites have not enough width of access roads. Therefore, construction will be approached from river side.

## 6.3 Resources for Construction

(1) Labor

All classes of labor identified above are available in Metro Manila and surrounding areas.

(2) Reinforcing Bar

Reinforcing bars are available in the local market.

(3) Ready-Mixed Concrete

Basically, ready-mixed concrete is available within Metro Manila.

(4) Earth Filling Materials

Filling or backfilling materials are purchased in Metro Manila or its suburb.

(5) Rock Materials

Rock materials are used for riprap, wet stone masonry and repair of existing flood dike. Suppliers for small volume works can be found easily in Metro Manila. Big volume of rocks is available/ transportable from Bataan area, which is 50 km from the construction site.

(6) Imported Materials

Materials of steel sheet piles for revetment and H-beam are imported from Japan to satisfy the STEP Loan requirement. In addition, flap gates to be installed at designated drainage outlets will be imported from Japan to insure the quality and durability. Geo-textile bag for re-use of dredged material is also imported from Japan.

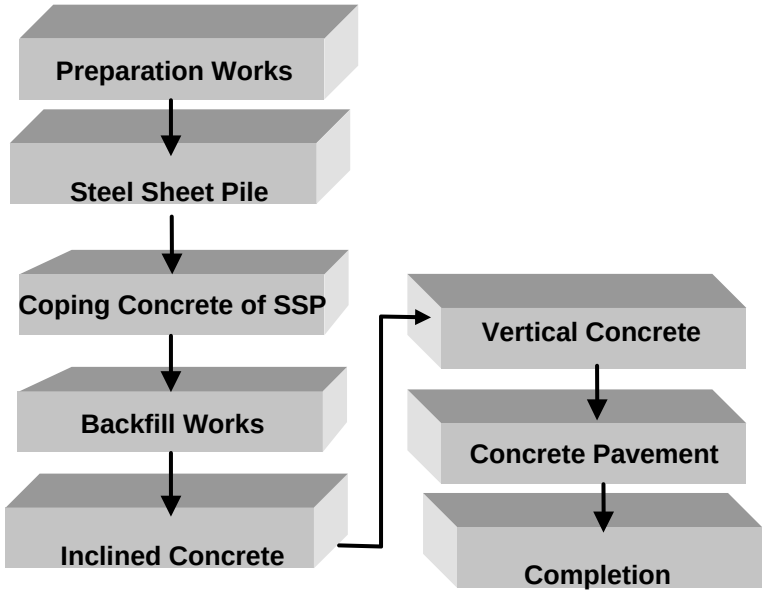
(7) Construction Equipment

The major categories of equipment required for the works are locally available or brought from Japan:

- Earthmoving equipment (backhoe, dredger, barges/tugboat, dump trucks, etc.).
- Pile driving (crawler crane, vibro-hammer with waterjet, generator, truck crane, barge/tugboat for on-water works, etc.).
- Equipment for concrete works (Concrete pump, transit mixer, vibrator, etc.)
- Equipment for Treatment of Dredged Material (Plant for Pre-mix Method for Solidification of Dredged Material)

## 6.4 Construction Method

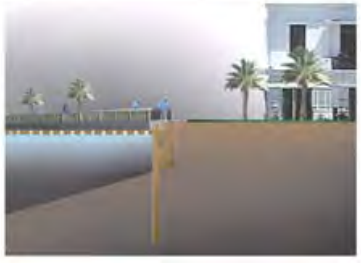
### (1) Revetment Works




For Steel Sheet Pile type Revetment, piling work is basically executed from the riverside. After piling works, formworks and reinforcing bars for coping concrete of sheet pile are installed. Sequentially, backfilling works and inclined wall concrete works with rebar installation follows.

1. Steel Sheet Pile (SSP) Piling

2. Backfill of Soil
3. Cover Concrete



4. Compacting of Soil
5. Concrete Pavement and Parapet Wall
6. Hand Railing

### (2) Dredging Work

In the construction works of Lower Marikina River, dredging works is dominant. There are three (3) steps for considering the dredging works, such as dredging method, hauling and disposal area.

a) Dredging Method

Based the sampling results of D/D, dredging materials is dominant by silt and loose sand. it is proposed to use grab-dredging for top layer and pump-dredging for bottom layer.

b) Hauling Plan

Hauling the dredging soil to the disposal area has two options: by land or by barge. Hauling on land will bring about the mess of transportation in the urban area and dump truck allows only operating in the night time which will limited the implementation time schedule. Beside, it might be expected during the transportation, dust and smell of water which come out from dredging materials.

By considering the social environmental, transportation by barge is recommendable. Moreover, it is proposed to conduct improvement of dredging soil in order to reduce the transportation volume and re-use at site as much as possible.

c) Disposal Area

In the D/D, disposal sites were studied to accommodate excavated materials. There is an option for dumping the dredging materials to the offshore of Manila Bay (about 100 km distance). But this option was not feasible for the Project, due to high cost, unclear factor of sea weather and needed longer construction time. It is proposed that solidified dredged soil be dumped on the low-land area of indentified disposal area near the Laguna Lakeshore Road-Dike in Taguig.

On the other hand, it is required to examine the dredged soil quality before implementation of dumping dredging soil to the disposal site.

(3) Re-use of Dredged Material

Dredged materials will be re-used for embankment materials of proposed Dike and Boundary Bank by means of geo-textiles bag methods. With this method, it enables to dewater and reinforce high water-content soil. This method gives easy workability and control the times for self-weight consolidation of the soil.

## 6.5 Construction Schedule

| Work Item | Unit | Working Days Required | Remarks |
|---|---|---|---|
| SSP Revetment | 50 m Span | 20 days | SSP, Coping Concrete Works |
| River Wall | 50 m Span | 15 days | Reinforce concrete work with backfill |
| Dredging | 1,000 $m^3$ | 1 day | 612,000 $m^3$ in total |

**Summary of Construction Schedule**

| Activity | | Period | Remarks |
|---|---|---|---|
| Preliminary and General | Mobilization | 5 months | |
| | Survey and Investigation | | Incl. reconfirmation of bank and subsoil conditions |
| Revetment, Floodwall and Dredging Works | | 30 months | Critical Path |
| Drainage Works | | | Depending on River Works |
| Preliminary and General | Demobilization | 1 months | |
| | Site Clean-up | | |
| Total Construction Period | | 36 months | 3 Years |

## 6.6 Cost Estimate

### 6.6.1 General

The works of Cost Estimates has been carried out for updating the results of review detailed design of Phase II (on-going Project) conducted in 2008 and for accommodating the costs arising from the revised plan under consideration as below;

- Fluctuation of labor rates, material unit prices, and equipment rental charges.
- Changes in the Bill of Quantities due to the revision of design.
- Labor and Equipment productivity based on the current status of project site.

### 6.6.2 Basic Condition of the Cost Estimates

(1) Price Level and Exchange Rate

The cost estimates have been updated on the price levels as of December 2010.

1.0 Peso = 1.905 Yen (1.0 US$ = 84.16 Yen = 44.178 Pesos)

(2) Classification of Foreign and Local Portions

The following conditions for the classification of foreign and local currency portions are applied in the cost estimates:

(a) Local portion:

- All Labor Costs,
- Part of operation cost of construction equipment,
- Part of construction material costs,
- Value Added Tax,
- Development of relocation site and compensation costs,
- All costs of administration for the government staff, and
- Cost of engineering services by local experts/staff

(b) Foreign portion:

- Part of operation costs of equipment,
- Part of construction material costs,
- Costs of engineering services by foreign experts.

**Foreign and Local Portions of Cost**

| Description | Foreign Portion (%) | Local Portion (%) |
|---|---|---|
| 1. Labor | 0 | 100 |
| 2. Construction Equipment | 70 | 30 |
| 3. Construction Materials | | |
| 3.1 Oil/Lubricant | 70 | 30 |
| 3.2 Woods/Stones/Sand | 40 | 60 |
| 3.3 Cement/Concrete | 70 | 30 |
| 3.4 Metal Products | 80 | 20 |
| 3.5 Chemical Products | 90 | 10 |

### 6.6.3 Unit Cost Analysis

#### (1) Construction Unit Cost

Costs for the construction works are estimated on a unit price basis except some lump sum and provisional sum items. Unit prices consist of direct cost of equipment, materials and labor, indirect cost including overhead expenses, unforeseen contingencies, miscellaneous expenditures and Contractor's profit and Value Added Tax. Composition of the unit price is as follows:

(a) Direct Cost

Direct Cost constituted three component items: labor cost, material cost and equipment cost.

i) Labor Cost

The labor rates are estimated based on the minimum labor rate approved by the Department of Labor and Employment (DOLE), NCR. The Labor wages used in the cost estimates includes leave, bonus, social security system (SSS), Philhealth, Pag-ibig Fund, and all other mandatory benefits, all in accordance with the Labor Code of the Philippines, edition 2000 (latest).

The updated Labor rates based from the prescribed minimum wage are 11.2 % higher than the prescribed rates used during the Review Detailed Design in 2008.

ii) Material Cost

The allowances for waste and inventory loss of materials are estimated in terms of percentage of quantities as follows; 3% for cement, 5% for processed Material and 3% for re-bars and 5% for others.

Construction Material Prices escalation from the Construction Materials Wholesale Index in the National Capital Region is also a reference.

Based merely from the fluctuation of material unit prices, there is increased of 10.0 % compared from the Review of Detailed Design in 2008.

iii) Equipment Cost

The hourly-operated rental rates issued by the Association of Carriers and Equipment Lessors (ACEL), Inc. on 2006, edition 23, are applied for the construction plant and equipment rental rates for the unit price analysis. The rental rates include operating cost of equipment, i.e. operator's wage, spare parts, repair, fuel and lubricants.

As for special equipment and machinery, such as water-jet machine and drilling equipment for hard soil strata, their operation costs has been estimated in accordance with "depreciation estimate table of construction machinery and equipment - edition 2008 - by Japan Construction Mechanization Association (JCMA).

(b) Indirect Cost

The contractor's indirect expenses are fixed at 16% of the direct cost of works in each unit cost. This percentage is rated within the range instructed in the DPWH's Department Order No. 57, series of 2002.

The indirect cost covers the following:

(c) Value Added Tax

Value Added Tax (VAT) is computed as 12% of the Estimated Direct Cost (EDC) and Overhead, Profit and Contingencies (OPC), as mandated in the DPWH Department Order #57, series 2002.

**(2) General and Temporary Works**

Mobilization and demobilization, contractor's facilities, experimental equipment and site clearing will be applied the same ratio between civil works and each items of ongoing Phase II Project.

### 6.6.4 Component of Project Cost

The Project Cost consists of the following:

| | | |
|---|---|---|
| (1) Main Construction Cost | : | Estimated by unit cost analysis. |
| (2) Cost for Engineering Services | : | Estimated by cost breakdown. |
| (3) Compensation Cost | : | Estimated by cost breakdown. Compensation for structures of affected families, etc. No land acquisition required. |
| (4) Administrative Expenses | : | 3.5% of costs of main construction, engineering services and compensation. |

(5) Price Contingency : Annual 1.8% of costs of foreign portions of main construction cost and engineering services. Also, 6.9% of costs of local portions of main construction cost, engineering services, compensation and administrative expenses.

(6) Physical Contingency : 5% of costs of main construction cost, engineering services, compensation, and their price contingency. Since escalation of 1.8% and 6.9% per annum is on projection only, physical contingency is deemed to be necessary for price contingency.

### 6.6.5 Estimated Project Cost

#### (1) Total Project Cost

The Project Cost for the improvement of Lower Marikina River Channel and all remaining sections (Priority 1, 2 and 3) of Pasig River are estimated as follows:

**Total Project Cost for Phase III Project**

(All Remaining Section of Pasig River + Lower Marikina River)

(in Million Pesos)

| ITEMS | | F.C. | L.C. | | | TOTAL |
|---|---|---|---|---|---|---|
| | | | L.C. | VAT | SUB-TOTAL | |
| 1 | Civil Works | 2,888.00 | 2,103.00 | 598.92 | 2,701.92 | 5,589.92 |
| 2 | Consulting Services | 300.04 | 249.56 | 15.02 | 264.58 | 564.62 |
| 3 | Compensation | - | 17.40 | - | 17.40 | 17.40 |
| 4 | Administration | - | 194.54 | - | 194.54 | 194.54 |
| | **Sub-Total (1 to 4)** | **3,188.04** | **2,564.50** | **613.94** | **3,178.44** | **6,366.48** |
| 5 | Price Contingency | 262.22 | 883.84 | 126.54 | 1,010.38 | 1,272.60 |
| 6 | Physical Contingency | 172.52 | 159.33 | 37.76 | 197.09 | 369.61 |
| | **Sub-Total (5 & 6)** | **434.74** | **1,043.17** | **164.30** | **1,207.47** | **1,642.21** |
| | **Total for Phase III Project** | **3,622.78** | **3,607.67** | **778.24** | **4,385.91** | **8,008.69** |

Note:

1) Price Level : as of December 2010
2) Exchange Rate : 1 Peso = 1.905 Yen
3) Price Contingency for Items 1, 2, 3, and 4 : 1.8 % of F.C. and 6.9 % of L.C.
4) Physical Contingency : 5.0 % (of Base Cost & Price Contingency)
5) Administration Cost for 1, 2 and 3 : 3.5 %
6) Taxes : 12% VAT.

#### (2) Annual Disbursement Schedule

In accordance with the Implementation Schedule, annual disbursement schedule is shown in the following table for the above estimated Project Cost.

## Annual Disbursement Schedule of Phase III Project

(Unit: Million Pesos)

| Year | Total | | | | | 2012 | | | | 2013 | | | | 2014 | | | | 2015 | | | | 2016 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Work Items | L.C. | F.C. | Sub-total (excl. Tax) | VAT | Total | L.C. | F.C. | VAT | TOTAL | L.C. | F.C. | VAT | TOTAL | L.C. | F.C. | VAT | TOTAL | L.C. | F.C. | VAT | TOTAL | L.C. | F.C. | VAT | TOTAL |
| A Main Construction Cost | 2,987.11 | 3,286.17 | 6,273.28 | 752.78 | 7,026.06 | | | | | 450.23 | 535.03 | 118.23 | 1,103.49 | 962.58 | 1,087.07 | 245.95 | 2,295.60 | 1,029.00 | 1,106.64 | 256.27 | 2,391.91 | 545.30 | 557.43 | 132.33 | 1,235.06 |
| 1. Base Cost | 2,103.00 | 2,888.00 | 4,991.00 | 598.92 | 5,589.92 | | | | | 351.00 | 483.00 | 100.08 | 934.08 | 702.00 | 964.00 | 199.92 | 1,865.92 | 702.00 | 964.00 | 199.92 | 1,865.92 | 348.00 | 477.00 | 99.00 | 924.00 |
| Phase II | 766.00 | 2,419.00 | 3,185.00 | 382.20 | 3,567.20 | | | | | 128.00 | 404.00 | 63.84 | 595.84 | 256.00 | 807.00 | 127.56 | 1,190.56 | 256.00 | 807.00 | 127.56 | 1,190.56 | 126.00 | 401.00 | 63.24 | 590.24 |
| Phase III | 1,337.00 | 469.00 | 1,806.00 | 216.72 | 2,022.72 | | | | | 223.00 | 79.00 | 36.24 | 338.24 | 446.00 | 157.00 | 72.36 | 675.36 | 446.00 | 157.00 | 72.36 | 675.36 | 222.00 | 76.00 | 35.76 | 333.76 |
| 2. Price Contingency | 741.86 | 241.68 | 983.54 | 118.02 | 1,101.56 | | | | | 77.79 | 26.55 | 12.52 | 116.86 | 214.74 | 71.30 | 34.32 | 320.36 | 278.00 | 89.94 | 44.15 | 412.09 | 171.33 | 53.89 | 27.03 | 252.25 |
| 3. Physical Contingency | 142.25 | 156.49 | 298.74 | 35.84 | 334.58 | | | | | 21.44 | 25.48 | 5.63 | 52.55 | 45.84 | 51.77 | 11.71 | 109.32 | 49.00 | 52.70 | 12.20 | 113.90 | 25.97 | 26.54 | 6.30 | 58.81 |
| B Engineering Services Cost | 336.48 | 336.61 | 673.09 | 25.46 | 698.55 | 59.89 | 65.30 | 4.20 | 129.39 | 80.03 | 83.09 | 5.88 | 169.00 | 85.55 | 84.59 | 6.54 | 176.68 | 91.46 | 86.11 | 7.25 | 184.82 | 19.55 | 17.52 | 1.59 | 38.66 |
| 1. Base Cost | 249.56 | 300.04 | 549.60 | 15.02 | 564.62 | 49.91 | 60.01 | 3.00 | 112.92 | 62.39 | 75.01 | 3.76 | 141.16 | 62.39 | 75.01 | 3.76 | 141.16 | 62.39 | 75.01 | 3.76 | 141.16 | 12.48 | 15.00 | 0.74 | 28.22 |
| 2. Price Contingency | 70.90 | 20.54 | 91.44 | 8.52 | 99.96 | 7.13 | 2.18 | 0.86 | 10.17 | 13.83 | 4.12 | 1.66 | 19.61 | 19.09 | 5.55 | 2.29 | 26.93 | 24.71 | 7.00 | 2.97 | 34.68 | 6.14 | 1.69 | 0.74 | 8.57 |
| 3. Physical Contingency | 16.02 | 16.03 | 32.05 | 1.92 | 33.97 | 2.85 | 3.11 | 0.34 | 6.30 | 3.81 | 3.96 | 0.46 | 8.23 | 4.07 | 4.03 | 0.49 | 8.59 | 4.36 | 4.10 | 0.52 | 8.98 | 0.93 | 0.83 | 0.11 | 1.87 |
| C Compensation Cost | 22.32 | | 22.32 | | 22.32 | | | | | 22.32 | | | 22.32 | | | | | | | | | | | | |
| 1. Base Cost | 17.40 | | 17.40 | | 17.40 | | | | | 17.40 | | | 17.40 | | | | | | | | | | | | |
| 2. Price Contingency | 3.86 | | 3.86 | | 3.86 | | | | | 3.86 | | | 3.86 | | | | | | | | | | | | |
| 3. Physical Contingency | 1.06 | | 1.06 | | 1.06 | | | | | 1.06 | | | 1.06 | | | | | | | | | | | | |
| D Administration Cost | 261.76 | | 261.76 | | 261.76 | 4.40 | | | 4.40 | 42.28 | | | 42.28 | 82.43 | | | 82.43 | 88.12 | | | 88.12 | 44.53 | | | 44.53 |
| 1. Base Cost | 194.54 | 0.00 | 194.54 | | 194.54 | 3.85 | | | 3.85 | 34.61 | | | 34.61 | 63.12 | | | 63.12 | 63.12 | | | 63.12 | 29.84 | | | 29.84 |
| 2. Price Escalation | 67.22 | | 67.22 | | 67.22 | 0.55 | | | 0.55 | 7.67 | | | 7.67 | 19.31 | | | 19.31 | 25.00 | | | 25.00 | 14.69 | | | 14.69 |
| Total (1. to 6.) | 3,607.67 | 3,622.78 | 7,230.45 | 778.24 | **8,008.69** | 64.29 | | | 133.79 | 594.86 | 618.12 | 124.11 | 1,337.09 | 1,130.56 | 1,171.66 | 252.49 | 2,554.71 | 1,208.58 | 1,192.75 | 263.52 | 2,664.85 | 609.38 | 574.95 | 133.92 | 1,318.25 |

1. Base Year used in estimating cost: December 2010
2. Exchange Rate: Php1 = Jpy1.905
3. Price Escalation: 1.8% p.a. for foreign currency and 6.9% for local currency
4. Physical Contingency: 5% x (Base Cost + Price Escalation)
5. Administration Cost: 3.5% X (Construction Cost + Engineering Services + Compensation Cost)
6. VAT : 12%

# CHAPTER 7 PROJECT EVALUATION OF PHASE III PROJECT

## 7.1 Environmental Evaluation

### 7.1.1 Environmental Compliance Certificate (ECC)

Base on the Environmental Impact Statement (EIS) conducted in 1989, the ECC (ECC-98-NCR-301-9807-128-120) was issued for the Project. Also, the validation was confirmed before the implementation of the Phase II Project through the letter of DENR-EBM dated March 7, 2008.

### 7.1.2 Review of EIS (1998) based on the JICA Guideline for Environmental and Social Considerations Revised in April 2010

The EIS (1998) was reviewed and supplemented as follows based on the JICA Guidelines for Environmental and Social Considerations revised in April 2010.

The assessment matrix developed for the project focuses on negative impacts.

**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. |
| | 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. |
| Natural Environment | 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 | No change in hydrological situation is anticipated during construction phase. |
| | 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 revived over 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. |
| | 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 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 impacted, B: Slight impact, C: Unknown, D: Few impact. — : Not Applicable*<br>*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. | | | | | |

### 7.1.3 Mitigation Measures in Construction of Phase III Project

**Suggested Mitigation Measures for Possible Negative Impacts**

| Items | | | Impact Evaluation (as table above) | 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. |
| | 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 in order to prevent dust from dispersing into the air. |
| | 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 impacted, 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.

## 7.2 Social Evaluation

The lower reaches of the Pasig-Marikina River is the main center of the nation. Offices, buildings, centers and facilities which are economically and politically influential to the whole nation are concentrated along its lower stream. In this respect, flood control and drainage in the area may give invaluable favorable impacts to the country's economic activities and people's living.

Two hundred households of informal settlers will be affected by the Phase III Project. There is no legal dwellers to be affected by the Project. There is no required land acquisition for the Project.

In general, implementation of flood control and drainage projects could exert favorable influence not only on the project site but the whole nation as summarized hereunder, to wit:

**(1) Provision of Social Stability and Encouragement of Economic Activity**

People living in the project area have experienced chronic and repeated floods in the past, as mentioned in the record of floods occurred. It is clear that people in the flood prone areas tremble in flood menace, whoever had experiences in the floods. Besides, the people are exposing themselves to danger of serious public hygiene after the flood disaster.

Owing to the implementation of the flood control project proposed, the people residing in the low-lying area would be able to be relieved from menace of floods. This would result in the emergence and subsequent pervasion of positive mental climate among inhabitants in the area. They could enjoy their living conditions and industrial activities.

**(2) Enhancement of Land Use and Related Business Development**

There are many depression areas in the project area. Some of these urban areas and areas to be developed into residential and industrial zones have been long under the floodwater. Without the proposed flood control, people in the flood prone areas would be discouraged to expand their business in their territories. Then, they might not utilize their land more effectively than the present utilization, in spite of limited urbanized lands in NCR and Rizal Province. On the other hand, once the proposed project would be implemented in the areas, these lands could be utilized more effectively for economic activities.

**(3) Creation of Job Opportunity and Activation of Regional Economy**

The implementation of the proposed project will create opportunities of temporal jobs during the construction period. These temporal workers and some construction materials will be supplied from inside and outside of the area. Moreover, the supporting services and other materials for these construction works are produced in NCR and its surrounding province, Rizal Province. These supporting business results in creating job opportunity and it will contribute to activation of the regional economy.

## 7.3 Economic Evaluation

### 7.3.1 General

An economic evaluation of the proposed project was previously performed as part of Detailed Engineering Design of Pasig-Marikina River Channel Improvement Project using price level of 2001. Therefore, this evaluation is conducted by updating the cost and benefit of the Project.

### 7.3.2 Financial Cost

The project cost is estimated by using the two sources: a) DPWH Budget allocated to Phase II Project and b) cost estimate for Phase III and Phase IV conducted this time.

#### (1) Price Indexes

All the values used previously are fixed at 2010-year price level by using arithmetic means of the following price indexes for corresponding years:

| 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|---|
| 1.60 | 1.56 | 1.51 | 1.41 | 1.27 | 1.17 | 1.14 | 1.06 | 1.06 | 1.00 |

Source: National Statistic Office

i) Consumer Price Index (Metro Manila)

ii) General Wholesale Price Index (Luzon)

iii) Retail Price Index (Metro Manila)

iv) Construction Materials Wholesales Price Index NCR, and

v) Construction Materials Retail Price Index NCR for the corresponding periods.

#### (2) Financial Cost of Phase II (DPWH Budget Allocation)

The budget allocations for Phase II for the period from 2007 to 2012 are as follows:

**Table 7.3.1 Budget Allocation for Phase II**

(in 1,000 Pesos)

| Year | Civil Works | Consultancy Services | ROW | Administration |
|---|---|---|---|---|
| 2007 | 0 | 84,920 | 0 | 3,080 |
| 2008 | 189,744 | 160,570 | 0 | 1,656 |
| 2009 | 449,697 | 50,001 | 92,512 | 0 |
| 2010 | 800,878 | 100,000 | 0 | 25,954 |
| 2011 | 1,108,600 | 18,597 | 0 | 34,863 |
| 2012 | 1,479,289 | 8,259 | 0 | 0 |

All the value of budget allocation for Phase II are converted into the 2010-year price level using the price indexes.

**Table 7.3.2 Budget for Phase II in 2010-Year Price Level**

(in 1,000 Pesos)

| Year | Civil work | Consultancy service | ROW | Administration |
|---|---|---|---|---|
| 2007 | 0 | 94,261 | 0 | 3,419 |
| 2008 | 197,334 | 166,993 | 0 | 1,722 |
| 2009 | 458,691 | 51,001 | 94,362 | 0 |
| 2010 | 800,878 | 100,000 | 0 | 25,954 |
| 2011 | 1,108,600 | 18,597 | 0 | 34,863 |
| 2012 | 1,479,289 | 8,259 | 0 | 0 |

The values of price Escalation were removed from the table.

### (3) Financial Cost of Phase III

**Table 7.3.3 Financial Cost of Phase III**

(in Million Pesos)

| Year | Main Construction Cost | | | Engineering Services Cost | | Compensation Cost | | Administration |
|---|---|---|---|---|---|---|---|---|
| | Pasig River Improv't | Lower Marikina | Physical Contingency | Base Cost | Physical Contingency | Base Cost | Physical Contingency | Base Cost |
| 2012 | | | | 112.9 | 5.8 | | | 3.9 |
| 2013 | 595.8 | 338.2 | 46.7 | 141.2 | 7.2 | 17.4 | 0.9 | 34.6 |
| 2014 | 1,190.6 | 675.4 | 93.3 | 141.2 | 7.2 | | | 63.1 |
| 2015 | 1,190.6 | 675.4 | 93.3 | 141.2 | 7.2 | | | 63.1 |
| 2016 | 590.2 | 333.8 | 46.2 | 28.2 | 1.4 | | | 29.8 |

Note: The values of Price Contingency were removed from the table above.

### (4) Financial Cost of Phase IV

**Table 7.3.4 Financial Cost of Phase IV**

(in Million Pesos)

| Year | Main Construction Cost | | | Engineering Services Cost | | Compensation Cost | | Administratio |
|---|---|---|---|---|---|---|---|---|
| | MCGS | River Improv't | Physical Contingenc | Base Cost | Physical Contingency | Base Cost | Physical Contingency | Base Cost |
| 2017 | | | | 40.8 | 2.0 | 4.0 | 0.2 | 1.5 |
| 2018 | 496.2 | 481.6 | 48.9 | 90.4 | 4.5 | 14.1 | 0.7 | 34.1 |
| 2019 | 744.8 | 720.2 | 73.3 | 115.1 | 5.8 | | | 49.7 |
| 2020 | 744.8 | 720.2 | 73.3 | 115.1 | 5.8 | | | 49.7 |
| 2021 | 744.8 | 720.2 | 73.3 | 135.5 | 7.0 | | | 50.5 |
| 2022 | 243.0 | 235.2 | 23.9 | 44.2 | 2.3 | | | 16.5 |

Note: The values of Price Contingency were removed from the table.

## 7.3.3 Economic Cost

The financial cost of each Phase is subsequently converted to economic values by using the following conversion factors that were derived in the detailed design study in 2002.

**Table 7.3.5 Conversion Factors used in Evaluation in Detailed Design**

| | Cost Category | Financial Cost (Billion Pesos) | Economic Cost(Billion Pesos) | Conversion Factor |
|---|---|---|---|---|
| 1 | Direct Construction Cost | 6.65 | 5.28 | 0.79 |
| | Pasig River Improvement | 2.77 | 2.24 | 0.81 |
| | MCGS | 2.09 | 1.56 | 0.75 |
| | Marikina River Improvement | 1.81 | 1.43 | 0.79 |
| 2 | Compensation | 2.36 | 1.35 | 0.57 |
| 3 | Engineering Service | 1.06 | 1.26 | 1.19 |
| 4 | Government Administration | 0.29 | 0.28 | 0.97 |
| 5 | Physical Contingency | 0.43 | 0.4 | 0.93 |
| 6 | Price Escalation | 1.28 | 0 | 0.00 |
| Total | | 12.07 | 8.58 | 0.71 |

**(1) Economic Cost of Phase II**

**Table 7.3.6 Economic Cost of Phase II**

(in Million Pesos)

| Year | Civil work | Consultancy service | ROW | Administration | Total |
|---|---|---|---|---|---|
| 2007 | 0 | 112 | 0 | 3 | 115 |
| 2008 | 160 | 199 | 0 | 2 | 360 |
| 2009 | 371 | 61 | 54 | 0 | 486 |
| 2010 | 648 | 119 | 0 | 25 | 792 |
| 2011 | 897 | 22 | 0 | 34 | 953 |
| 2012 | 1,197 | 10 | 0 | 0 | 1,207 |

**(2) Economic Cost of Phase III**

**Table 7.3.7 Economic Cost of Phase III**

(in Million Pesos)

| Year | Main Construction Cost | | | Engineering Services Cost | | Compensation Cost | | Administration |
|---|---|---|---|---|---|---|---|---|
| | Pasig River Improv't | Lower Marikina | Physical | Base Cost | Physical | Base Cost | Physical | Base Cost |
| 2012 | | | | 134 | 5 | | | 4 |
| 2013 | 482 | 268 | 44 | 168 | 7 | 10 | 1 | 33 |
| 2014 | 963 | 534 | 87 | 168 | 7 | | | 61 |
| 2015 | 963 | 534 | 87 | 168 | 7 | | | 61 |
| 2016 | 478 | 264 | 43 | 34 | 1 | | | 29 |

**(3) Economic Cost of Phase IV**

**Table 7.3.8 Economic Cost of Phase IV**

(in Million Pesos)

| Year | Main Construction Cost | | | Engineering Services Cost | | Compensation Cost | | Administratio |
|---|---|---|---|---|---|---|---|---|
| | MCGS | River Improv't | Physical Contingenc | Base Cost | Physical Contingency | Base Cost | Physical Contingency | Base Cost |
| 2017 | | | | 49 | 2 | 2 | 0 | 1 |
| 2018 | 371 | 381 | 46 | 108 | 4 | 8 | 1 | 33 |
| 2019 | 556 | 570 | 68 | 137 | 5 | | | 48 |
| 2020 | 556 | 570 | 68 | 137 | 5 | | | 48 |
| 2021 | 556 | 570 | 68 | 166 | 6 | | | 49 |
| 2022 | 182 | 186 | 22 | 55 | 2 | | | 16 |

**(4) Economic Cost of Overall Project**

**Table 7.3.9 Economic Cost of Overall Project**

(in Million Pesos)

| Year | Phase II | Phase III | Phase IV | Total |
|---|---|---|---|---|
| 2007 | 115 | | | 115 |
| 2008 | 360 | | | 360 |
| 2009 | 486 | | | 486 |
| 2010 | 792 | | | 792 |
| 2011 | 953 | | | 953 |
| 2012 | 1,207 | 143 | | 1,350 |
| 2013 | | 1,012 | | 1,012 |
| 2014 | | 1,820 | | 1,820 |
| 2015 | | 1,820 | | 1,820 |
| 2016 | | 848 | | 848 |
| 2017 | | | 54 | 54 |
| 2018 | | | 951 | 951 |
| 2019 | | | 1,384 | 1,384 |
| 2020 | | | 1,384 | 1,384 |
| 2021 | | | 1,415 | 1,415 |
| 2022 | | | 462 | 462 |

### 7.3.4 Costs for Operation/Maintenance and Replacement

(1) Cost for Operation and Maintenance

The maintenance cost is assumed to be equivalent to 0.3% of the total direct construction cost as the same as detailed design in 2002.

(2) Cost for Replacement

The replacement costs of steel gates of MCGS is assumed that it takes place every 15 years after the completion of MCGS at 266 million pesos that was equivalent to 12 % of the MCGS construction cost in accordance with the detailed design in 2002.

### 7.3.5 Estimation Method of Project Benefit

Flood control benefit is generally defined as the reduction of potential flood damage attributed to the designed works. The reduction is obtained as the difference in the estimated flood damage between the "with-" and the "without-project" conditions. For the estimation of the benefit, thus, it is the first step to identify and to qualify potential flood damages in the flood prone area under "without project condition". The flood damages are composed of (1) direct damage, (2) infrastructure damage and (3) indirect damage.

The following are summary of estimation method of benefit applied in the detailed design.

**(1) Direct Damage**

The components of direct damage in this study are selected based on the data available and inventory of existing facilities, as follows:

a) Residential building
b) Manufacturing establishments

c) Wholesale and retail trading establishment
d) Hotel and restaurant
e) Real estate and office building
f) Educational facility
g) Health/Medical facility
h) Agriculture production
i) Other facilities

In terms of building property such as residential and industrial facilities, flood damage is calculated with the formula in general: [unit property value] x [damage rate].

**(2) Infrastructure Damage**

Infrastructure damage has rarely been recorded, although it is usually larger than the damage to building properties and agricultural production. Since the more urbanized area is the smaller ratio, the ratio is set at 0.35.

**(3) Indirect Damage**

The components of indirect damage are selected based on the data available, as follows:

(a) Residence, cleaning away materials damage after inundation
(b) Business losses of private business establishments
(c) Other

After flood, a family has to clean and repair their houses damage by flood. These activities are done by the members of the household in general. Thus, these activities are considered as loss of housekeeping, so their labor cost is estimated as part of flood damages. Its amount is estimated as a product of daily household income multiplying the number of days spent.

After flood, a damaged business establishment is closed to clean, fix and repair its workspace, furniture and equipment damaged by flood, and to clear away inventory stocks damaged. Even after these activities, its business stagnates for a few days after returning to its former state. These losses are considered as business losses. The lost days are proportionate to inundation depth. Its amount is estimated as a product of daily value added of the business establishment multiplying of the number of days closed and stagnated.

Indirect losses included the following activities in general:

(a) Emergency activities: Emergency activities such as evacuation and relief of flood victims are brought about during flooding period and just after the disaster. These activities are usually executed by the public sector or by social welfare society.

(b) Medical care and cure for victims suffering from waterborne diseases because of flood inundation: Even after flood disaster, some victims could suffer from waterborne diseases, since the circumstance of flood prone areas is vulnerable against public hygiene. Then, medical activities are indispensable for these victims.

(c) Prevention activities against crimes: Crimes such as stealing and pilfering in the confusion at the scene of the flood should be prevented in addition to evacuation and relief activities.

In large cities, particularly, the other indirect damage could be sufficient to require inclusion in the flood damage computation. Although the actual computation of the other indirect damages above was not undertaken, it is presumed to be 10% of the direct damage.

**(4) Estimation of Annual Average Benefits (Value in 2001 in D/D)**

The annual damage is calculated applying the following formula, on the basis of the flood damages for the respective probable rainfalls or discharges:

The annual average benefit is defined as the reduction of probable damage under the "with-" and "without-Project" conditions. The project is proposed as flood control scheme for 30-year probable rainfall. The annual benefit in the Project Area is estimated as follows:
The return period of the non-damage case is generally set to 1 year as presented in the table below. However, the estimated return period of Upper Pasig River for the non-damage case was at 1.4 so that the corresponding average annual exceedance probability, expectation, was estimated at 0.21 based on the computation as follows: 1/1.4-1/2=0.21 for the section of river. On the other hand, the estimated return period of Marikina River for the non-damage case was slightly lower than 1.0 so that it was set to 1.0 in this analysis for simplicity.

**Computation of Annual Benefit**

| Return Period | Flood Damage (Million Pesos) W/o Project | W/ Project | Reduction | Average (Million Pesos) | Expectation | Benefit (Million Pesos) |
|---|---|---|---|---|---|---|
| | | | | | 0.50000 | |
| 2 – Year | | | | | | |
| | | | | | 0.30000 | |
| 5 – Year | | | | | | |
| | | | | | 0.10000 | |
| 10 – Year | | | | | | |
| | | | | | 0.05000 | |
| 20 – Year | | | | | | |
| | | | | | 0.01667 | |
| 30 – Year | | | | | | |
| | | | | Total Annual Benefit: | | |

### 7.3.6 Annual Average Benefits (Value in 2010)

The values of the potential damages avoided as a result of the project are updated from the previous detailed design study in 2001 to the current value in 2010. The major changes made in the analysis are 1) a growth rate of housing value, 2) a price index and 3) flood area. On the basis of the update, the benefit of the project is quantified.

**(1) Growth rate of housing value**

The growth rate of housing value was computed by comparing the base unit value of house structure in 2001 and 2010.

**Table 7.3.10 Growth Rate of Housing Value**

| Source | Values (1000 Pesos) | Rate of increase |
|---|---|---|
| Base unit value of house structure in 2001*1 | 130,800 | 1.35 |
| Base unit value of house structure in the preparatory Study in 2010 | 176,919 | |

Source: *1 Page 7-6 , Detailed Engineering Design of Pasig-Marikina River Channel Improvement Project prepared in 2002, Project Evaluation, Volume XV, March 2002

### (2) Price Index

The arithmetic means of price indexes at 1.6 for the period from 2001 to 2010 was adopted for converting the damage values in 2002 to 2010.

### (3) Flood Area

The flood area was also reviewed as part of the study to enable separate estimation of the project benefit of the Pasig River Improvement Project. This is because 1) prioritization of subproject components was performed in the Phase II due to the sharp increase in the steel cost after the detailed engineering design to stay in the project budget and therefore 2) it required the transfer of the unfinished portion of the river protection work in the Phase II to the subsequent Phase III project.

**Table 7.3.11 Estimated Flood Area**

| | | | | Return Period | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 2 | 5 | 10 | 20 | 30 |
| Entire Flood Area | | | | 9.7 | 30.0 | 35.3 | 49.4 | 55.0 |
| | Outside of Project Area | San Juan River | | 1.8 | 3.5 | 3.8 | 4.7 | 4.9 |
| | | Upper Most Marikina | | 6.7 | 7.0 | 7.5 | 7.9 | 8.1 |
| | Pasig Marikina River | | Without | 1.2 | 19.5 | 24.0 | 36.8 | 42.0 |
| | | | With II | 1.0 | 17.9 | 19.5 | 30.9 | 35.4 |
| | | | With III | 0.5 | 1.4 | 16.2 | 29.4 | 34.6 |
| | | | With IV | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | | Pasig River (0-7.1 km) | Without | 0.0 | 0.8 | 2.1 | 3.0 | 3.7 |
| | | | With II | 0.0 | 0.2 | 0.4 | 0.7 | 1.1 |
| | | | With III | 0.0 | 0.0 | 0.0 | 0.0 | 0.9 |
| | | | With IV | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | | Pasig River (7.1-17.1km) | Without | 0.3 | 1.3 | 3.3 | 4.8 | 5.8 |
| | | | With II | 0.1 | 0.3 | 0.6 | 1.2 | 1.8 |
| | | | With III | 0.0 | 0.0 | 0.0 | 1.0 | 1.5 |
| | | | With IV | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | | Lower and Middle Marikina River | Without | 0.9 | 17.3 | 18.5 | 29.0 | 32.5 |
| | | | With II | 0.9 | 17.3 | 18.5 | 29.0 | 32.5 |
| | | | With III | 0.5 | 1.4 | 16.2 | 28.4 | 32.1 |
| | | | With IV | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

Unit: $km^2$

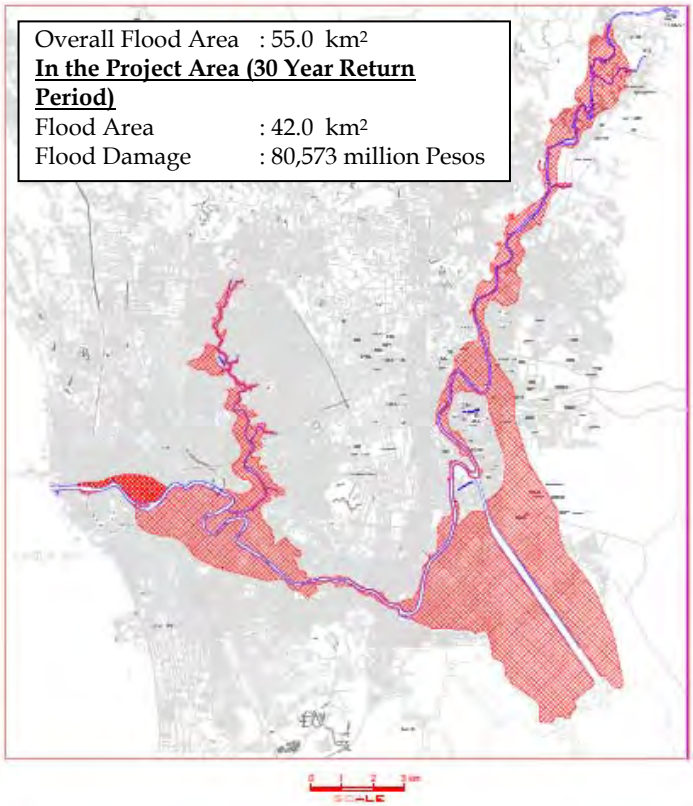



**Figure 7.3.1 Inundation Area without the Project**

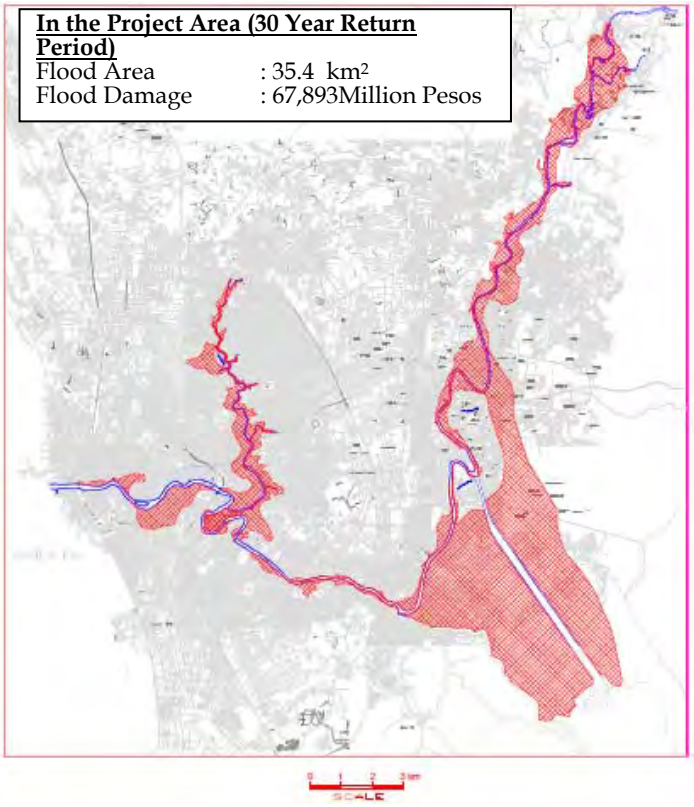



**Figure 7.3.2 Inundation Area with the Project Phase II**

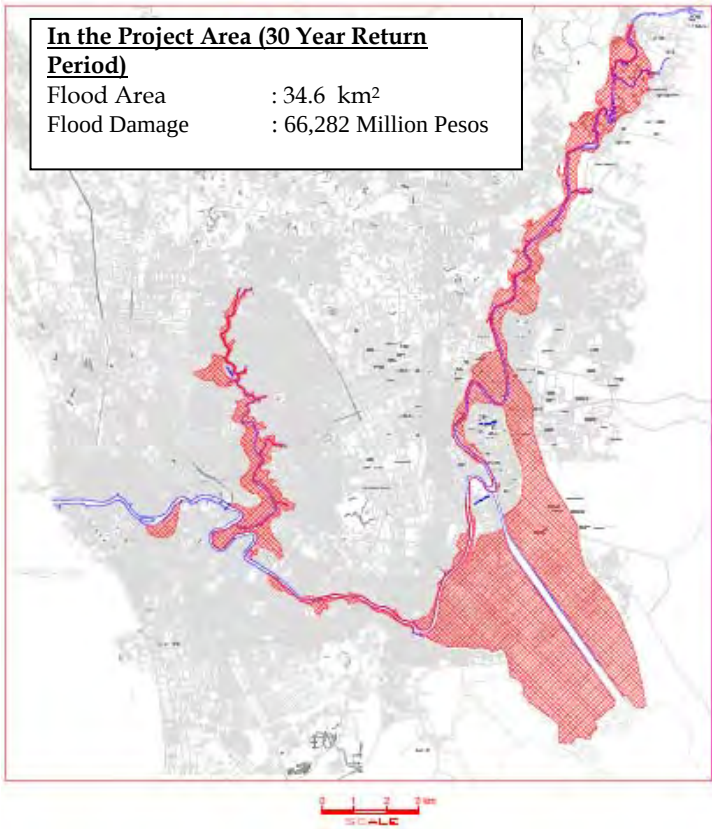



**Figure 7.3.3 Inundation Area with the Project Phase II and III**

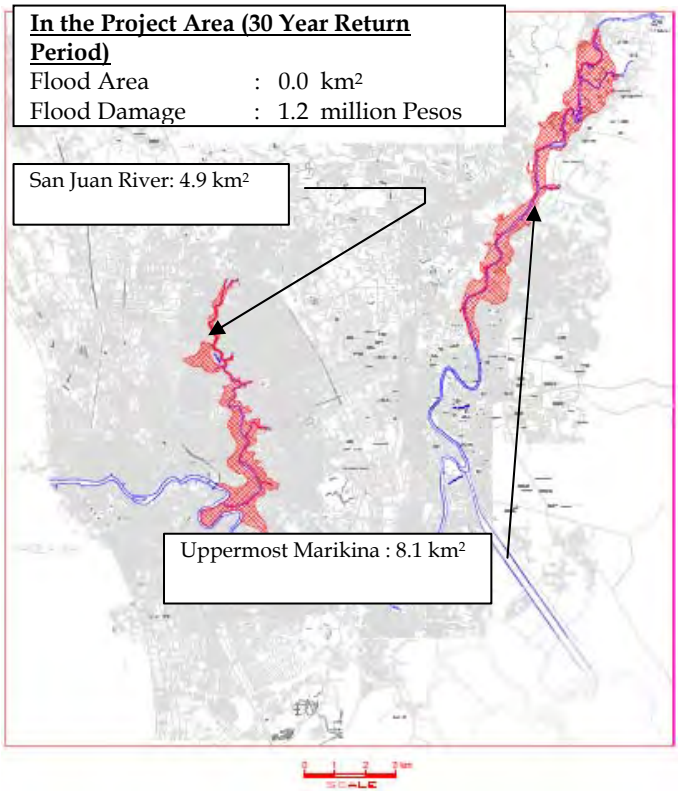



**Figure 7.3.4 Inundation Area with the Overall Project**

### (4) Other conditions

In undertaking the economic analysis, the following assumptions were further laid down in line with the previous study in 2002.

- The project benefit was fully generated upon completion of the structures of the corresponding project component.
- The damages on infrastructure were equivalent to 35 % of total potential damages in property; and other indirect damage were equivalent to 10% of the total direct damages.
- The damage rate of flood remained unchanged.

### (5) Estimation of potential flood damages

On the basis of the potential flood damages estimated for the entire project in 2002, the potential damages in 2010 were computed according to1) a growth rate of housing value and 2) the price index.

**Table 7.3.12 Flood Damages without the Project Case – Overall Project Area (2001)**

| Item | Return Period ( Year ) | | | | |
|---|---|---|---|---|---|
| | 2 | 5 | 10 | 20 | 30 |
| **I. Area Inundated ($km^2$)** | 1.22 | 19.5 | 24.0 | 36.8 | 42.0 |
| **II Estimated Value of Damaged Property (Million Pesos in Economic Terms)** | | | | | |
| 1. Direct Damage | 1,407 | 9,288 | 17,058 | 30,506 | 43,960 |
| (1) Facilities | 1,019 | 6,943 | 12,635 | 22,596 | 32,562 |
| a. Housing Units | 347 | 2,233 | 4,120 | 7,520 | 10,576 |
| b. Manufacturing | 224 | 2,130 | 3,761 | 6,830 | 9,473 |
| c. Wholesale & Retail Trade | 214 | 1,338 | 2,581 | 4,368 | 6,918 |
| d. Hotels & Restaurants | 27 | 110 | 174 | 319 | 467 |
| e. Real Estate & Offices | 32 | 170 | 307 | 548 | 792 |
| f. Education | 36 | 203 | 356 | 627 | 899 |
| g. Health | 117 | 630 | 1,087 | 1,945 | 2,798 |
| h. Other Facilities | 22 | 130 | 248 | 439 | 640 |
| (2) Agricultural Production | 0 | 0 | 0 | 1 | 1 |
| a. Irrigated Field | 0 | 0 | 0 | 1 | 1 |
| b. Rainfed Field | 0 | 0 | 0 | 0 | 0 |
| (3) Infrastructure | 388 | 2,344 | 4,422 | 7,909 | 11,397 |
| 2. Indirect Damage | 295 | 1,883 | 3,460 | 6,197 | 8,826 |
| (1) Household | 97 | 606 | 1,135 | 2,074 | 2,962 |
| (2) Business Losses | 48 | 373 | 618 | 1,072 | 1,469 |
| (3) Other Damages | 150 | 904 | 1,706 | 3,051 | 4,396 |
| 3. Total | 1,702 | 11,171 | 20,517 | 36,702 | 52,786 |

Source: The values in 2001were drawn from the report of Detailed Engineering Design of Pasig-Marikina River Channel Improvement Project prepared in 2002, Project Evaluation, Volume XV, March 2002,
Unit: Million Pesos

**Table 7.3.13 Flood Damages without the Project Case – Entire Project Area (2010)**

| Item | Return Period ( Year ) | | | | |
|---|---|---|---|---|---|
| | 2 | 5 | 10 | 20 | 30 |
| **I. Area Inundated ($km^2$)** | 1.22 | 19.5 | 24.0 | 36.8 | 42.0 |
| **II Estimated Value of Damaged Property (Million Pesos in Economic Terms)** | | | | | |
| 1. Direct Damage | 2,085 | 14,253 | 25,917 | 46,298 | 66,804 |
| (1) Property | 1,545 | 10,557 | 19,197 | 34,294 | 49,483 |
| a. Housing Units | 470 | 3,020 | 5,573 | 10,172 | 14,305 |
| b. Manufacturing | 358 | 3,408 | 6,018 | 10,928 | 15,156 |
| c. Wholesale & Retail Trade | 343 | 2,141 | 4,130 | 6,989 | 11,069 |
| d. Hotels & Restaurants | 42 | 176 | 279 | 510 | 747 |
| e. Real Estate & Offices | 51 | 271 | 491 | 878 | 1,267 |
| f. Education | 57 | 325 | 570 | 1,003 | 1,438 |
| g. Health | 188 | 1,008 | 1,740 | 3,112 | 4,476 |
| h. Other Facilities | 35 | 208 | 397 | 703 | 1,025 |
| (2) Agricultural Production | 0 | 1 | 1 | 1 | 1 |
| a. Irrigated Field | 0 | 1 | 1 | 1 | 1 |
| b. Rainfed Field | 0 | 0 | 0 | 0 | 0 |
| (3) Infrastructure | 541 | 3,695 | 6,719 | 12,003 | 17,319 |
| 2. Indirect Damage | 441 | 2,991 | 5,398 | 9,664 | 13,769 |
| (1) Household | 155 | 970 | 1,817 | 3,318 | 4,739 |
| (2) Business Losses | 78 | 596 | 990 | 1,715 | 2,350 |
| (3) Other Damages | 209 | 1,425 | 2,592 | 4,630 | 6,680 |
| 3. Total | 2,526 | 17,244 | 31,314 | 55,961 | 80,573 |

Unit: Million Pesos

The damages of each section of the waterbody with and without the project cases were subsequently computed according to the estimated flood area. For example, the estimated flood damages of the Lower Pasig River without the Project and with the Project Phase III were presented below.

## Table 7.3.14 Flood Damages - Lower Pasig River Without Phase III

Unit: Million Pesos

| Item | | Return Period ( Year ) | | | | |
|---|---|---|---|---|---|---|
| | | 2 | 5 | 10 | 20 | 30 |
| **I.** | **Area Inundated ($km^2$)** | 0.00 | 0.20 | 0.36 | 0.74 | 1.12 |
| **II.** | **Estimated Value of Damaged Property (Million Pesos in Economic Terms)** | | | | | |
| 1. | Direct Damage | 0 | 146 | 389 | 930 | 1,781 |
| (1) | Property | 0 | 108 | 288 | 689 | 1,319 |
| a. | Housing Units | 0 | 31 | 84 | 204 | 381 |
| b. | Manufacturing | 0 | 35 | 90 | 220 | 404 |
| c. | Wholesale & Retail Trade | 0 | 22 | 62 | 140 | 295 |
| d. | Hotels & Restaurants | 0 | 2 | 4 | 10 | 20 |
| e. | Real Estate & Offices | 0 | 3 | 7 | 18 | 34 |
| f. | Education | 0 | 3 | 9 | 20 | 38 |
| g. | Health | 0 | 10 | 26 | 63 | 119 |
| h. | Other Facilities | 0 | 2 | 6 | 14 | 27 |
| (2) | Agricultural Production | 0 | 0 | 0 | 0 | 0 |
| a. | Irrigated Field | 0 | 0 | 0 | 0 | 0 |
| b. | Rainfed Field | 0 | 0 | 0 | 0 | 0 |
| (3) | Infrastructure | 0 | 38 | 101 | 241 | 462 |
| 2. | Indirect Damage | 0 | 31 | 81 | 194 | 367 |
| (1) | Household | 0 | 10 | 27 | 67 | 126 |
| (2) | Business Losses | 0 | 6 | 15 | 34 | 63 |
| (3) | Other Damages | 0 | 15 | 39 | 93 | 178 |
| 3. | Total | 0 | 177 | 470 | 1,124 | 2,148 |

## Table 7.3.15 Flood Damages - Lower Pasig River With Phase III

Unit: Million Pesos

| Item | | Return Period ( Year ) | | | | |
|---|---|---|---|---|---|---|
| | | 2 | 5 | 10 | 20 | 30 |
| **I.** | **Area Inundated ($km^2$)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.94 |
| **II.** | **Estimated Value of Damaged Property (Million Pesos in Economic Terms)** | | | | | |
| 1. | Direct Damage | 0 | 0 | 0 | 0 | 1,495 |
| (1) | Property | 0 | 0 | 0 | 0 | 1,107 |
| a. | Housing Units | 0 | 0 | 0 | 0 | 320 |
| b. | Manufacturing | 0 | 0 | 0 | 0 | 339 |
| c. | Wholesale & Retail Trade | 0 | 0 | 0 | 0 | 248 |
| d. | Hotels & Restaurants | 0 | 0 | 0 | 0 | 17 |
| e. | Real Estate & Offices | 0 | 0 | 0 | 0 | 28 |
| f. | Education | 0 | 0 | 0 | 0 | 32 |
| g. | Health | 0 | 0 | 0 | 0 | 100 |
| h. | Other Facilities | 0 | 0 | 0 | 0 | 23 |
| (2) | Agricultural Production | 0 | 0 | 0 | 0 | 0 |
| a. | Irrigated Field | 0 | 0 | 0 | 0 | 0 |
| b. | Rainfed Field | 0 | 0 | 0 | 0 | 0 |
| (3) | Infrastructure | 0 | 0 | 0 | 0 | 388 |
| 2. | Indirect Damage | 0 | 0 | 0 | 0 | 308 |
| (1) | Household | 0 | 0 | 0 | 0 | 106 |
| (2) | Business Losses | 0 | 0 | 0 | 0 | 53 |
| (3) | Other Damages | 0 | 0 | 0 | 0 | 150 |
| 3. | Total | 0 | 0 | 0 | 0 | 1,803 |

### (6) Estimation of Benefit

On the basis of the above computation on flood damages, the benefit of the projects is estimated as follows:

**Table 7.3.16 Benefit Estimation Pasig River Phase III**

Unit: Million Pesos

| River | Return Period | Damages | | Avoided Damages | Average Damages Avoided | Average Annual Exceedance Probability | Annual average damage | Sum of the damages |
|---|---|---|---|---|---|---|---|---|
| | | Without | With | | | | | |
| Pasig Downstream | 2 | 0 | 0 | 0 | 0 | - | 0 | 0 |
| | 5 | 177 | 0 | 177 | 89 | 0.30 | 27 | 27 |
| | 10 | 470 | 0 | 470 | 324 | 0.10 | 32 | 59 |
| | 20 | 1,124 | 0 | 1,124 | 797 | 0.05 | 40 | 99 |
| | 30 | 2,148 | 1,803 | 345 | 735 | 0.02 | 12 | 111 |
| Pasig Upstream | 1.4 | 0 | 0 | 0 | 0 | - | 0 | 0 |
| | 2 | 104 | 0 | 104 | 52 | 0.21 | 11 | 11 |
| | 5 | 283 | 0 | 283 | 193 | 0.30 | 58 | 69 |
| | 10 | 744 | 0 | 744 | 514 | 0.10 | 51 | 121 |
| | 20 | 1,778 | 1,520 | 258 | 501 | 0.05 | 25 | 146 |
| | 30 | 3,395 | 2,877 | 518 | 388 | 0.02 | 6 | 152 |
| Marikina | 1 | 0 | 0 | 0 | 0 | - | 0 | 0 |
| | 2 | 1,904 | 1,116 | 788 | 394 | 0.50 | 197 | 197 |
| | 5 | 15,349 | 1,201 | 14,148 | 7,468 | 0.30 | 2,240 | 2,437 |
| | 10 | 24,222 | 21,130 | 3,092 | 8,620 | 0.10 | 862 | 3,299 |
| | 20 | 44,094 | 43,182 | 912 | 2,002 | 0.05 | 100 | 3,399 |
| | 30 | 62,349 | 61,601 | 748 | 830 | 0.02 | 14 | 3,413 |
| Sum of the above | 2 | 2,008 | 1,116 | 892 | 446 | - | 208 | 208 |
| | 5 | 15,809 | 1,201 | 14,608 | 7,750 | 0.30 | 2,325 | 2,533 |
| | 10 | 25,437 | 21,130 | 4,307 | 9,458 | 0.10 | 946 | 3,479 |
| | 20 | 46,996 | 44,702 | 2,294 | 3,301 | 0.05 | 165 | 3,644 |
| | 30 | 67,893 | 66,282 | 1,611 | 1,953 | 0.02 | 33 | 3,676 |

The benefit of the Phase II ,the summation of the annual average damage, is thus estimated at 3,676 million peso/year.

The estimated return period of Upper Pasig River for the non-damage case was at 1.4 so that the corresponding average annual exceedance probability was estimated at 0.21 based on the computation as follows: 1/1.4-1/2=0.21 for the section of river. On the other hand, the estimated return period of Marikina River for the non-damage case was slightly lower than 1.0 so that it was set to 1.0 in this analysis for simplicity.

### (7) Summary of Benefit Estimated

The estimated benefit of each project component is presented in the table below.

**Table 7.3.17 Benefit Estimation for each of the Project Component in 2010**

| | Benefit (Million Pesos) |
|---|---|
| Phase II | 1,265 |
| Phase III | 3,676 |
| Phase IV | 4,314 |
| Overall Project | 9,256 |

### 7.3.7 Economic Analysis

The economic internal rate of return (EIRR) of the project is presented below (refer to Tables 7.3.22 to 7.3.25). All the projects were judged economically viable.

**Table 7.3.18 Economic Analysis**

| Project | EIRR | NPV@15% | B/C |
|---|---|---|---|
| Phase II | 22% | 1,477 | 1.7 |
| Phase III | 37% | 4,266 | 3.4 |
| Phase IV | 36% | 2,220 | 3.6 |
| Overall Project | 29% | 7,964 | 2.7 |

The analysis of the projects was conducted for the period until 2066 with an assumption of 50-years project life after the completion of the Phase III's civil work in 2016.

### 7.3.8 Sensitivity Analysis

The sensitivity analysis indicated that the projects are less sensitive to an increase in investment costs or a decrease in benefit. The cost overrun at 20 % and benefit reduction at 20% pushed down the EIRR of any of the project components. However they are, nonetheless, still well over the threshold of the designated social discount rate.

**Table 7.3.19 Sensitivity Analysis - 20% Cost Overrun**

| Project Components | EIRR | NPV Million Pesos Discounted @15% | B/C ratio (@15%) |
|---|---|---|---|
| Phase II | 20% | 1,044 | 1.4 |
| Phase III | 33% | 3,909 | 2.8 |
| Phase IV | 32% | 2,051 | 3.0 |
| Entire Project | 26% | 7,003 | 2.2 |

**Table 7.3.20 Sensitivity Analysis - 20% Reduction in Benefit**

| Project Components | EIRR | NPV Million Pesos Discounted @15% | B/C ratio (@15%) |
|---|---|---|---|
| Phase II | 19% | 748 | 1.3 |
| Phase III | 32% | 3,056 | 2.7 |
| Phase IV | 31% | 1,607 | 2.9 |
| Overall Project | 25% | 5,411 | 2.1 |

An additional sensitivity analysis was conducted to see the impact of cost overrun on the project viability. The result of the analysis indicated that the economic viability was maintained even with the overall cost increase at more than 35 %.

**Table 7.3.21 Sensitivity Analysis – 35% Cost Overrun**

| Project Components | EIRR | NPV Million Pesos Discounted @15% | B/C ratio (@15%) |
|---|---|---|---|
| Phase II | 18% | 718 | 1.2 |
| Phase III | 30% | 3,641 | 2.5 |
| Phase IV | 30% | 1,924 | 2.7 |
| Overall Project | 24% | 6,283 | 2.0 |

## Table 7.3.22 Cost Benefit Analysis (Phase II)

| Year | Cost | | | | | | Benefit | Net Benefit |
|---|---|---|---|---|---|---|---|---|
| | Civil work | Consultancy service | ROW | Construction MNG | Maintenance Cost | Total | | |
| 2007 | 0 | 112 | 0 | 3 | 0 | 115 | 0 | -115 |
| 2008 | 160 | 199 | 0 | 2 | 0 | 360 | 0 | -360 |
| 2009 | 371 | 61 | 54 | 0 | 0 | 486 | 0 | -486 |
| 2010 | 648 | 119 | 0 | 25 | 0 | 792 | 0 | -792 |
| 2011 | 897 | 22 | 0 | 34 | 0 | 953 | 0 | -953 |
| 2012 | 1,197 | 10 | 0 | 0 | 0 | 1,207 | 0 | -1,207 |
| 2013 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2014 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2015 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2016 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2017 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2018 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2019 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2020 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2021 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2022 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2023 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2024 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2025 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2026 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2027 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2028 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2029 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2030 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2031 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2032 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2033 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2034 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2035 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2036 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2037 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2038 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2039 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2040 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2041 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2042 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2043 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2044 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2045 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2046 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2047 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2048 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2049 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2050 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2051 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2052 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2053 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2054 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2055 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2056 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2057 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2058 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2059 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2060 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2061 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2062 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2063 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2064 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2065 | | | | | 10 | 10 | 1,265 | 1,256 |
| 2066 | | | | | 10 | 10 | 1,265 | 1,256 |

| EIRR | NPV | B/C |
|---|---|---|
| 22% | 1,477 | 1.7 |

## Table 7.3.23 Cost Benefit Analysis (Phase III)

| Year | Cost | | | | | | | | | | Benefit | Net Benefit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Main Construction Cost | | | Engineering Services Cost | | Compensation Cost | | Admin Cost | Maintenance Cost | Total Cost | | |
| | Potentail Area | Lower Marikina | Physical Contingency | Base Cost | Physical Contingency | Base Cost | Physical Contingency | Base Cost | | | | |
| 2007 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | 0 |
| 2008 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | 0 |
| 2009 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | 0 |
| 2010 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | 0 |
| 2011 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | 0 |
| 2012 | 0.0 | 0.0 | 0.0 | 134.3 | 5.4 | 0.0 | 0.0 | 3.7 | 0.0 | 143.4 | 0 | -143 |
| 2013 | 482.0 | 267.5 | 43.5 | 167.8 | 6.7 | 10.0 | 0.8 | 33.4 | 0.0 | 1,011.9 | 0 | -1,012 |
| 2014 | 963.2 | 534.2 | 86.9 | 167.8 | 6.7 | 0.0 | 0.0 | 61.0 | 0.0 | 1,819.8 | 0 | -1,820 |
| 2015 | 963.2 | 534.2 | 86.9 | 167.8 | 6.7 | 0.0 | 0.0 | 61.0 | 0.0 | 1,819.8 | 0 | -1,820 |
| 2016 | 477.5 | 264.0 | 43.0 | 33.6 | 1.3 | 0.0 | 0.0 | 28.8 | 0.0 | 848.2 | 0 | -848 |
| 2017 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2018 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2019 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2020 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2021 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2022 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2023 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2024 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2025 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2026 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2027 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2028 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2029 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2030 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2031 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2032 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2033 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2034 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2035 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2036 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2037 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2038 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2039 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2040 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2041 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2042 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2043 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2044 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2045 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2046 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2047 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2048 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2049 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2050 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2051 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2052 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2053 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2054 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2055 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2056 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2057 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2058 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2059 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2060 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2061 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2062 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2063 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2064 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2065 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |
| 2066 | | | | | | | | | 13.5 | 13.5 | 3,676 | 3,663 |

| EIRR | NPV | B/C |
|---|---|---|
| 37% | 4,266 | 3.4 |

# Table 7.3.24 Cost Benefit Analysis (Phase IV)

| Year | Phase IV | | | | | | | | | | | | | Benefit | Net Benefit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Civil Work | | | Engineering Service | | | | Compensation Cost | | Admin Cost | Maitenance Cost | Replacement Cost | Total Cost | | |
| | MCGS | Phase IV | Physical Contingency | Detailed Design | Nonstructural Measures | Construction Supervision | Physical Contingency | Base Cost | Physical Contingency | Base Cost | | | | | |
| 2007 | | | | | | | | | | | | | 0.0 | 0 | 0 |
| 2008 | | | | | | | | | | | | | 0.0 | 0 | 0 |
| 2009 | | | | | | | | | | | | | 0.0 | 0 | 0 |
| 2010 | | | | | | | | | | | | | 0.0 | 0 | 0 |
| 2011 | | | | | | | | | | | | | 0.0 | 0 | 0 |
| 2012 | | | | | | | | | | | | | 0.0 | 0 | 0 |
| 2013 | | | | | | | | | | | | | 0.0 | 0 | 0 |
| 2014 | | | | | | | | | | | | | 0.0 | 0 | 0 |
| 2015 | | | | | | | | | | | | | 0.0 | 0 | 0 |
| 2016 | | | | | | | | | | | | | 0.0 | 0 | 0 |
| 2017 | 0 | 0 | 0 | 0 | 0 | 49 | 2 | 2 | 0 | 1 | | | 54.4 | 0 | -54 |
| 2018 | 371 | 381 | 46 | 0 | 0 | 108 | 4 | 8 | 1 | 33 | | | 950.5 | 0 | -951 |
| 2019 | 556 | 570 | 68 | 0 | 0 | 137 | 5 | 0 | 0 | 48 | | | 1,384.4 | 0 | -1,384 |
| 2020 | 556 | 570 | 68 | 0 | 0 | 137 | 5 | 0 | 0 | 48 | | | 1,384.4 | 0 | -1,384 |
| 2021 | 556 | 570 | 68 | 0 | 5 | 161 | 6 | 0 | 0 | 49 | | | 1,415.3 | 0 | -1,415 |
| 2022 | 182 | 186 | 22 | 0 | 2 | 53 | 2 | 0 | 0 | 16 | | | 462.0 | 0 | -462 |
| 2023 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2024 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2025 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2026 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2027 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2028 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2029 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2030 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2031 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2032 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2033 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2034 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2035 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2036 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2037 | | | | | | | | | | | 13.5 | 266.6 | 280.0 | 4,314 | 4,034 |
| 2038 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2039 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2040 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2041 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2042 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2043 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2044 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2045 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2046 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2047 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2048 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2049 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2050 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2051 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2052 | | | | | | | | | | | 13.5 | 266.6 | 280.0 | 4,314 | 4,034 |
| 2053 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2054 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2055 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2056 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2057 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2058 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2059 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2060 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2061 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2062 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2063 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2064 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2065 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |
| 2066 | | | | | | | | | | | 13.5 | | 13.5 | 4,314 | 4,300 |

| | EIRR | NPV | B/C |
|---|---|---|---|
| Phase IV | 36% | 2,220 | 3.621 |

## Table 7.3.25 Cost Benefit Analysis (Overall Project )

| Year | Cost | | | | Benefit | Net Benefit |
|---|---|---|---|---|---|---|
| | Phase II | Phase III | Phase IV | Total Cost | | |
| 2007 | 115 | 0 | 0 | 115 | 0 | -115 |
| 2008 | 360 | 0 | 0 | 360 | 0 | -360 |
| 2009 | 486 | 0 | 0 | 486 | 0 | -486 |
| 2010 | 792 | 0 | 0 | 792 | 0 | -792 |
| 2011 | 953 | 0 | 0 | 953 | 0 | -953 |
| 2012 | 1,207 | 143 | 0 | 1,350 | 0 | -1,350 |
| 2013 | 10 | 1,012 | 0 | 1,022 | 1,265 | 244 |
| 2014 | 10 | 1,820 | 0 | 1,830 | 1,265 | -564 |
| 2015 | 10 | 1,820 | 0 | 1,830 | 1,265 | -564 |
| 2016 | 10 | 848 | 0 | 858 | 1,265 | 407 |
| 2017 | 10 | 13 | 54 | 78 | 4,942 | 4,864 |
| 2018 | 10 | 13 | 951 | 974 | 4,942 | 3,968 |
| 2019 | 10 | 13 | 1,384 | 1,408 | 4,942 | 3,534 |
| 2020 | 10 | 13 | 1,384 | 1,408 | 4,942 | 3,534 |
| 2021 | 10 | 13 | 1,415 | 1,439 | 4,942 | 3,503 |
| 2022 | 10 | 13 | 462 | 485 | 4,942 | 4,457 |
| 2023 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2024 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2025 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2026 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2027 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2028 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2029 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2030 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2031 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2032 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2033 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2034 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2035 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2036 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2037 | 10 | 13 | 280 | 303 | 9,256 | 8,952 |
| 2038 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2039 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2040 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2041 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2042 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2043 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2044 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2045 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2046 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2047 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2048 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2049 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2050 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2051 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2052 | 10 | 13 | 280 | 303 | 9,256 | 8,952 |
| 2053 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2054 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2055 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2056 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2057 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2058 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2059 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2060 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2061 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2062 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2063 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2064 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2065 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |
| 2066 | 10 | 13 | 13 | 37 | 9,256 | 9,219 |

| EIRR | NPV | B/C |
|---|---|---|
| 29% | 7,964 | 2.659 |

### 7.3.9 Effects of the Project and Performance Indicators

#### (1) Effects of the Project

One of the major objectives of the Project is to upgrade the river channel improvement of the Pasig-Marikina River at the safety level of 100-year return period in accordance with the Master Plan formulated in 1990. However, the river channel itself is to implement the river channel improvement for the Phase III stretch including the remaining potential areas of the Pasig River stretch at the safety level of 30-year return period in a manner of urgent project.

As the result of implementation of the Project in the Pasig River, the flow capacity, which is currently 200 $m^3/s$, will increase to a maximum of 1,200 $m^3/s$.

**Table 7.3.2 Flow Capacity of Pasig-Marikina River**

| River Name | Stretch (km) | Flow Capacity ($m^3/s$) | | | |
|---|---|---|---|---|---|
| | | Present River Channel | | | After Project |
| | | Average | Minimum | Maximum | Minimum |
| (1) Pasig | 0.0 - 1.0 | 1,200 | 900 | 1,500 | 1,200 |
| | 1.0 - 4.0 | 600 | 200 | 1,200 | 1,200 |
| | 4.0 - 7.0 | 1,000 | 600 | 1,500 | 1,200 |
| | 7.0 - 17.1 | 500 | 200 | 1,000 | 600 |
| (2 Lower Marikina | 0.0 - 6.5 | 400 | 200 | 1,000 | 550 |

However, the safety level of 30-year return period could not be attained under the "without MCGS" condition. The safety level will remain at about 20-year return period in the lower stretch of the Pasig River downstream of the confluence of San Juan River, and about 10-year and 2-year return periods of the upper Pasig River upstream of the confluence of San Juan River and the Lower Marikina River.

Judging from the inundation area, the 30-year return period could not be observed as in the case of construction of MCGS. There will still exist inundation areas in the case of "without MCGS."

#### (2) Performance Indicators

##### (a) Operation Indicator

According to JICA's "Operation and Effect Indicators Reference (October 2002), it is proposed to set-up an indicator to identify the operation and maintenance conditions of the project through the periodical monitoring activities for the indicator, and also to conduct proper operation and maintenance. In this regard, the application of annual maximum flood discharge as the operational indicator is considered in view of the following reasons:

- The following indicators are generally applied to flood control projects: (1) Flow capacity at the reference point; (2) Annual maximum flood discharge at the reference point; and (3) Annual maximum water level at the reference point.

- Among the above indicators, "(1) Flow capacity at the reference point" seems to be the most preferable to evaluate the maintenance condition of the design flow capacity, which will be achieved through the river channel improvement project. However, to monitor the flow capacity at the reference point, it is required to

conduct river channel survey every year from the river mouth to the reference point. Thus, it may be too difficult to apply the flow capacity as the indicator.

- With regard to "(2) Annual maximum flood discharge at the reference point," it seems to be the second priority to evaluate the maintenance condition of the design flow capacity, while "(3) Annual maximum water level", which is already an obtainable indicator can only evaluate the safety water level, but not discharge. Since the river channel improvement is designed based on the discharge, the discharge is more preferable than the water level to evaluate the maintenance conditions.

Under the above considerations, the application of annual maximum flood discharge at the St. Niño water level gauging station is proposed as the operational indicator for the Pasig-Marikina River Channel Improvement Project, since it is the one being used as reference point for the Pasig-Marikina River. To detect the annual maximum flood discharge, it is necessary to conduct flood discharge observation at every flooding time using a float or a current meter for water flow velocity, together with a cross sectional survey at the reference point including the arrangement of a table compiling the observed discharge records. As for the flood discharge observation work, it is recognized that FCSEC, among the offices in DPWH, has the capacity to conduct the work.

**(b) Effect Indicator**

Effect indicators of the Project are as presented below:

**Table 7.3.27 Effect Indicators 1 (Flood Area, Population and Assets)**

| Return period | St.Nino Discharge ($m^3/s$) | Without the Project | | | | Completion Phase II | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Flood Area ($km^2$) | Affected Population (1000) | Asset Value (Billion Pesos) | Damages (Million Peso) | Flood Area ($km^2$) | Affected Population (1000) | Asset Value (Billion Pesos) | Damages (Million Peso) |
| | | A | B | C | D | E | F | G | H |
| 1/2 | 1470 | 1.2 | 55 | 8.2 | 2,526 | 1.0 | 44 | 6.5 | 2,008 |
| 1/5 | 2020 | 19.5 | 379 | 62.0 | 17,244 | 17.9 | 347 | 56.9 | 15,809 |
| 1/10 | 2350 | 24.0 | 599 | 88.5 | 31,314 | 19.5 | 487 | 71.9 | 25,437 |
| 1/20 | 2740 | 36.8 | 1,004 | 146.2 | 55,961 | 30.9 | 843 | 122.8 | 46,996 |
| 1/30 | 2900 | 42.0 | 1,221 | 177.6 | 80,573 | 35.4 | 1,029 | 149.7 | 67,893 |

**Table 7.3.28 Effect Indicators 2 (Flood Area, Population and Assets)**

| Return period | St.Nino Discharge ($m^3/s$) | Completion Phase III | | | | Completion Phase IV | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Flood Area ($km^2$) | Affected Population (1000) | Asset Value (Billion Pesos) | Damages (Million Peso) | Flood Area ($km^2$) | Affected Population (1000) | Asset Value (Billion Pesos) | Damages (Million Peso) |
| | | I | J | K | L | M | N | O | P |
| 1/2 | 1470 | 0.5 | 24 | 4 | 1,116 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1/5 | 2020 | 1.4 | 26 | 4 | 1,201 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1/10 | 2350 | 16.2 | 404 | 60 | 21,130 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1/20 | 2740 | 29.4 | 802 | 117 | 44,702 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1/30 | 2900 | 34.6 | 1,004 | 146 | 66,282 | 0.0 | 0.0 | 0.0 | 1.2 |

## Table 7.3.29 Estimation of Benefit (Benefit and Impact of Phase II)

| Return Period | Impact of Phase II | | | | Benefit Estimation Phase II | | | |
|---|---|---|---|---|---|---|---|---|
| | Flood Area ($km^2$) | Affected Population (1000) | Asset Value (Billion Pesos) | Damage (Million Peso) | Average Damage Avoided (Million Peso) | Average Annual Exceedance Probability | Annual Average Damage (Million Peso) | Cumulative Value (Million Peso) |
| | A-E | B-F | C-G | D-H | | | | |
| 1/2 | 0.25 | 11 | 1.7 | 518 | 259 | *- | 56 | 56 |
| 1/5 | 1.62 | 32 | 5.2 | 1,434 | 976 | 0.30 | 293 | 348 |
| 1/10 | 4.50 | 112 | 16.6 | 5,878 | 3,656 | 0.10 | 366 | 714 |
| 1/20 | 5.90 | 161 | 23.4 | 8,965 | 7,421 | 0.05 | 371 | 1,085 |
| 1/30 | 6.61 | 192 | 27.9 | 12,680 | 10,822 | 0.02 | 180 | 1,265 |

* The estimated return period of flood in Upper Pasig River without causing damage is 1/1.4, so that the corresponding annual average damage is estimated at 0.21 based on the computation (1/1.4 - 1/2 = 0.21). On the other hand, the estimated return period in Marikina River without damage is lower than 1.0, so that it is assumed to be 1.0 in this analysis.

## Table 7.3.30 Estimation of Benefit (Benefit and Impact of Phase III)

| Return Period | Impact of Phase III | | | | Benefit Estimation Phase III | | | |
|---|---|---|---|---|---|---|---|---|
| | Flood Area ($km^2$) | Affected Population (1000) | Asset Value (Billion Pesos) | Damage (Million Peso) | Average Damage Avoided (Million Peso) | Average Annual Exceedance Probability | Annual Average Damage (Million Peso) | Cumulative Value (Million Peso) |
| | E-I | F-J | G-K | H-L | | | | |
| 1/2 | 0.43 | 19 | 2.9 | 892 | 446 | *- | 208 | 208 |
| 1/5 | 16.50 | 321 | 52.5 | 14,608 | 7,750 | 0.30 | 2,325 | 2,533 |
| 1/10 | 3.30 | 82 | 12.2 | 4,307 | 9,458 | 0.10 | 946 | 3,479 |
| 1/20 | 1.51 | 41 | 6.0 | 2,294 | 3,301 | 0.05 | 165 | 3,644 |
| 1/30 | 0.84 | 24 | 3.6 | 1,611 | 1,953 | 0.02 | 33 | 3,676 |

* The estimated return period of flood in Upper Pasig River without causing damage is 1/1.4, so that the corresponding annual average damage is estimated at 0.21 based on the computation (1/1.4 - 1/2 = 0.21). On the other hand, the estimated return period of Marikina River without damage is lower than 1.0, so that it is assumed to be 1.0 in this analysis.

## Table 7.3.31 Estimation of Benefit (Benefit and Impact of Phase IV)

| Return Period | Impact of Phase IV | | | | Benefit Estimation Phase IV | | | |
|---|---|---|---|---|---|---|---|---|
| | Flood Area ($km^2$) | Affected Population (1000) | Asset Value (Billion Pesos) | Damage (Million Peso) | Average Damage Avoided (million pesos) | Average Annual Exceedance Probability | Annual Average Damage (million pesos) | Cumulative Value (million pesos) |
| | I-M | J-N | K-O | L-O | | | | |
| 1/2 | 1 | 24 | 4 | 1,116 | 558 | *- | 279 | 279 |
| 1/5 | 1 | 26 | 4 | 1,201 | 1,159 | 0.30 | 348 | 627 |
| 1/10 | 16 | 404 | 60 | 21,130 | 11,165 | 0.10 | 1,117 | 1,743 |
| 1/20 | 29 | 802 | 117 | 44,702 | 32,916 | 0.05 | 1,646 | 3,389 |
| 1/30 | 35 | 1,004 | 146 | 66,280 | 55,491 | 0.02 | 925 | 4,314 |

* The estimated return period of flood in Upper Pasig River without causing damage is 1/1.4, so that the corresponding annual average damage is estimated at 0.21 based on the computation (1/1.4 - 1/2 = 0.21). On the other hand, the estimated return period of Marikina River without damage is lower than 1.0, so that it is assumed to be 1.0 in this analysis.

## Table 7.3.32 Estimation of Benefit (Benefit and Impact of Entire Project)

| Return Period | Impact Entire Project | | | | Benefit Estimation Entire Project | | | |
|---|---|---|---|---|---|---|---|---|
| | Flood Area ($km^2$) | Affected Population (1000) | Asset Value (Billion Pesos) | Damage (Million Peso) | Average Damage Avoided (million pesos) | Average Annual Exceedance Probability | Annual Average Damage (million pesos) | Cumulative Value (million pesos) |
| | A-M | B-N | C-O | D-P | | | | |
| 1/2 | 1.2 | 55 | 8 | 2,526 | 1,263 | *- | 543 | 543 |
| 1/5 | 19.5 | 379 | 62 | 17,244 | 9,885 | 0.30 | 2,965 | 3,508 |
| 1/10 | 24.0 | 599 | 88 | 31,314 | 24,279 | 0.10 | 2,428 | 5,936 |
| 1/20 | 36.8 | 1,004 | 146 | 55,961 | 43,638 | 0.05 | 2,182 | 8,118 |
| 1/30 | 42.0 | 1,221 | 178 | 80,572 | 68,266 | 0.02 | 1,138 | 9,256 |

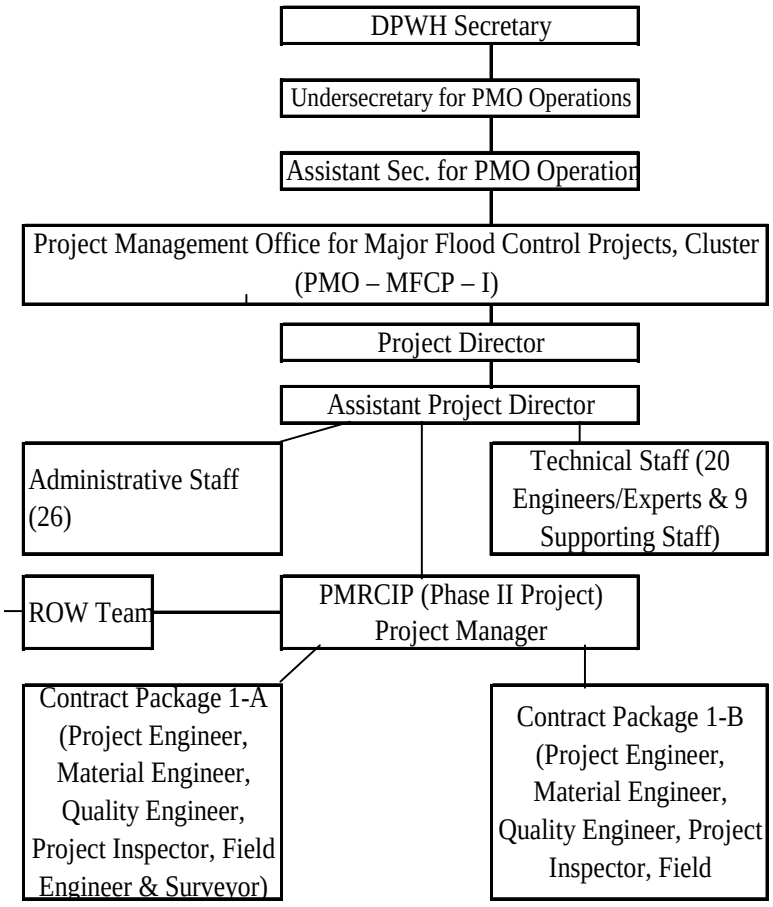
* The estimated return period of flood in Upper Pasig River without causing damage is 1/1.4, so that the corresponding annual average damage is estimated at 0.21 based on the computation (1/1.4 - 1/2 = 0.21). On the other hand, the estimated return period of Marikina River without damage is lower than 1.0, so that it is assumed to be 1.0 in this analysis.

# CHAPTER 8 IMPLEMENTATION OF PHASE III PROJECT

## 8.1 Implementing Agency for Construction

The Department of Public Works and Highways (DPWH) will be the governmental agency responsible for the execution of the Phase III Project. The actual project execution is to be entrusted to the Project Management Office for the Major Flood Control (PMO-MFCP) Cluster I. The consultants are to be employed to assist the agency in the pre-construction and construction supervision of the Project phases. For the relocation for project affected people and non-structural measures of flood mitigation, the agencies responsible such as LGUs and MMDA are expected to undertake the respective activities through the coordination of DPWH.

Organization of PMO-MFCP I is shown below, including the site organization for construction supervision for on-going Phase II Project. Under the Project Director, the PMO-MFCP I composes of Technical and Support Staff (29 positions) and Administrative Staff (26 positions).




## 8.2 Proposed Utilization of STEP Loan

The Phase III Project is eligible for the preferential terms of Japanese ODA Loans called as "STEP (Special Terms for Economic Partnership)". STEP Loan is expected to raise the visibility of Japanese ODA among citizens in both recipient countries and Japan through best use of advanced technologies and know-how of Japanese firms.

There are advantages in STEP Loan compared with general untied loan as follows:

- Low interest rate, grace period and long repayment period, as follows:

| | Interest Rate | Grace Period | Repayment Period |
|---|---|---|---|
| General Loan | 1.40% p.a. | 10 years | 25 years |
| STEP Loan | 0.20% p.a. | 10 years | 40 years |

- Detailed design can be conducted through the JICA's grant technical cooperation, resulting in substantial reduction/saving of project cost. The detailed design is made by the consultant employed by JICA. However, the consultant for the construction supervision is selected by the GOP.

- After pledge or loan agreement, the selection of consultant for construction supervision is conducted by the DPWH for about 6 months. During this selection, the separate works of the detailed design from the project activities through JICA's grant technical cooperation would result in shortening of project implementation time by about half a year.

The terms and conditions of STEP Loan are described below:

- Prime contractors are tied to Japanese firms. Joint ventures (JV) with recipient countries area also admitted on condition that Japan is a leading partner. Sub-contractors are untied and open to all countries.
- Total cost of goods procured from Japan shall be no less than 30% of the total amount of contract(s) (except consulting services) financed by STEP Loan.
- STEP covers up to 100% of the total project cost.

**Special Term for Economic Partnership(STEP)** - *from JICA Website* -

The Government of Japan has decided to introduce a new ODA loan scheme from July 2002, now called the Special Term for Economic Partnership (STEP), which is expected to raise the visibility of Japan's ODA to the citizens in the recipient countries and Japan through utilizing and transferring excellent technologies and know-how of Japanese firms.

**1. Recipient Countries of STEP**

Low-Income Countries, Lower-Middle-Income Countries and Middle-Income Countries to which a tied aid can be extended under OECD rules (except Least among Less Developed Countries and Upper-Middle-Income Countries).

**2. Eligible Projects of STEP**

(1) Outline: Projects eligible for STEP will be limited to those which are in the sectors and fields below (2), and at the same time, for which Japanese technologies and equipment are substantially utilized.

(2) Sectors and Fields

| | |
|---|---|
| Bridges and Tunnels | Ports |
| Airports | Urban mass transit system |
| Oil/Gas transmission and storage facilities | **Urban flood control projects** |
| Communications /Broadcasting/ Public information system | |
| Power stations/ power transmission and distribution lines | |
| Trunkroads/Dams<br>(limited to projects that substantially utilize anti-earthquake techniques, ground treatment techniques, fast implementation techniques of Japan) | |
| Environmental_Projects<br>(limited to projects that substantially utilize air-pollution prevention techniques, water-pollution prevention techniques, waste treatment and recycling techniques, and waste heat recycling and utilization techniques of Japan) | |

**3. Terms and Conditions of STEP**

**(1) Interest Rate and Repayment Period:** Repayment period will be 40 years including 10 years grace period. Interest rate will be set so as to make it possible to extend a tied aid under OECD rules.

**(2) Procurement Conditions**: Prime contractors are tied to Japanese firms. Joint ventures (JV) with recipient countries are also admitted on condition that Japan is a leading partner. Sub-contractors are untied and open to all countries.

**(3) Country of Origin of Goods and Services to be Procured under STEP:** Not less than 30% of the total amount of contract(s) (excluding consulting services) financed by STEP loan must be accounted for by either (a) goods from Japan and services provided by Japanese firms, or (b) goods from Japan only, according to the nature of project.

| Category | Example |
|---|---|
| (a) In case of projects which advanced technologies and/or know-how of Japanese firms can be identified in Services (e.g. construction methods), not only Goods but also Services must be included in the ratio mentioned. | Tunnels, ports, concrete bridges, trunk roads, dams, sewerage systems, urban underground headrace tunnels, public information systems, hydroelectric power, and geothermal power, etc. |
| (b) In case of projects which consist of mainly the installation of Goods or Plants and their core technologies can be identified in Goods or Plants, only Goods shall be included in the ratio mentioned. | Communications/broadcasting facilities, wind/solar/thermal power generation, oil/gas transmission and storage facilities, waste treatment sites, waste incineration plants, steel bridges, urban mass transit systems, urban flood control projects, power transmission and distribution line, etc. |

**(4) Coverage Ratio:** STEP covers up to 100% of the total project cost.

**(5) Audit:** In order to secure fair procurement process, procurements shall be audited by a third party after a bid process is completed, by utilizing ODA loan or JBIC Special Assistance Facility.

The STEP Loan has conditions to utilize the Japanese advanced technology and know-how of Japanese firms. Civil works of Phase III Project have two (2) critical technical/environmental problems; (1) the adopted steel sheet pile foundation for construction of revetments can not be driven into the existing hard subsoil (about 65% sections) by commonly used vibro-hammer driving method, and (2) the more than 600,000 cum dredged materials containing high water content are not allowed environmentally to pass the narrow streets in the urban house-congested area for disposal. To solve these technical/environmental problems, it is proposed to use the Japanese advanced technology such as Vibro-Hammer with Waterjet for driving method and Eco-Tube Method for Re-use and Pre-mix Method for Solidification for the treatment of dredged materials.

**(Driving Steel Sheet Piles into Hard Subsoil Technically/Environmentally)**

**Waterjet Technology:** At 65% areas along the proposed sections, foundation is formed by volcanic tuff (the Guadalupe tuff), locally called “adobe”. This tuff is considered a suitable bedrock foundation. However, it is hard to drive steel piles into this tuff by common driving method. Vibro-Hammer Driving with Waterjet Technology is proposed for utilization as excellent construction method for pile driving into hard strata. This method facilitates the construction activities and minimize vibration/noise of construction activities. This is also applied for ongoing Phase II Project.

This technology invented and of practical use in Japan needs not only equipment but also outstanding construction technology. The developed Japanese construction technologies of Vibro

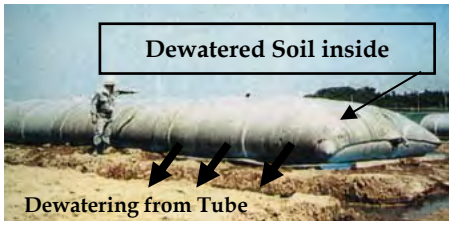
Hammer with Waterjet include the software such as suitable selection depending on subsoil condition, water level, adjacent existing structures, suitable output of motor, speed of penetration of pile, etc.

**(Treatment of Dredged Material)**

Among the alternative disposal methods for of dredged material are summarized as follows, only inland disposal will be applicable at present.

- Manila Bay (20 km one-way hauling distance) → "Ban" at Present
- Sea outside Manila Bay (100 km one-way hauling distance) → High hauling cost and needed additional construction time.
- Inland Area → Need Solidification → Cement Pre-mix Method for Solidification and disposal to proposed area (Near Laguna Lake in Taguig City) and/or re-use at site for embankment (Eco-tube Method)

**Eco-tube Method of Reusing High Water Content Soil:** For treatment of dredged material of Lower Marikina River Channel, the Eco-tube Method which was developed by the Public Works Research Institute of Japanese Government enables to dewater and reinforce high water content soil, and to reuse the dredged material for the proposed Boundary Banks, filling materials in geo-textile tubes with filtration effect which are made from Japanese technology. This filtration effect ejects clean water from the tube while the soil remains inside it. This method can dewater high water content contaminated soil with keeping contaminants inside the Eco-tube, because of its filtration effect.

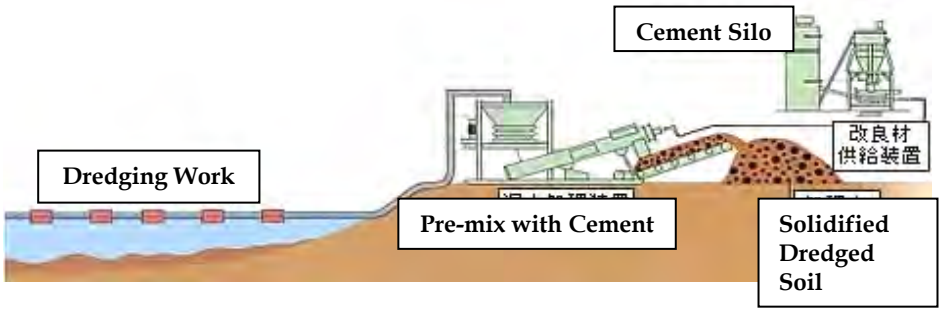



Material of Geo-textile with high quality is fabricated on the Japanese high technology for the purpose of filtration effect and containing heavy dredged materials with water.

On the other hand, Geo-textile Tube has the following characteristics:

a) Since geo-textile tube has weakness against the sunshine, tubes should be covered with soils. After floods/earthquake occurred, inspection for maintenance of cover-soil should be conducted. It is essential to repair cover-soil as required.
b) In case of big flood occurred, there might be possibility that geo-tube be washed out and damages to existing structures such as bridge piers, houses, etc.
c) If contaminated soil is contained in tube, it will be exposed when tube is damaged.

**Pre-mix Method for Solidification of Dredged Material:** Since the dredging works are executed at the river channel flowing in the urban area, loading, hauling and disposal operations for safe high water content soil require sufficient environmental consideration. Cement-based Pre-mix Method for Solidification is proposed for the Project. Cement reacts with water in the dredged material to chemically bind free water and dry the material. Plant equipment for this Method are brought into the site from Japan.



## 8.3 Procurement Method

### (1) Procurement of Construction Contractors

Since the construction of the Project is expected to be undertaken with the JICA STEP Loan, the contractors for construction work shall be selected under the Competitive Bidding procedures with Pre-qualification (PQ) among the Japanese firms in accordance with the guideline of JICA as well as the laws and regulations of Government of the Philippines. The number of contract package is to be two (2); one for improvement works of Pasig River Channel and one for Improvement works of Lower Marikina River Channel.

### (2) Procurement of JICA Consultant for Detailed Design and Preparation of Tender Documents

In case of STEP Loan, the Consultant for detailed design for the Project can be conducted through the Consultant to be selected by JICA to facilitate the project implementation. The number of contract package is to be one (1).

### (3) Procurement of DPWH Consultant for Construction Supervision

For the construction supervision of the Project, the Consultant shall be selected by the DPWH in accordance with the latest "Guidelines for the Employment of Consultants under JBIC ODA Loans". The number of contract package is to be one (1).

## 8.4 Implementation Schedule

The implementation schedule of the Phase III Project includes the items of fund requirements, procurement of consultant and contractors, and the construction works. The period for construction work is set at 3.0 years from July 2003 to June 2016.

Under the STEP Loan, the review of detailed design, construction design and preparation of pre-qualification/tender documents can be conducted through the JICA's grant technical cooperation to facilitate the implementation. The implementation schedule of Phase III Project is presented in the next page. The respective periods of the required works are as follows:

| | | |
|---|---|---|
| (1) | Procurement of DPWH Consultant for Construction Supervision | : 6 months |
| (2) | Detailed Design and Preparation of Tender Documents by Consultant selected by JICA | : 8 months |
| (3) | Procurement of Construction Contractors | : 10 months |
| (4) | Construction Works | : 36 months |
| (5) | Consulting Services for PQ & Tender/Construction Supervision | : 48 months |

## Implementation Schedule of the Phase III Project

| Year/Month | 2011 | | | | | | | | | | 2012 | | | | | | | | | | 2013 | | | | | | | | | | 2014 | | 2015 | | 2016 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WORK ITEM | M | A | M | J | J | A | S | O | N | D | J | F | M | A | M | J | J | A | S | O | N | D | J | F | M | A | M | J | J | A | S | O | N | D | | | | |
| **1. JICA Preparatory Study** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **2. ICC-Evaluation** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **3. JICA Follow-up/ Fact Finding** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **4. JICA Appraisal for Loan** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **5. Pledge/Loan Agreement** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **6. Procurement of Consultants for Review (by JICA Grant)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **7. Procurement of Consultants for C/S (by DPWH)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **8. Consultaing Services** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **(1)** Construction Design/Preparation of Tender Documents (by JICA Grant) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **(2)** Formulation and Conduct of Non-Structural Measures | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **(3)** Assistance in PQ and Tender | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **(4)** Construction Supervision | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **(5)** Assistance in Resettlement & External Monitoring | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **(6)** Environmental Monitoring and Management | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **(7)** Clear Payment & Completion Reporting | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **9. Resettlement and Compensation** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **10. Tendering for Procurement of Contractors** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **11. Construction** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **(1)** Improvement of Remaining Sections of Pasig River | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **(2)** Improvement of Lower Marikina River | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Year/Month | 2011 | | | | | | | | | | 2012 | | | | | | | | | | 2013 | | | | | | | | | | 2014 | | 2015 | | 2016 | |

## 8.5 Fund Requirement

### (1) Amount to be Financed by JICA STEP Loan

For the calculation of amount of proposed STEP Loan, the estimated project cost mentioned in Section 6.6.5 is reformed as follows. The non-eligible costs, which are not subject for loan, are considered for the categories of compensation (resettlement), government administration and taxes.

**Project Cost of Phase III for STEP Loan**

(Million Pesos)

| | Component | F.C. | L.C. | Total (Eligible Expenditure) | Non-Eligible Cost (incld. Tax & Duty) | % of Eligible Expenditure to be Financed by JICA STEP Loan |
|---|---|---|---|---|---|---|
| 1 | Civil Works | 2,888.00 | 2,103.00 | 4,991.00 | 598.92 | 100% |
| 2 | Price Contingency | 241.68 | 741.86 | 983.54 | 118.02 | 100% |
| 3 | Physical Contingency | 156.49 | 142.25 | 298.74 | 35.84 | 100% |
| 4 | Consulting Services | 336.61 | 336.48 | 673.09 | 25.46 | 100% |
| 5 | Compensation | - | | | 22.32 | - |
| 6 | Administration | - | | | 261.76 | - |
| | **Total for Phase III Project** | **3,622.78** | **3,323.59** | **6,946.37** | **1,062.32** | **8,008.69** |
| | Amount to be Financed from STEP Loan | 3,622.78 | 3,323.59 | **6,946.37 (JY13,233)** | | |

Note:

1) Price Level as of December 2010
2) Exchange Rate: 1 Peso = 1.905 Yen
3) Civil Works excluding price and physical contingencies.
4) Price and Physical Contingencies are for Civil Works.
5) Consulting Services include physical contingency and price contingency.
6) Administration includes price contingency.
7) Tax is 12% VAT.

### (3) Annual Budgetary Requirements

Under the condition that amount within P6,946.37 million in total is to be financed by JICA STEP Loan, the following table shows the annual budgetary requirement for the total Project Cost of Phase III:

(in million pesos)

| | 2012 | 2013 | 2014 | 2015 | 2016 | Total |
|---|---|---|---|---|---|---|
| Loan Portion | 125.19 | 1,148.38 | 2,219.79 | 2,313.21 | 1,139.80 | 6,946.37 (87%) |
| GOP | 8.60 | 188.71 | 334.92 | 351.64 | 178.45 | 1,062.32 (13%) |
| Total | 133.79 | 1,337.09 | 2,554.71 | 2,664.85 | 1,318.25 | 8,008.69 (100.0%) |

## 8.6 Plan for Operation and Maintenance

### 8.6.1 MMDA for Operation and Maintenance

There is a Memorandum of Agreement (MOA) executed in July 9, 2002 and Guidelines on the Transfer of Flood Control Responsibilities in Metro Manila from DPWH to MMDA dated August 2002 between DPWH and MMDA (refer to ANNEX). In addition, Minutes of Discussion for implementation of Phase II project among the DPWH, MMDA and JICA includes the commitment dated February 2003 indicating the MMDA's responsibility for the operation and maintenance of the completed project.

Number of MMDA personnel are 7,140 in total. Regarding the flood control, the "Flood Control and Sewerage Management Office" has responsibility.

**(1) Organization for Flood Control**

Their organization is shown below:


**(2) Personnel for Flood Control**

Total Number of Personnel for Flood Control & Sewerage Management Office are about 1,220, equivalent to 17% of all MMDA personnel, as follows:

| Technical | Office | Skilled Workers | Laborer | Total |
|---|---|---|---|---|
| 160 | 140 | 320 | 600 | 1,220 |

Also employment status is categorized as below:

| | Permanent | Daily Basis (long period) | Daily Basis (short period) | Total |
|---|---|---|---|---|
| Total | 115 | 560 | 545 | 1,220 |

(Source: Flood Control & Sewerage Management Office of MMDA as of January 2011)

**(3) MMDA Equipment**

Equipment of MMDA is managed by the Equipment Management Division. As of April 2011, the MMDA has the following major 150 equipment. Out of these equipment, 82 % are operational equipment and 18 % are in the condition of required repair.

**(4) Budget for Flood Control**

The following shows the allotted budgets in the recent years for Flood Control and Sewerage Management Office:

| Year | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|
| Budget (Mil.Pesos) | 568 | 560 | 629 | 559 |

Source: MMDA Flood Control and Sewerage Management Office

**(5) Necessary Maintenance for Structures to be Completed in the Project**

After the completion of the Phase II Phase and/or Phase III Project, the completed facilities are transferred to the MMDA. Such facilities along the Pasig River are steel revetments, reinforced concrete river walls and concrete drainage outlets. Although materials used for these structures may not need the frequent maintenance, periodical inspection should be conducted. Drainage outlets will need daily maintenance activities and during/after flood.

On the other hand, since the major completed facilities of Lower Marikina River are dredged/excavated channel, dikes and river wall, frequent maintenance works will not necessary. However, periodical inspection should be done. For maintenance of dredged channel, cross-sectional/longitudinal survey of riverbed is necessary once a year. Depending on the status of riverbed based on the results of surveys dredging for maintenance may be necessary once a several years. Navigation also requires the maintenance of sufficient channel depth.

It is deemed to the MMDA has presently necessary equipment and staff for the O & M.

### 8.6.2 Set-up of Flood Mitigation Committee (FMC)

**(1) Strategy**

In principle, FMC will be established in the following strategy: FMC makes every effort for prompt realization of flood control project consisting of structural and non-structural measures as well as minimizing the unfavorable activities which bring about adverse influence to control of flood discharge and/or hamper the smooth flow in the river channel.

**(2) Role and Responsibilities of FMC**

The role and responsibilities of FMC are as follows:

- Enhance/strengthen the publicity and awareness of the Project
- Facilitate and assist the activities on the resettlement and acquisition of the ROW
- Facilitate and assist introduction and operation of Non-structural measures by MMDA and LGUs
- Facilitate and assist monitoring of the O&M activities and any illegal activities for the phase III stretch and potential areas
- Set-up a "query window" for the Project
- Act as grievance and redress committee for ROW acquisition and other matters
- Control of illegal land use and disorderly land development in whole Pasig-Marikina River Basin
- Others

**(3) Member of FMC**

FMC shall, in principle, be composed of members with the following roles and responsibilities:

- DPWH shall act as Chairperson of FMC in the planning, detailed design and implementation stage, while MMDA will be the Chairperson during the O&M stage.
- As standing members of FMC, LGUs in the cities of Manila, Makati, Marikina, Mandaluyong, Pasig, Quezon and San Juan directly related to the target stretches of Phase III and the potential areas in Phase II are to be included.
- As observer members, agencies concerned in flood risk management as well as river basin development such as DENR, OCD, NEDA, HUDCC, LLDA and PRRC are to be involved.
- LGUs administratively related to the Pasig-Marikina River Basin such as San Mateo, Antipolo, Tanay and Rodriguez are to be involved.
- LGUs administratively related to the Manggahan Floodway and the Napindan Channel such as Cainta, Taytay, Pateros and Taguig City shall also be involved.

## 8.7 Consulting Engineering Services

### 8.7.1 Objective and Scope of Services

The Consulting Engineering Services is to carry out the following tasks. For the item (a), the Consultant selected by the JICA will carry out. For items (b) to (h), the Consultant to be selected by the DPWH shall conduct. Terms of Reference for Consulting Services are hereto attached as **ANNEX-1** for JICA Consultant and **ANNEX-2** for DPWH Consultant, respectively**.**

**(1) By Consultant Employed by the JICA**

Detailed design, cost estimation and preparation of tender documents

- Review of the previous plans and designs
- Update and collection of information and data
- Survey and investigations
- Structural analysis and computation
- Detailed design preparation
- Construction planning
- Cost estimate
- Preparation of pre-qualification/tender documents
- Review of Resettlement Action Plan (RAP)
- Review of Environmental Impact Statement and preparation of Environmental Management Plan

**(2) By Consultant Employed by the DPWH**

(a) Formulation of Non-structural Measures

- GIS mapping of project area including land use and structures
- Flood inundation analysis
- Baseline survey in socio-economic conditions
- Hazard map preparation
- Flood warning/evacuation system formulation
- Institutional analysis in community organization
- Formulation of Information Campaign Plan
- Conceptualize, design and produce information materials

(a) Assist in conducting non-structural measures

- Preparation of conduct schedule

- Coordination between DPWH and LGUs concerned
- Implementation of Information Campaign and Publicity
- Establishment of Website
- Elaboration and Utilization of Flood Hazard Map
- Overseas Training Course

(b) Assistance for pre-qualification and tendering for selection of civil work contractors
- Assist in pre-qualification evaluation
- Attend pre-tender conference and the site explanation to tenderers
- Assist in tender opening and evaluation together with preparing the tender evaluation reports

(c) Construction supervision
(d) Assistance for environmental management and monitoring
(e) Assistance in resettlement
(f) External monitoring services for resettlement
(g) Technical assistance for operation and maintenance works including preparation of the manuals
(h) Transfer of Knowledge

### 8.7.2 Work Schedule of Consulting Engineering Services

The detailed schedule of Consulting Engineering Services for Phase III is shown in Terms of Reference for Consulting Services. The engineering services for the detailed design by the Consultant selected by JICA are scheduled for 8 months and 48 months for pre-construction and construction supervision by the Consultant employed by the DPWH.

The manning schedule for Consulting Engineering Services is shown in table below and also shown in the Terms of Reference for the Consulting Services.

| | Foreign Consultant | Local Consultant | Total |
|---|---|---|---|
| JICA Consultant | 62 M/M | 54 M/M | 116 M/M |
| DPWH Consultant | 200 M/M | 692 M/M | 892 M/M |
| Total | 262 M/M | 746 M/M | 1,008 M/M |

### 8.7.3 Cost for Consulting Services

Cost of Consulting Services is estimated as follows:

(Unit: 1,000)

| | Description | Unit | Q'ty | Amount (JPY) | Amount (PHP) | Amount (VAT) (PHP |
|---|---|---|---|---|---|---|
| I. | Foreign Currency | | | | | |
| | 1) Remuneration (Foreign Expert) | M/M | 200 | 500,000 | - | - |
| | 2) Out of Pocket Expenses | L.S. | | 71,580 | - | - |
| | **Sub-Total** | | | **571,580** | - | - |
| II. | Local Currency | | | | | |
| | 1) Remuneration (Local Expert) | M/M | 692 | - | 96,880 | 11,625.6 |
| | 2) Remuneration (Local Support Staff) | M/M | 680 | - | 28,320 | 3,398.4 |
| | 3) Out of Pocket Expenses | L.S. | | - | 124,355 | - |
| | **Sub-Total** | | | **-** | **249,555** | **15,024.0** |
| | **Total** | | | **Y571,580 (= P300,042)** | **P249,555** | **P15,024** |
| | **Grand Total (in Pesos)** | | | **P564,621** | | |

Note: P1.0 = JPY1.905

# ANNEX 1 TERMS OF REFERENCE FOR CONSULTING ENGINEERING SERVICES ON THE DETAILED DESIGN OF PASIG-MARIKINA RIVER CHANNEL IMPROVEMENT PROJECT (PHASE III)

# TERMS OF REFERENCE
# FOR
# CONSULTING ENGINEERING SERVICES
# ON
# THE DETAILED DESIGN
# OF
# PASIG-MARIKINA RIVER CHANNEL
# IMPROVEMENT PROJECT
# (PHASE III)

**REPUBLIC OF THE PHILIPPINES**
**DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS**
**MANILA, PHILIPPINES**

## 1. BACKGROUND AND NECESSITY OF THE PROJECT

The Pasig-Marikina-San Juan River System, of which total catchment area is 621 $km^2$, 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 9.9 km and 19.9 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 11.5 million in 2010, is the economic, political and cultural center of the Philippines.

A Master Plan of flood control for the Pasig-Marikina River including the drainage in Metro Manila was prepared in 1954. In line with the flood control plan, the improvement works of the Pasig River, consisting mainly of river walls and revetments of the channel, were constructed in the 1970's. The Manggahan Floodway having a design flow capacity of 2,400 $m^3/s$ for diversion of flood from Marikina River to Laguna Lake was completed in 1988 to mitigate the flood damage due to the overflow of the lower Marikina River and Pasig River.

However, even though the completion of Manggahan Floodway, flood damages along the Pasig-Marikina River have been frequently experienced in last 25 years from 1986 to 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 existing flood problems in Metro Manila, in addition to the Manggahan Floodway, 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 updating/review of the F/S for the river channel improvement project through the Special Assistance for Project Formation (SAPROF) of JICA in 1998, the "Pasig-Marikina River Channel Improvement Project (PMRCIP)" was proposed for the implementation in the following four phases under the financial assistance of Japanese ODA:

(1) Phase I: Detailed Design for the Overall Project (29.7 km) from Delpan Bridge to Marikina Bridge

(2) Phase II: Channel Improvement Works for Pasig River (Delpan Bridge to Napindan River; 16.4 km)

(3) Phase III: Channel Improvement Works for Lower Marikina River including Construction of Marikina Control Gate Structure (MCGS) (Junction with Napindan River to Manggahan Floodway; 7.2 km)

(4) Phase IV: Channel Improvement Works for Upper Marikina River (Manggahan Floodway to Marikina Bridge; 6.1 km)

Following the SAPROF study, the Government of Japan through the JICA has decided to extend its loan to finance for the Phase I of the Project under 23rd Loan Package in June 1999. Thus, the Detailed Design (D/D) was carried out from October 2000 to March 2002.

On the other hand, since 1994, a flagship project named the Pasig River Rehabilitation Program (PRRP) has been implemented as a multi-agency undertaking to retrieve the beauty and lush greenery of the Pasig River as it used to be as early as the 15th century. In particular, the DPWH has been appointed for the civil works for flood mitigation, especially channel improvement. Both the National Housing Authority (NHA) and the concerned LGUs have undertaken to relocate all the informal settlers living along the Pasig River and its tributaries under the Pasig River Rehabilitation Commission (PRRC).

After the completion of the detailed design, the implementation of the Phase II Project for the Pasig River was approved by the ICC-Technical Board (TB) on July 26, 2002 and by the ICC-Cabinet Committee (CC) on August 01, 2002. Subsequent approval of the same by the NEDA Board was done September 03, 2002. Due to the change in project cost, re-approval of ICC-TB and ICC-CC was attained on March 06, 2003 and March 13, 2003, respectively. NEDA Board confirmation on the subject Project was given on May 06, 2003.

A meeting among JICA, DPWH, MMDA and NEDA was held on July 22, 2004 at the office of MMDA. The Chairman of MMDA still had a lot of queries that had to be addressed. This led to the conduct of a Value Engineering Study (VES) by the University of the Philippines-National Hydraulic Research Center (UP-NHRC) from June to September 2005. Results of the VES had been presented on March 10, 2006 to NEDA and MMDA wherein project approval has been made.

The construction of Phase II Project has been requested for financing under the 26th JICA Yen Loan Package (STEP: Special Term Economic Partnership). After the Loan Agreement for the Phase II Project dated February 27, 2007, pre-construction stage consisting of design review, pre-qualification of the contractors and tendering has started in December 2007. The construction 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 ongoing Phase II Project, it is proposed to implement the Phase III Project which is the Lower Marikina River Channel Improvement Works in total of 5.4 km from the immediate vicinity of NHCS (Napindan Hydraulic Control Structure) to the downstream of the junction with the Manggahan Floodway, excluding the construction of proposed MCGS. 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. These sections were not covered by the on-going Phase (II) Project.

To support for formulation of a Yen-Loan Project as “Phase-III”, the JICA has executed the Preparatory Study starting in September 2010 until July 2011 to review the existing Pasig-Marikina River Channel Improvement Plan, focusing on river improvement stretch covered by Phase III, in the course of the study for the whole river improvement stretch (from river mouth to Marikina Bridge) in Pasig-Marikina River Basin including the present river conditions reflecting recent river basin development, recent flood damage conditions and impacts to flood damage by future climate change.

## 2. PROJECT DESCRIPTION

### 2.1 Overall Project

#### 2.1.1 Project Area

The Project Area for this whole flood control project is delineated in the most significant portion of the Pasig-Marikina River, i.e., the Pasig River from the river mouth to the Napindan Junction, the Lower Marikina River from the Napindan Junction to the effluent point of the Manggahan Floodway, and the Upper Marikina River from the Manggahan Floodway to St. Niño. This delineation considers the flood control effect as well as the social significance that the river passes through the core of Metro Manila.

#### 2.1.2 Objectives of the Overall Project

The objectives of the overall Project are to mitigate the flood damage caused by channel overflow of the Pasig-Marikina River Channel, to facilitate the urban development and to enhance the favorable environment along the river.

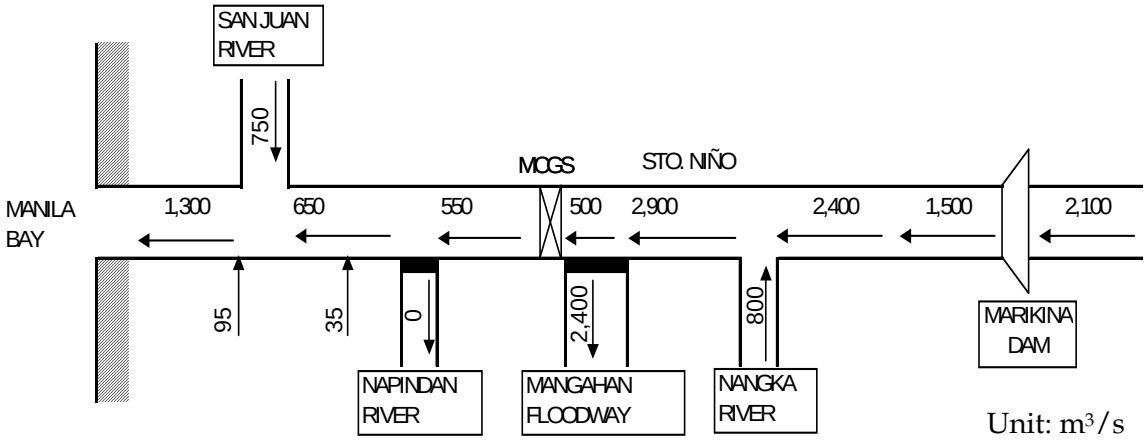
(1) To mitigate the frequent inundation or massive flooding caused by the overflowing of Pasig-Marikina River resulting in severe damages to lives, livestock, properties and infrastructure with the aim of alleviating the living and sanitary conditions in Metro Manila including parts of Rizal Province.

(2) To create a more dynamic economy by providing a flood-free urban center as an important strategy for furthering national development.

(3) To rehabilitate and enhance the favorable environment and aesthetic view along the riverside areas by providing with more ecologically stable condition which will arrest the progressive deterioration of environmental conditions, health and sanitation in Metro Manila.

#### 2.1.3 Overall Flood Control Plan

The updated Master Plan which was formulated in the "Study on Flood Control and Drainage Project in Metro Manila; JICA, March 1990" is premised on the project scale of a 100-year return period, and the estimated design discharges were reviewed in the on-going detailed engineering design as shown below:




Design Flood Discharge Distribution (100-Year Return Period)

The Master Plan is mainly composed of the River Channel Improvement and the Construction of Marikina Control Gate Structure (MCGS) and the Marikina Multipurpose Dam. The River Channel Improvement comprises improvement works for the Pasig, Marikina and San Juan Rivers.

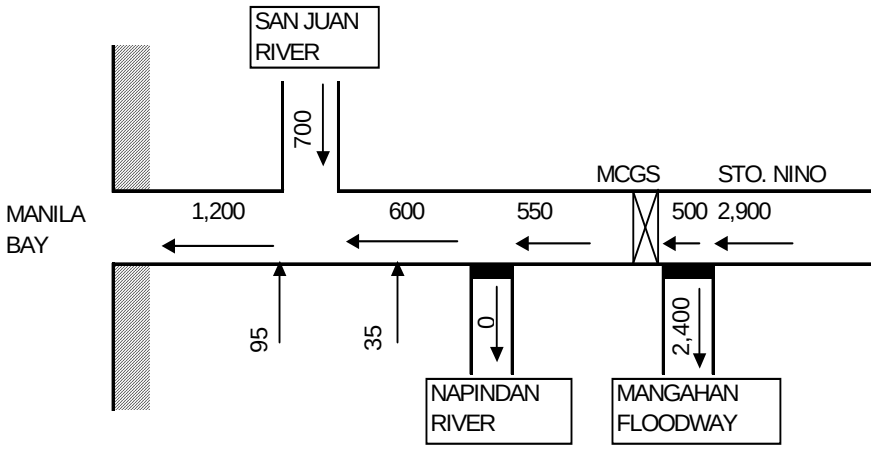
The Marikina Multipurpose Dam is proposed to be a concrete gravity type with a height of 70m to impound the water of 25,000,000 $m^3$ and to regulate the inflow flood of 2,100 $m^3/s$ down to 1,500 $m^3/s$.

## 2.2 Urgent Flood Control Plan

Based on the above Master Plan, the implementation of Urgent Flood Control Project was proposed and its Detailed Design (D/D) was carried out. Aiming at increasing the flow capacity and mitigating overflow of the Pasig-Marikina River, the Urgent Project consists of the improvements of Pasig River, the lower Marikina River and the upper Marikina River (for a stretch of about 30 km from the river mouth to Marikina Bridge, Marikina City) and the construction of MCGS. The construction of Marikina Multipurpose Dam and the improvement of the San Juan River are not included in the Urgent Project.

### 2.2.1 Design Flood Discharge

The design flood discharge distribution for 30-year return period is as presented below (as a result of D/D, some design discharges of Master Plan were changed; 1,300 to 1,200 $m^3/s$ and 650 to 600 $m^3/s$):




Unit: $m^3/s$

Design Flood Discharge Distribution at a 30-Year Return Period

### 2.2.2 River Channel Improvement

The channel improvement plan for the Pasig-Marikina River is prepared in accordance with the design criteria described below:

### (1) Design Channel Alignment

The design alignment of the channel shall conform to the existing channel course because of the difficulty of land acquisition and house evacuation in the urban area. Cut-off of meandering channel of the Pasig River at Sta. Ana, Manila City, is not planned.

### (2) Design Longitudinal Profile

No dredging work is proposed for the river improvement of the Pasig River. In the Marikina River, the riverbed profile primarily follows the average of the existing lowest riverbed to lower the high water level. The design high water level is determined from the result of hydraulic calculation.

To set the crown elevation of river wall and dike, the following freeboard corresponding to the design discharge is employed in accordance with "the DPWH Design Guidelines Criteria and Standards": 1.0 m for Pasig and Lower Marikina River.

### (3) Cross Section

For the Pasig River, the existing cross section is employed, because land acquisition and house evacuation are difficult. Likewise, no dredging work is employed. Widening of the Pasig and the Lower Marikina River is especially difficult because of the densely built-up residential, commercial and industrial areas.

In the Lower Marikina River, single trapezoidal section is basically applied to ensure the stability of channel slope. Widening of the channel is also difficult because of the densely built-up residential and industrial areas. The side slope of 2 (horizontal) is to 1 (vertical) is adopted.

In the Upper Marikina River, there are some open spaces being utilized for agriculture along the river channel except some stretches where factories and houses occupy the riverbanks. Widening of river channel is planned to confine the design flood discharge in agricultural areas. However, channel widening in house-congested areas is avoided as much as possible to reduce the number of houses to be evacuated.

## 2.3 Revised Implementation Schedule for Urgent Project Works

Taking into account the present situations, the implementation of the Urgent Project is revised as follows. Construction of the MCGS is deferred to the Phase IV.

| Implementing Phase | Works | Length to be Improved (Design Discharge) |
|---|---|---|
| II | Pasig River Channel Improvement (1) (Delpan Bridge to Napindan Channel) | 13.1 km on both banks (1,200 /600 $m^3$/s) |
| III | Lower Marikina River Channel Improvement (Napindan Channel to downstream of MCGS) | 5.4 km channel length (550 $m^3$/s) |
| | Pasig River Improvement (2) (Remaining Sections between Delpan Bridge and Napindan Channel) | 9.9 km on both banks (1,200 /600 $m^3$/s) |
| IV | Upper Marikina River & MCGS (MCGS to Marikina Bridge) | 7.9 km channel length (2,900 $m^3$/s) |

## 2.4 Phase III Project

In the context of the Urgent Flood Control Plan, the Phase III Project composes of:

(1) Lower Marikina River Improvement Works
(Napindan Channel to downstream of Manggahan Floodway: 5.40 km)

(2) Remaining Sections of Phase II in the Pasig River Channel Improvement Works
(Del Pan Bridge to Napindan Channel: 9.9 km in total on both banks)

Fig. 1 shows the implementation schedule of Phase III Project.

### 2.4.1 Lower Marikina River Improvement Works

The 5.4 km stretch of the Lower Marikina Rive Channel upstream from the junction with Pasig River shall be improved by the means of the following works:

| Work | Quantity |
|---|---|
| a) Dredging of Riverbed | 612,000 $m^3$ |
| b) Earth Dike | 1,814 m (3 locations) |
| c) River Wall | 337 m (1 location) |
| d) Boundary Bank | 7,063 m |
| e) Bridge Pier Protection | 4 Existing Bridges |

### 2.4.2 Remaining Sections of Pasig River Channel Improvement Works

There are 9.9 km long remaining sections along the Pasig River Channel which are not included in the ongoing Phase II project. These sections were more damaged by the flood caused by Typhoon "Ondoy" in September 2009 and require the urgent improvement works such as construction of concrete river walls and steel sheet pile supported revetments.

## 3. CONSULTING ENGINEERING SERVICES

In compliance with the construction works under the Phase III Project as stated above, the objectives and scope of Consulting Services to be conducted through the JICA's grant technical cooperation are enumerated as follows:

### 3.1 Objectives

The objectives of the consulting engineering services are to carry out the detailed design of Phase III project.

### 3.2 Scope of Services

The following matters shall be undertaken:

(1) Review of Detailed Design

This will cover the review of the results of the previously prepared plan, study and detailed design to identify the main points that require further investigation for the preparation of the detailed design of Phase III Project.

(2) Survey and Investigation

To update the required information and data, additional data will be collected and analyzed, including the present river condition, drainage condition, land utilization condition, existing structures, access roads, field laboratory, possible spoil/disposal areas, etc.

(3) Detailed Design

The detailed design shall be conducted with complete hydraulic and structural computations.

(4) Detailed Cost Estimate
(5) Preparation of Pre-qualification Documents
(6) Preparation of Tender Documents
(7) Review of Resettlement Action Plan (RAP) based on the results of Detailed Design
(8) Review of Environment Impact Statement and preparation of Environmental Management Plan

### 3.3 Work Schedule

The consulting engineering services shall be completed within the specified 8 months. The time schedule for Project Implementation including Consulting Services is shown in Fig. 1.

### 3.4 Expertise Required

For the consulting engineering services, the required experts and their man-months are tabulated below. The manning schedule is shown in Fig. 2.

| Item No. | Designation | Man-Month |
|---|---|---|
| **A.** | **Foreign Consultant** | |
| (1) | Project Manager | 8 |
| (2) | Drainage Engineer (I) | 8 |
| (3) | Structural Engineer (I) | 8 |
| (4) | Structural Engineer (II) | 8 |
| (5) | Construction Planner (I) | 6 |
| (6) | Cost Estimator (I) | 5 |
| (7) | Geodetic Engineer (I) | 4 |
| (8) | Contract Specialist (I) | 8 |
| (9) | Soil Mechanic Engineer | 3 |
| (10) | Resettlement Expert (I) | 2 |
| (11) | Environmentalist (I) | 2 |
| | **Sub-Total for A** | **62** |
| **B.** | **Local Consultant** | |
| (1) | River/Drainage Engineer (II) | 8 |
| (2) | Structural Engineer (III) | 8 |
| (3) | Structural Engineer (IV) | 8 |
| (4) | Construction Planner (II) | 6 |
| (5) | Cost Estimator (II) | 4 |
| (6) | Geodetic Engineer (II) | 6 |
| (7) | Contract Specialist (II) | 6 |
| (8) | Resettlement Expert (II) | 4 |
| (9) | Environmentalist (II) | 4 |
| | **Sub-Total for B** | **54** |
| | **Total for A + B** | **116** |

### 3.5 Equipment for the Consulting Engineering Services

The equipment to be produced by the Consultants for the smooth execution of the Consulting engineering services is listed in the following table.

| Particulars | | Unit | Quantity |
|---|---|---|---|
| 1 | Computer | set | 10 |
| 2 | Installation of LAN and System Equipment | system | 1 |

| | | | |
|---|---|---|---|
| 3 | Office Software for Computer | set | 10 |
| 4 | Engineering Software for Computer | set | 2 |
| 5 | Printer with accessories and spare parts | set | 3 |
| 6 | Photocopy Machine and Accessories (A3 size) | set | 1 |
| 7 | Plotter (A1 size) | set | 1 |
| 8 | Digital Camera and Monitoring Device | set | 2 |
| 9 | LCD Projector | set | 1 |
| 10 | Office Furniture and Fixture | lump sum | 1 |
| 11 | Facsimile equipment and accessories | set | 1 |
| 12 | Punching and Binding Machine | set | 1 |
| 13 | Auto Level (for Topographic-survey) | set | 1 |
| 14 | Total Station (for Topographic-survey) | set | 1 |
| 15 | Miscellaneous | lump sum | 1 |

## 4. UNDERTAKING OF THE GOVERNMENT OF THE PHILIPPINES

The Government of the Republic of the Philippines is prepared to provide the following to the Consultant in support of the consulting engineering services:

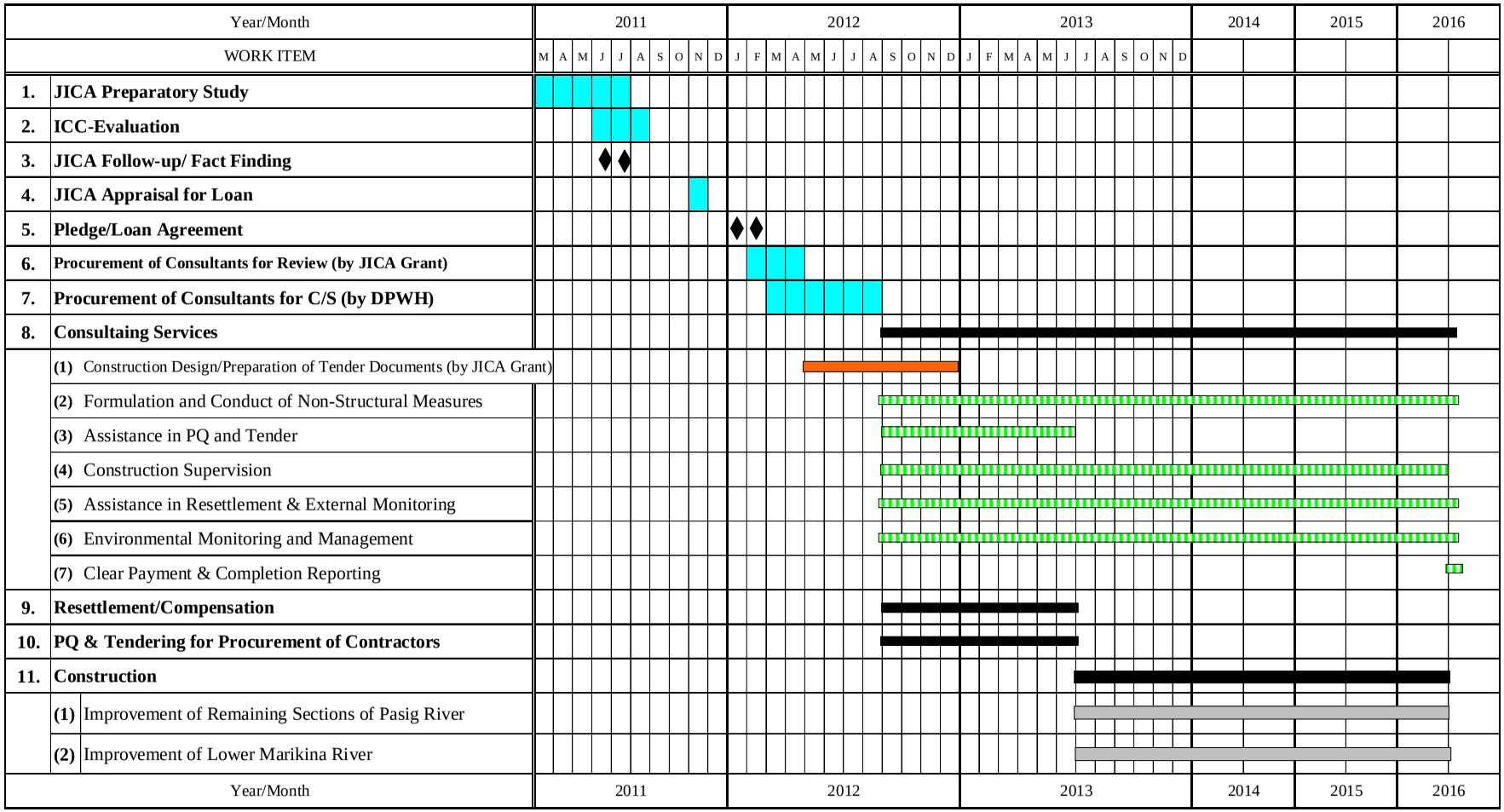
(1) Data, information and available documents relevant to the Project.

(2) Tax exemption for materials, machines, tools, equipment, stationery and others which will be required to conduct the engineering services.

(3) Arrangement of all necessary immigration procedures for the foreign experts.

(4) Assistance for giving security of life and property of the experts during their stay in the Philippines.

## Fig. 1 Implementation Schedule of the Phase III Project



## Fig. 2 Manning Schedule for Consulting Services (for D/D by JICA Grant)

| Designation | 2012 | | | | | | | | | | | | 2013 | | | | | | | | | | | | 2014 | | | | | | | | | | | | 2015 | | | | | | | | | | | | M/M |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | J | F | M | A | M | J | J | A | S | O | N | D | J | F | M | A | M | J | J | A | S | O | N | D | J | F | M | A | M | J | J | A | S | O | N | D | J | F | M | A | M | J | J | A | S | O | N | D | Total |
| | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **I. Expatriate Expert** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1) Project Manager | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 8 |
| 2) Drainage Engineer | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 8 |
| 3) Structural Engineer (I) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 8 |
| 4) Structural Engineer (II) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 8 |
| 5) Construction Planner (I) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 6 |
| 6) Cost Estimator (I) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 5 |
| 7) Geodetic Engineer (I) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 4 |
| 8) Contract Specialist (I) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 8 |
| 9) Soil Mechanic Engineer | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 3 |
| 10) Resettlement Expert (I) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2 |
| 11) Environmentalist (I) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2 |
| **Total** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | **62** |
| **II. Local Expert** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1) Drainage Engineer (II) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 8 |
| 2) Structural Engineer (III) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 8 |
| 3) Structural Engineer (IV) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 8 |
| 4) Construction Planner (II) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 6 |
| 5) Cost Estimator (II) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 4 |
| 6) Geodetic Engineer (II) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 6 |
| 7) Contract Specialist (II) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 6 |
| 8) Resettlement Expert (II) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 4 |
| 9) Environmentalist (II) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 4 |
| **Total** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | **54** |
| **III. Local Support Staff** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1) Administrative Officer | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 8 |
| 2) Secretary | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 8 |
| 3) Encoder (1) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 8 |
| 4) Encoder (2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 8 |
| 5) CAD Operator (1) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 8 |
| 6) CAD Operator (2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 8 |
| 7) Surveyor | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 8 |
| 8) Survey Aide (I) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 8 |
| 9) Survey Aide (II) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 8 |
| 10) Utilityman | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 8 |
| **Total** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | **80** |

# ANNEX 2 TERMS OF REFERENCE FOR CONSULTING ENGINEERING SERVICES ON THE CONSTRUCTION SUPERVISION OF PASIG-MARIKINA RIVER CHANNEL IMPROVEMENT PROJECT (PHASE III)

# TERMS OF REFERENCE
# FOR
# CONSULTING ENGINEERING SERVICES
# ON
# THE CONSTRUCTION SUPERVISION
# OF
# PASIG-MARIKINA RIVER CHANNEL
# IMPROVEMENT PROJECT
# (PHASE III)

**REPUBLIC OF THE PHILIPPINES**
**DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS**
**MANILA, PHILIPPINES**

## 1. BACKGROUND AND NECESSITY OF THE PROJECT

The Pasig-Marikina-San Juan River System, of which total catchment area is 621 $km^2$, 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 9.9 km and 19.9 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 11.5 million in 2010, is the economic, political and cultural center of the Philippines.

A Master Plan of flood control for the Pasig-Marikina River including the drainage in Metro Manila was prepared in 1954. In line with the flood control plan, the improvement works of the Pasig River, consisting mainly of river walls and revetments of the channel, were constructed in the 1970's. The Manggahan Floodway having a design flow capacity of 2,400 $m^3/s$ for diversion of flood from Marikina River to Laguna Lake was completed in 1988 to mitigate the flood damage due to the overflow of the lower Marikina River and Pasig River.

However, even though the completion of Manggahan Floodway, flood damages along the Pasig-Marikina River have been frequently experienced in last 25 years from 1986 to 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 existing flood problems in Metro Manila, in addition to the Manggahan Floodway, 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 updating/review of the F/S for the river channel improvement project through the Special Assistance for Project Formation (SAPROF) of JICA in 1998, the "Pasig-Marikina River Channel Improvement Project (PMRCIP)" was proposed for the implementation in the following four phases under the financial assistance of Japanese ODA:

(1) Phase I: Detailed Design for the Overall Project (29.7 km) from Delpan Bridge to Marikina Bridge

(2) Phase II: Channel Improvement Works for Pasig River (Delpan Bridge to Napindan River; 16.4 km)

(3) Phase III: Channel Improvement Works for Lower Marikina River including Construction of Marikina Control Gate Structure (MCGS) (Junction with Napindan River to Manggahan Floodway; 7.2 km)

(4) Phase IV: Channel Improvement Works for Upper Marikina River (Manggahan Floodway to Marikina Bridge; 6.1 km)

Following the SAPROF study, the Government of Japan through the JICA has decided to extend its loan to finance for the Phase I of the Project under 23rd Loan Package in June 1999. Thus, the Detailed Design (D/D) was carried out from October 2000 to March 2002.

On the other hand, since 1994, a flagship project named the Pasig River Rehabilitation Program (PRRP) has been implemented as a multi-agency undertaking to retrieve the beauty and lush greenery of the Pasig River as it used to be as early as the 15th century. In particular, the DPWH has been appointed for the civil works for flood mitigation, especially channel improvement. Both the National Housing Authority (NHA) and the concerned LGUs have undertaken to relocate all the informal settlers living along the Pasig River and its tributaries under the Pasig River Rehabilitation Commission (PRRC).

After the completion of the detailed design, the implementation of the Phase II Project for the Pasig River was approved by the ICC-Technical Board (TB) on July 26, 2002 and by the ICC-Cabinet Committee (CC) on August 01, 2002. Subsequent approval of the same by the NEDA Board was done September 03, 2002. Due to the change in project cost, re-approval of ICC-TB and ICC-CC was attained on March 06, 2003 and March 13, 2003, respectively. NEDA Board confirmation on the subject Project was given on May 06, 2003.

A meeting among JICA, DPWH, MMDA and NEDA was held on July 22, 2004 at the office of MMDA. The Chairman of MMDA still had a lot of queries that had to be addressed. This led to the conduct of a Value Engineering Study (VES) by the University of the Philippines-National Hydraulic Research Center (UP-NHRC) from June to September 2005. Results of the VES had been presented on March 10, 2006 to NEDA and MMDA wherein project approval has been made.

The construction of Phase II Project has been requested for financing under the 26th JICA Yen Loan Package (STEP: Special Term Economic Partnership). After the Loan Agreement for the Phase II Project dated February 27, 2007, pre-construction stage consisting of design review, pre-qualification of the contractors and tendering has started in December 2007. The construction 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 ongoing Phase II Project, it is proposed to implement the Phase III Project which is the Lower Marikina River Channel Improvement Works in total of 5.4 km from the immediate vicinity of NHCS (Napindan Hydraulic Control Structure) to the downstream of the junction with the Manggahan Floodway, excluding the construction of proposed MCGS. 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. These sections were not covered by the on-going Phase (II) Project.

To support for formulation of a Yen-Loan Project as “Phase-III”, the JICA has executed the Preparatory Study starting in September 2010 until July 2011 to review the existing Pasig-Marikina River Channel Improvement Plan, focusing on river improvement stretch covered by Phase III, in the course of the study for the whole river improvement stretch (from river mouth to Marikina Bridge) in Pasig-Marikina River Basin including the present river conditions reflecting recent river basin development, recent flood damage conditions and impacts to flood damage by future climate change.

## 2. PROJECT DESCRIPTION

### 2.2 Overall Project

### 2.1.1 Project Area

The Project Area for this whole flood control project is delineated in the most significant portion of the Pasig-Marikina River, i.e., the Pasig River from the river mouth to the Napindan Junction, the Lower Marikina River from the Napindan Junction to the effluent point of the Manggahan Floodway, and the Upper Marikina River from the Manggahan Floodway to St. Niño. This delineation considers the flood control effect as well as the social significance that the river passes through the core of Metro Manila.

### 2.1.2 Objectives of the Overall Project

The objectives of the overall Project are to mitigate the flood damage caused by channel overflow of the Pasig-Marikina River Channel, to facilitate the urban development and to enhance the favorable environment along the river.

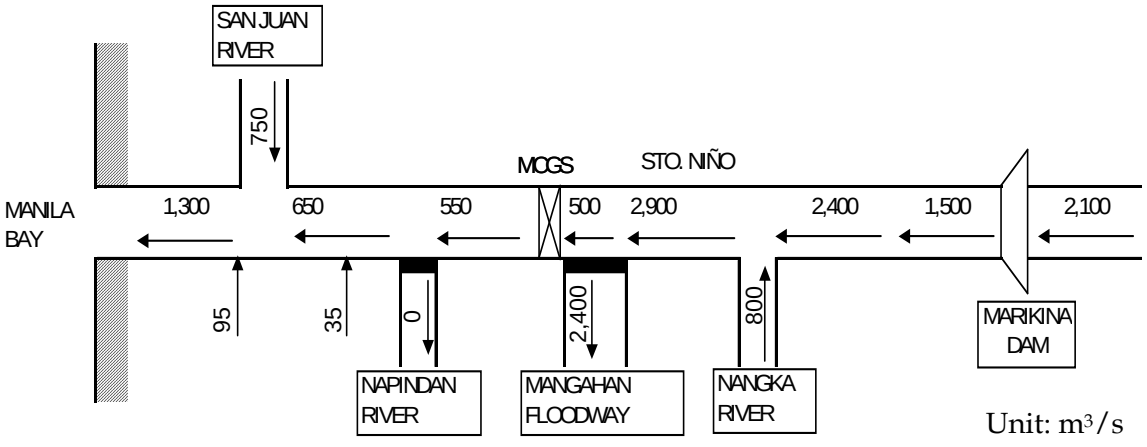
(1) To mitigate the frequent inundation or massive flooding caused by the overflowing of Pasig-Marikina River resulting in severe damages to lives, livestock, properties and infrastructure with the aim of alleviating the living and sanitary conditions in Metro Manila including parts of Rizal Province.

(2) To create a more dynamic economy by providing a flood-free urban center as an important strategy for furthering national development.

(3) To rehabilitate and enhance the favorable environment and aesthetic view along the riverside areas by providing with more ecologically stable condition which will arrest the progressive deterioration of environmental conditions, health and sanitation in Metro Manila.

### 2.1.3 Overall Flood Control Plan

The updated Master Plan which was formulated in the "Study on Flood Control and Drainage Project in Metro Manila; JICA, March 1990" is premised on the project scale of a 100-year return period, and the estimated design discharges were reviewed in the on-going detailed engineering design as shown below:




Design Flood Discharge Distribution (100-Year Return Period)

The Master Plan is mainly composed of the River Channel Improvement and the Construction of Marikina Control Gate Structure (MCGS) and the Marikina Multipurpose Dam. The River Channel Improvement comprises improvement works for the Pasig, Marikina and San Juan Rivers.

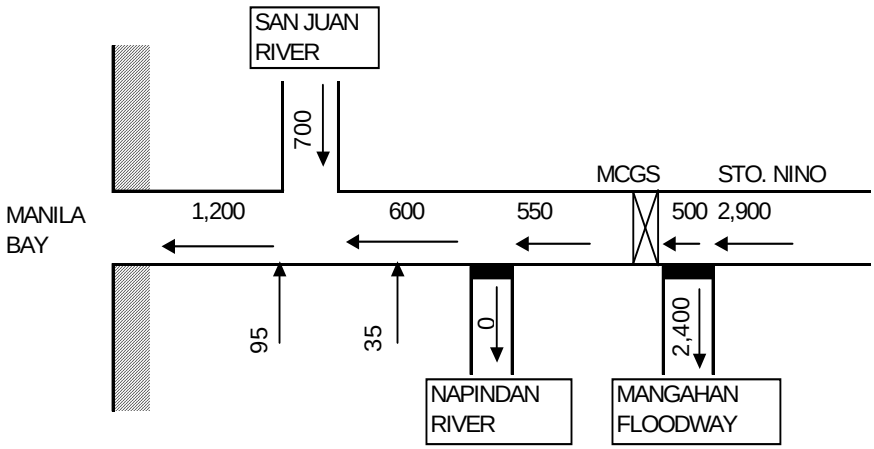
The Marikina Multipurpose Dam is proposed to be a concrete gravity type with a height of 70m to impound the water of 25,000,000 $m^3$ and to regulate the inflow flood of 2,100 $m^3/s$ down to 1,500 $m^3/s$.

## 2.2 Urgent Flood Control Plan

Based on the above Master Plan, the implementation of Urgent Flood Control Project was proposed and its Detailed Design (D/D) was carried out. Aiming at increasing the flow capacity and mitigating overflow of the Pasig-Marikina River, the Urgent Project consists of the improvements of Pasig River, the lower Marikina River and the upper Marikina River (for a stretch of about 30 km from the river mouth to Marikina Bridge, Marikina City) and the construction of MCGS. The construction of Marikina Multipurpose Dam and the improvement of the San Juan River are not included in the Urgent Project.

### 2.2.1 Design Flood Discharge

The design flood discharge distribution for 30-year return period is as presented below (as a result of D/D, some design discharges of Master Plan were changed; 1,300 to 1,200 $m^3/s$ and 650 to 600 $m^3/s$):




Unit: $m^3/s$

Design Flood Discharge Distribution at a 30-Year Return Period

### 2.2.2 River Channel Improvement

The channel improvement plan for the Pasig-Marikina River is prepared in accordance with the design criteria described below:

**(1) Design Channel Alignment**

The design alignment of the channel shall conform to the existing channel course because of the difficulty of land acquisition and house evacuation in the urban area. Cut-off of meandering channel of the Pasig River at Sta. Ana, Manila City, is not planned.

**(2) Design Longitudinal Profile**

No dredging work is proposed for the river improvement of the Pasig River. In the Marikina River, the riverbed profile primarily follows the average of the existing lowest riverbed to lower the high water level. The design high water level is determined from the result of hydraulic calculation.

To set the crown elevation of river wall and dike, the following freeboard corresponding to the design discharge is employed in accordance with "the DPWH Design Guidelines Criteria and Standards": 1.0 m for Pasig and Lower Marikina River.

**(3) Cross Section**

For the Pasig River, the existing cross section is employed, because land acquisition and house evacuation are difficult. Likewise, no dredging work is employed. Widening of the Pasig and the Lower Marikina River is especially difficult because of the densely built-up residential, commercial and industrial areas.

In the Lower Marikina River, single trapezoidal section is basically applied to ensure the stability of channel slope. Widening of the channel is also difficult because of the densely built-up residential and industrial areas. The side slope of 2 (horizontal) is to 1 (vertical) is adopted.

In the Upper Marikina River, there are some open spaces being utilized for agriculture along the river channel except some stretches where factories and houses occupy the riverbanks. Widening of river channel is planned to confine the design flood discharge in agricultural areas. However, channel widening in house-congested areas is avoided as much as possible to reduce the number of houses to be evacuated.

## 2.3 Revised Implementation Schedule for Urgent Project Works

Taking into account the present situations, the implementation of the Urgent Project is revised as follows. Construction of the MCGS is deferred to the Phase IV.

| Implementing Phase | Works | Length to be Improved (Design Discharge) |
|---|---|---|
| II | Pasig River Channel Improvement (1) (Delpan Bridge to Napindan Channel) | 13.1 km on both banks (1,200 /600 $m^3/s$) |
| III | Lower Marikina River Channel Improvement (Napindan Channel to downstream of MCGS) | 5.4 km channel length (550 $m^3/s$) |
| | Pasig River Improvement (2) (Remaining Sections between Delpan Bridge and Napindan Channel) | 9.9 km on both banks (1,200 /600 $m^3/s$) |
| IV | Upper Marikina River & MCGS (MCGS to Marikina Bridge) | 7.9 km channel length (2,900 $m^3/s$) |

### 2.4 Phase III Project

In the context of the Urgent Flood Control Plan, the Phase III Project composes of:

(1) Lower Marikina River Improvement Works
(Napindan Channel to downstream of Manggahan Floodway: 5.40 km)

(2) Remaining Sections of Phase II for the Pasig River Channel Improvement Works
(Del Pan Bridge to Napindan Channel: 9.9 km in total on both banks)

Fig. 1 shows the implementation schedule of Phase III Project.

#### 2.4.1 Lower Marikina River Improvement Works

The 5.4 km stretch of the Lower Marikina Rive Channel upstream from the junction with Pasig River shall be improved by the means of the following works:

| Work | Quantity |
|---|---|
| f) Dredging of Riverbed | 612,000 $m^3$ |
| g) Dike | 1,814 m (3 locations) |
| h) River Wall | 337 m (1 location) |
| i) Boundary Bank | 7,063 m |
| j) Bridge Pier Protection | 4 Existing Bridges |

#### 2.4.2 Remaining Sections of Pasig River Channel Improvement Works

There are 9.9 km long remaining sections along the Pasig River Channel which are not included in the ongoing Phase II project. These sections were more damaged by the flood caused by Typhoon "Ondoy" in September 2009 and require the urgent improvement works such as construction of concrete river walls and steel sheet pile supported revetments.

## 3. CONSULTING ENGINEERING SERVICES

In compliance with the construction works under the Phase III Project as stated above, the objectives and scope of Consulting Services are enumerated as follows:

### 3.3 Objectives

The objectives of the consulting engineering services are to carry out the followings:

(1) Assistance in pre-qualification and tendering;
(2) Construction supervision;
(3) Assistance in involuntary resettlement;
(4) Technical assistance for introduction and operation of non-structural measures;
(5) Environmental monitoring and management; and
(6) Transfer of technology.

### 3.4 Scope of Services

#### 3.2.1 Pre-construction Phase

The following matters shall be undertaken in the pre-construction stage:

(1) Assistance to the DPWH for the acceptance and evaluation of pre-qualification received from the applicants; and

(2) Assistance to the DPWH for the acceptance and evaluation of the tender documents from tenderers.

### 3.2.2 Construction Supervision Phase

The Consultant shall assist DPWH in the supervision of the project construction including but not limited to the followings:

**(1) Construction Supervision**

(a) Review and endorsement of proposed plans, design, scheduled and documents related to the project implementation and construction works which are submitted for approval by the Contractor;

(b) Monitoring and reporting to the DPWH on the progress of the work and accomplishment in relation to the schedule;

(c) File inspection of works as deemed necessary by the Consultant for performance and quality control works for the Contractor;

(d) Establishment of procedures for testing of construction materials and evaluation of tests conducted by the Contractor;

(e) Conduct of necessary inspection and testing of materials, manufacturer of products and equipment used in the Project;

(f) Verification of Contractor's survey, sounding and setting measurements of quantity for interim and final payment;

(g) Recommendation to the DPWH on the acceptance or rejection of the works, in whole or in part, in accordance with the specifications or conditions of contracts;

(h) Supervision and inspection of the work for adherence to plans and specifications;

(i) Supervision of additional field investigations when required;

(j) Advice on the method of measurement and computation of work, and assistance in the verification of contract progress and payment; and

(k) Supervision of the preparation of as-built drawings by the Contractor.

**(2) Design Adjustments**

The Consultant shall make revisions, modifications and/or adjustments of designs from time to time and as necessary in accordance with actual field conditions and the comments of the DPWH.

**(3) Preparation of Operation and Maintenance Manual**

The Consultant shall prepare the operation and maintenance manual of project facilities.

**(4) Assistance in the Involuntary Resettlement**

a) Assistance in the resettlement of displaced persons

- The Consultant shall assist the DPWH in the resettlement of the displaced persons, including the movement of the displaced persons.

- The Consultant shall follow up the resettlement of the displaced persons such as the monitoring of the living conditions at the relocation site.

- Further, the Consultant shall conduct the follow-up survey during the construction time by utilizing the appropriate external monitoring.

b) Assistance in Review and Strengthening of Livelihood Programs for the Displaced Persons

- The Consultant shall conduct the consultation with the displaced persons for the preparation of appropriate income restoration and improvement programs of their livelihood.

- The Consultant shall prepare the livelihood program by reflecting the actual needs and requests from the displaced persons.

- The Consultant shall formulate the task force with the concerned LGUs and prepare the appropriate income restoration and improvement plans such as assistance for the displaced persons to obtain assistance from micro-credit programs or other sources to improve income-generating activities.

- The Consultant shall conduct the appropriate livelihood program for the improvement of the income and living status of the displaced persons.

**(5) Environmental Monitoring and Management**

The Consultant shall carry out the environmental monitoring, evaluation and management during the construction stage, including formation of multipartite monitoring team, preparation of monitoring program and establishment of environmental monitoring and management system..

**(6) External Monitoring for Involuntary Resettlement**

External monitoring shall be periodically conducted by a local university or a NGO, independent of this Consultant, under the sub-contract of consulting services.

### 3.3 Technical Assistance of Introduction and Operation of Non-structural Measures

The Consultant shall assist the DPWH, MMDA and LGUs in the introduction and operation of non-structural measures such as Information Campaign, Establishment of Web-site, Elaboration of Hazard Map and Overseas Training.

**(1) Information Campaign and Publicity**

The DPWH which is the implementing agency for the Project shall be the lead office for this conduct of campaign and publicity. Other governmental offices such as Philippines Information Agency (PIA), Pasig Rehabilitation Commission (PRRC), Department of Environment and Natural Resources (DENR), Office of the Civil Defense (OCD), PAGASA, MMDA, Local Government Unit (LGUs) and Non-Governmental Organizations (NGOs) shall be extensively involved in the implementation of the Information Campaign/Publicity. The DPWH will make all the coordination and arrangement with the said agencies concerned and provide necessary data/information to the Consultants. The activities and contents of Information Campaign and Publicity are as follows:

(a) Formulation of Campaign Plan
(b) Conceptualize, design and produce information materials
(c) Conduct community-based explanatory discussion

(d) Public Hearing
(e) Caravan operation involving schools, government officials, Barangay Officers, etc.
(f) Development of community-based project motivators
(g) Establishment of community-based information centers
(h) Undertake mass media exposure and public relation activities
(i) Continuous linkages with national/local government units

**(2) Establishment of Web-Site**

The establishment of website aims at information dissemination regarding activities and flood mitigation projects implemented by FMC members such as DPWH, MMDA and so on, and water level monitored by EFCOS. Objectives of the dissemination are (1) to provide the water level information for Command Centers of LGUs which strongly eager to gain the information for their quick response against a flood disaster and (2) to release the importance, significance and progress regarding river Improvement, flood mitigation facilities and flood warning system for stakeholders in Pasig-Marikina river basin.

The DPWH, the representative agency of FMC, will make all the coordination and arrangement with the MMDA and LGUs concerned and provide necessary data/information to the Consultants. The equipment and apparatus to operate website would be installed in the compound of EFCOS Project Office in consideration of an effective utilization of electronic devises which had already installed in the office.

The major points of the establishment of website are summarized:

(a) Timely Water Level Information
(b) Activities and Projects regarding flood mitigation by FMC
(c) Monitoring station to disclose water levels and LGUS to be transmitted the information should be selected through discussions with DPWH, MMDA and LGUs
(d) Education and training through the Information Campaign and Publicity should be carried out to have a correct understanding of the information for the information receiver in LGUs.

**(3) Elaboration of Hazard Map**

The flood hazard map will be prepared by utilizing past study results by donors (for example, exposure data base and flood maps to be prepared by assistance of AusAID), and information regarding flood mitigation/evacuation facilities from relative agencies such as DPWH and LGUs. Area along the channel in Pasig City will be nominated as a target area in which there was deeply inundated by Typhoon “Ondoy” and which is adjacent city of the construction site of the Phase III Project.

The Consultant shall assist DPWH and LGUs to establish the Hazard Map with the description of evacuation routes, evacuation centers and means of evacuation corresponding to timing of evacuation and scale of floods. In addition, as for the evacuation, the gender issues will be also considered and reflected on the Flood Hazard Map, for instance, in such a way that conditions as to evacuation centers and routes are described to enable vulnerabilities and feminine gender to properly evacuate to a hospitable place.

Objectives of the establishment of hazard map are as follows: (1) to serve as a model for other LGUs in Pasig-Marikina River Basin, (2) to facilitate flood evacuation activities and to be utilized for review of action plan on flood disaster risk reduction in Pasig City, and (3) to assist the capacity building in respect to the efficient utilization of information for the flood risk reduction.

The contents of the elaboration and utilization of flood hazard map are; Elaboration of Hazard

Map and Implementation of Seminar

**(4) Overseas Training Course**

Training will be conducted during the construction stage to visit overseas rivers which similar in hydrological characteristic to the Pasig-Marikina River. The training course is composed of site visit, presentation by and discussion with related agencies, which would be carried out to learn plans, measures and regulations for the integrated flood mitigation.

### 3.4 Reporting

The Consultant shall prepare and submit the following reports and documents to the DPWH.

#### 3.4.1 Construction Supervision

a) Inception Report (10 copies), two (2) months after the commencement of the services, to present the detailed work plan and program of the services including recommendations for possible alternative plans and/or designs, if any, for discussion.

b) Monthly Progress Report (20 copies), to present the details of expert personnel mobilization, progress of work, financial man-month used, problems encountered and the anticipated services for the next period of the services, including progress on resettlement activities.

c) Quarterly Progress Report (10 copies) to present the project progress status.

d) Pre-qualification Evaluation Report (10 copies) to present the results of the evaluation and to select the qualified applicants.

e) Tender Evaluation Report (10 copies) to present the results of the tenders to select the most responsible contractors.

f) Operation and Maintenance Manual (20 copies) containing technical procedures for the appropriate operation and maintenance of all project facilities.

g) Environmental Monitoring and Management Report (10 copies) shall be submitted at every six (6) months after the commencement of the services, presenting the environmental evaluation and management during and after the construction stage.

h) Bimonthly Resettlement Progress Report (10 copies) containing the progress of resettlement activities.

i) Service Completion Report (20 copies), at the completion of all the consulting engineering services.

#### 3.4.2 Introduction of Non-structural Measures

**(1) Information Campaign and Publicity of the Project**

a) Inception Report (10 copies) shall be submitted two (2) months after the commencement of the services, presenting the detailed work plan and program of the information campaign and publicity.

b) Bimonthly Progress Report (10 copies) shall be submitted presenting the details of expert personnel mobilization, work progress, problems encountered and the anticipated

services for the next period of services.

c) Service Completion Report (20 copies) shall be submitted at the completion of the services, compiling a summary of the whole period of the services, the implementation program and results of campaign and publicity.

**(2) Establishment of Website**

a) Inception Report (10 copies) shall be submitted one (1) months after the commencement of the services, presenting the detailed work plan and conception of website.

b) Service Completion Report (20 copies) shall be submitted at the completion of the services, which should indicate contents of the website, and ways to use and to update the website.

**(3) Elaboration of Hazard Map**

a) Inception Report (10 copies) shall be submitted one (1) months after the commencement of the services, presenting the detailed work plan and program for making the hazard map.

b) Service Completion Report (20 copies) shall be submitted at the completion of the services, compiling a summary of the whole period of the services, a procedure of elaboration, and ways to renewal and to utilize the map

c) Presentation Materials (30) shall be made for 1st Seminar and the Materials (30) for 2nd Seminar

### 3.5 Work Schedule

The consulting engineering services shall be completed within the time specified below:

| | | |
|---|---|---|
| (1) | Pre-construction | : 10 months |
| (2) | Construction Supervision | : 36 months |
| (3) | Preparation of Completion Report | : 2 months |
| (4) | Assistance in Resettlement | : 38 months |
| (5) | Introduction of Non-structural Measures | : 38 months |
| (6) | Environmental Monitoring | : 38 months |
| (7) | Transfer of Knowledge | : 38 months |

A total of 48 months of consulting engineering services will be required for the Project. The time schedule for Project Implementation including Consulting Services is shown in Fig. 1.

### 3.6 Expertise Required

For the consulting engineering services, the required experts and their man-months are tabulated below. The manning schedule is shown in Fig. 2.

| Item No. | Designation | Man-Month |
|---|---|---|
| **A.** | **Foreign Consultant** | |
| (1) | Project Manager | 48 |
| (2) | Drainage Engineer I | 38 |
| (3) | Structural Engineer I | 38 |
| (4) | Construction Engineer I | 38 |
| (5) | Geodetic Engineer I | 4 |
| (6) | Contract Specialist I | 10 |

| | | |
|---|---|---|
| (7) | Environmentalist I | 6 |
| (8) | Hydrologist (Hazard Map & Website) | 15 |
| (9) | Socio-Economist (Hazard Map) | 3 |
| | **Sub-Total for A** | **200** |
| **B.** | **Local Consultant** | |
| (1) | Co-Project Manager | 48 |
| (2) | Drainage Engineer II | 38 |
| (3) | Structural Engineer II | 38 |
| (4) | Structural Engineer III | 38 |
| (5) | Construction Engineer II | 38 |
| (6) | Quality Control Engineer I | 38 |
| (7) | Quality Control Engineer II | 38 |
| (8) | Quantity Surveyor I | 38 |
| (9) | Quantity Surveyor II | 38 |
| (10) | Geodetic Engineer II | 38 |
| (11) | Geodetic Engineer III | 38 |
| (12) | GIS-Engineer (Website) | 8 |
| (13) | Computer System Engineer (Website) | 8 |
| (14) | Institutional Specialist (Hazard Map) | 8 |
| (15) | Environmentalist II | 48 |
| (16) | Resettlement Expert | 48 |
| (17) | Media Specialist | 48 |
| (18) | Community Organizer | 48 |
| (19) | Graphic Artist | 48 |
| | **Sub-Total for B** | **692** |
| | **Total for A + B** | **892** |

### 3.7 Equipment for the Consulting Engineering Services

The equipment to be produced by the Consultants for the smooth execution of the Consulting engineering services is listed in the following table.

| Particulars | | Unit | Quantity |
|---|---|---|---|
| 1 | Computer | **SET** | 13 |
| 2 | Installation of LAN and System Equipment | system | 1 |
| 3 | Office Software for Computer | set | 13 |
| 4 | Engineering Software for Computer | set | 5 |
| 5 | Printer with accessories and spare parts | set | 6 |
| 6 | Photocopy Machine with Sorter & Accessories (A3 size, Color, Scanner) | set | 1 |
| 7 | Plotter (A1 size) | set | 1 |
| 8 | Digital Camera and Monitoring Device | set | 4 |
| 9 | LCD Projector | set | 1 |
| 10 | Office Furniture and Fixture | lot | 1 |
| 11 | Facsimile equipment and accessories | set | 1 |
| 12 | Punching and Binding Machine | set | 1 |
| | Topographic Survey Instrument | Lump sum | 1 |
| 13 | Miscellaneous | Lump sum | 1 |

## 4. UNDERTAKING OF THE GOVERNMENT

The Government of the Republic of the Philippines is prepared to provide the following to the Consultant in support of the consulting engineering services:

(1) Data, information and available documents relevant to the Project.

(2) Tax exemption for materials, machines, tools, equipment, stationery and others which will be required to conduct the engineering services.

(3) Arrangement of all necessary immigration procedures for the foreign experts.

(4) Assistance for giving security of life and property of the experts during their stay in the Philippines.

## 5. APPLICABILITY OF SPECIFIC PROVISIONS OF JICA GUIDELINES TO THE CONSULTANCY CONTRACT

In compliance with the JICA Guidelines for the Employment of Consultants under the Japanese ODA Loans, March 2009, the following sections shall be applied:

Section 2.02 Responsibilities of Consultants

(3) In the case of a difference of opinion between the DPWH and the consultant on any important matters involving professional judgment that might affect the proper evaluation or execution of the project, the DPWH shall allow the consultant to submit promptly to the DPWH a written report and, simultaneously, to submit a copy to JICA. The DPWH shall forward the report to JICA with its comments in time to allow JICA to study it and communicate with the DPWH before any irreversible steps are taken in the matter. In cases of urgency, a consultant shall have the right to request the DPWH and/or JICA that the matter be discussed immediately between the DPWH and JICA.

Section 2.06 monitoring by JICA

(1) The DPWH is responsible for supervising the consultant's performance and ensuring that the consultant carries out the assignment in accordance with the contract. Without assuming the responsibilities of the DPWH or the consultant, JICA may monitor the work as necessary in order to satisfy itself that it is being. Carried out in accordance with appropriate standards and is based on acceptable data.

(2) As appropriate, JICA may take part in discussions between the DPWH and the consultant. However, JICA shall not be liable in any way for the implementation of the project by reason of such monitoring or participation in discussions. Neither the DPWH nor the consultant shall be released from any responsibility for the project by reason of JICA's monitoring or participation in discussion.

## Fig. 1 Implementation Schedule of the Phase III Project

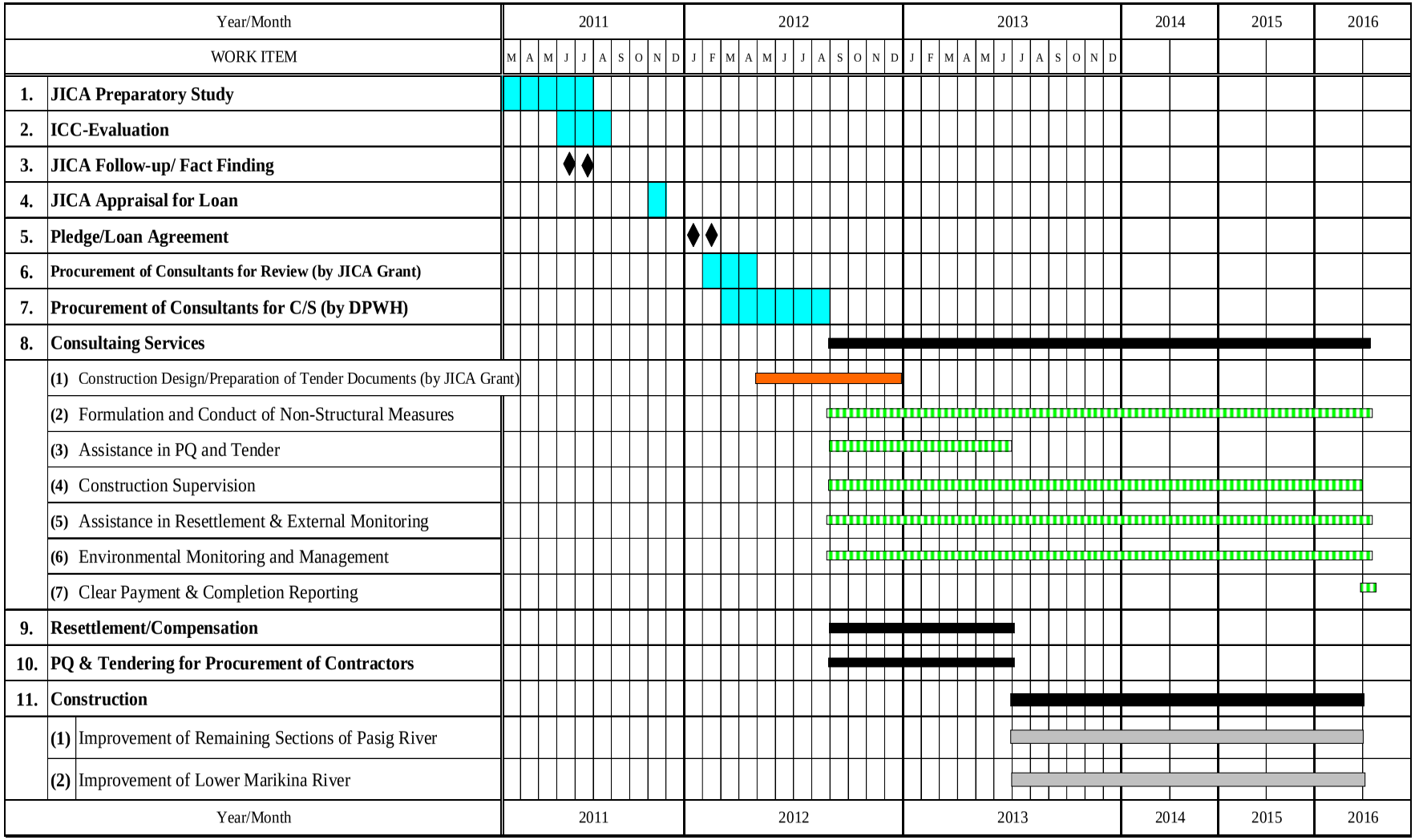
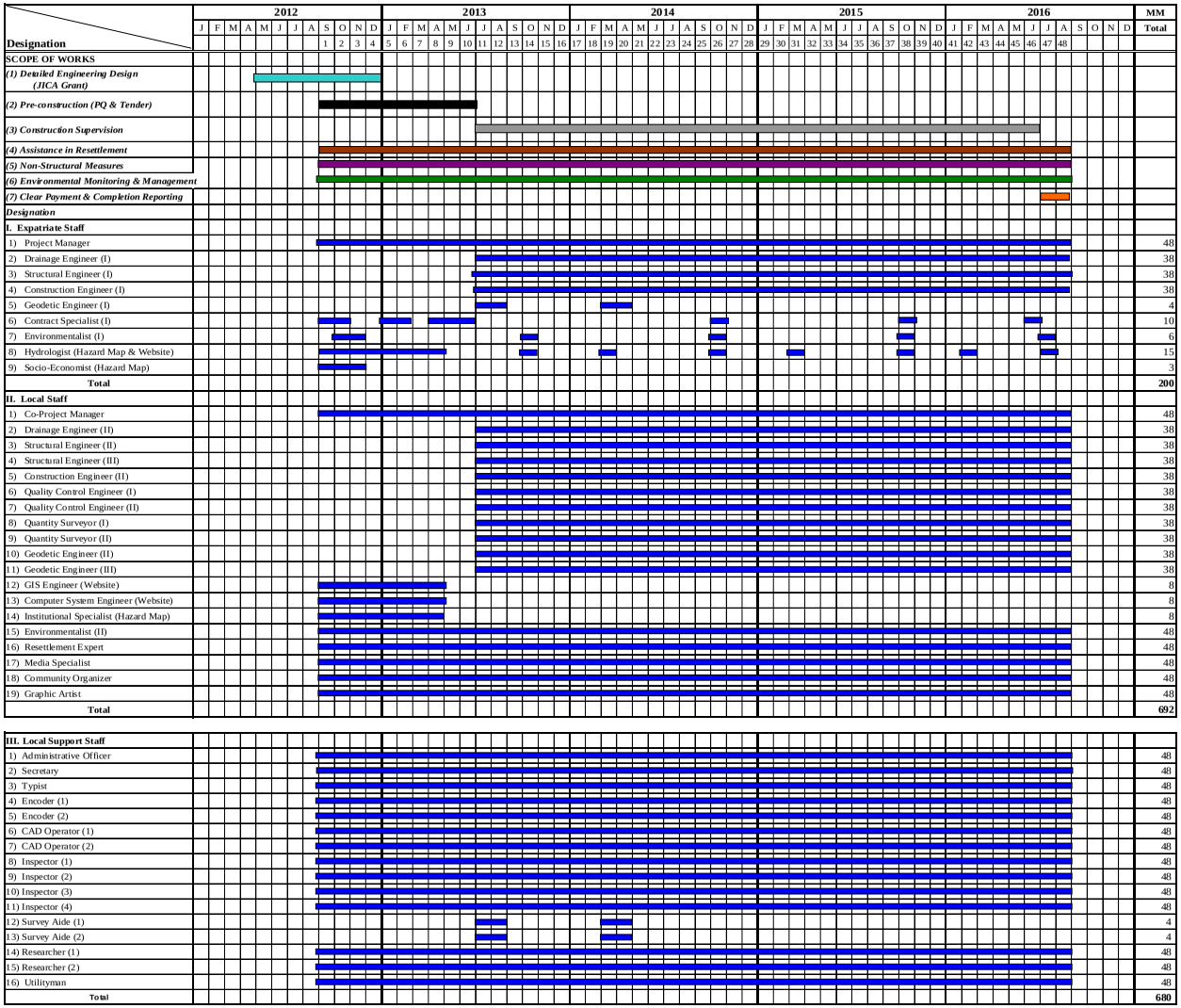


**Fig. 2 ASSIGNMENT SCHEDULE FOR CONSULTING SERVICES (for Construction Supervision Stage)**



# 2. Resettlement Action Plan (DRAFT)

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

# PASIG-MARIKINA RIVER CHANNEL IMPROVEMENT PROJECT (PHASE III)

# RESETTLEMENT ACTION PLAN

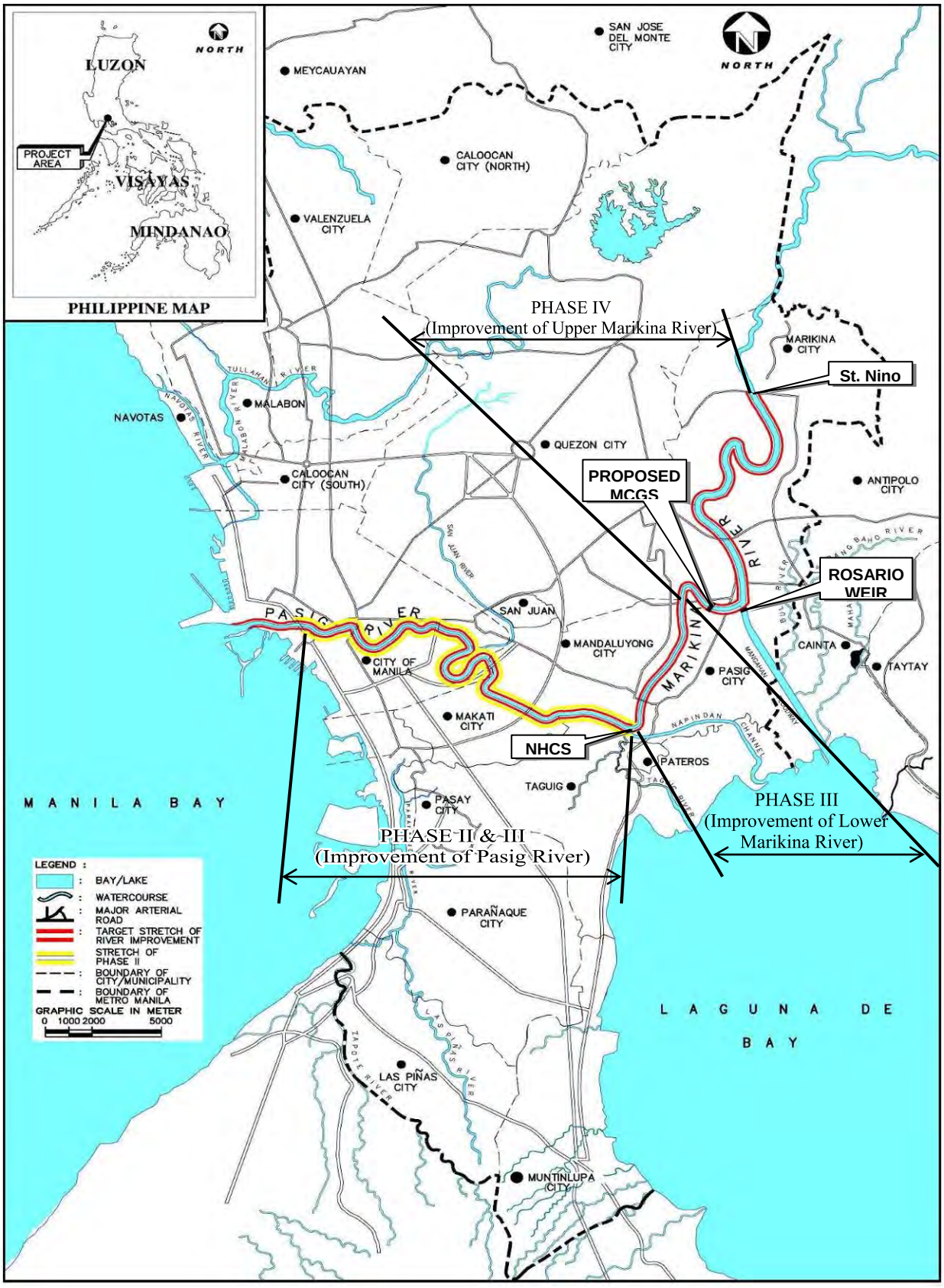
## IN ACCORDANCE WITH THE JICA RESETTLEMENT GUIDELINES/POLICIES FOR SOCIAL CONSIDERATIONS

**SEPTEMBER 2011**

**PASIG-MARIKINA RIVER CHANNEL IMPROVEMENT PROJECT (PHASE III)**

## Conditional Clause on the RAP Implementation Schedule

“Table 38. RAP Implementation Schedule" was prepared based on the most updated project schedule available. The schedule may have differences with the schedules proposed in the Main Report and the Implementation Plan (I/P).




**PROJECT LOCATION MAP**

# Resettlement Action Plan



Appendix

# CHAPTER 1 PROJECT DESCRIPTION

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 in 2010, is the economical, political and cultural center of the Philippines.

However, even though the completion of Manggahan Floodway, flood damages along the Pasig-Marikina River have been frequently experienced for the 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 flooding problems in Metro Manila, the necessity of river channel improvement of Pasig-Marikina River has been further studied. The Department of Public Works and Highways (DPWH) conducted an 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 System from January 1988 to March 1990 with technical assistance from the Japan International Cooperation Agency (JICA), called "The Study on Flood Control and Drainage Project in Metro Manila"

Based on the updating/review of the F/S for the river channel improvement project through Special Assistance for Project Formation (SAPROF) of JICA under the financial assistance of Japanese Overseas Development Assistance (ODA) in 1998, the "Pasig-Marikina River Channel Improvement Project (PMRCIP)" was proposed for implementation in the following four (4) phases:

(1) Phase I : Detailed Design for the Overall Project from Delpan Bridge to Marikina Bridge; 29.7 km

(2) Phase II : Channel Improvement Works for Pasig River (Delpan Bridge to Napindan River); 6.4 km

(3) Phase III : Channel Improvement Works for Lower Marikina River including Construction of Marikina Control Gate Structure (MCGS) (Junction with Napindan River to Mangahan Floodway); 7.2 km

(4) Phase IV: Channel Improvement Works for Upper Marikina River (Mangahan Floodway to Marikina Bridge); 6.1 km

The Detailed Design (D/D) for the whole PMRCIP was conducted in October 2000 and completed in March 2002 under the JBIC (now JICA) 23rd Yen Loan Package. Thus, the PMRCIP (Phase II) has been requested for financing under the 26 th JICA Yen Loan

Package (STEP: Special Term Economic Partnership), eventually commenced its construction/civil works in July 2009 which is scheduled for completion in June 2012

Since Tropical Storm “Ondoy” occurred in September 2009 caused tremendous damages in Metro Manila, it is urgently needed to complete the whole scheme of the PMRCIP to protect the Metro Manila areas against further flood disaster.

Following the ongoing PMRCIP (Phase II), implementation of the PMRCIP (Phase III) has subsequently being proposed which will cover channel improvement along the Lower Marikina River with a total stretched of 5.4 km from the confluence point with Napindan Channel to Diversion Point of Mangahan Floodway, excluding however the construction of MCGS. Also, inclusion of heavily deteriorated bank sections in the Pasig River caused by the recent floods including Tropical Storm 'Ondoy' is proposed to be considered/included in the said Phase III Project. These are sections not covered under the on-going Phase (II) Project. The project coverage area for the PMRCIP (Phase III) is located in the cities of Manila, Mandaluyong, Makati and Pasig in Metro Manila.

The major scope of the proposed PMRCIP (Phase III) is summarized below:

1. Construction of revetment with reinforced concrete river wall supported by the steel sheet piles along the Pasig River (total length = approximately 9.90 km on both banks: revetment with river wall = 7.50 km, river wall only = 2.40 km)

2. Dredging of Lower Marikina River (total length = 5.40 km; total volume = approximately 612,000 $m^3$)

3. Construction of dike/revetment, river wall and boundary banks along Lower Marikina River (dike/revetment = 1.70 km, river wall = 0.34 km, boundary bank = 7.06 km)

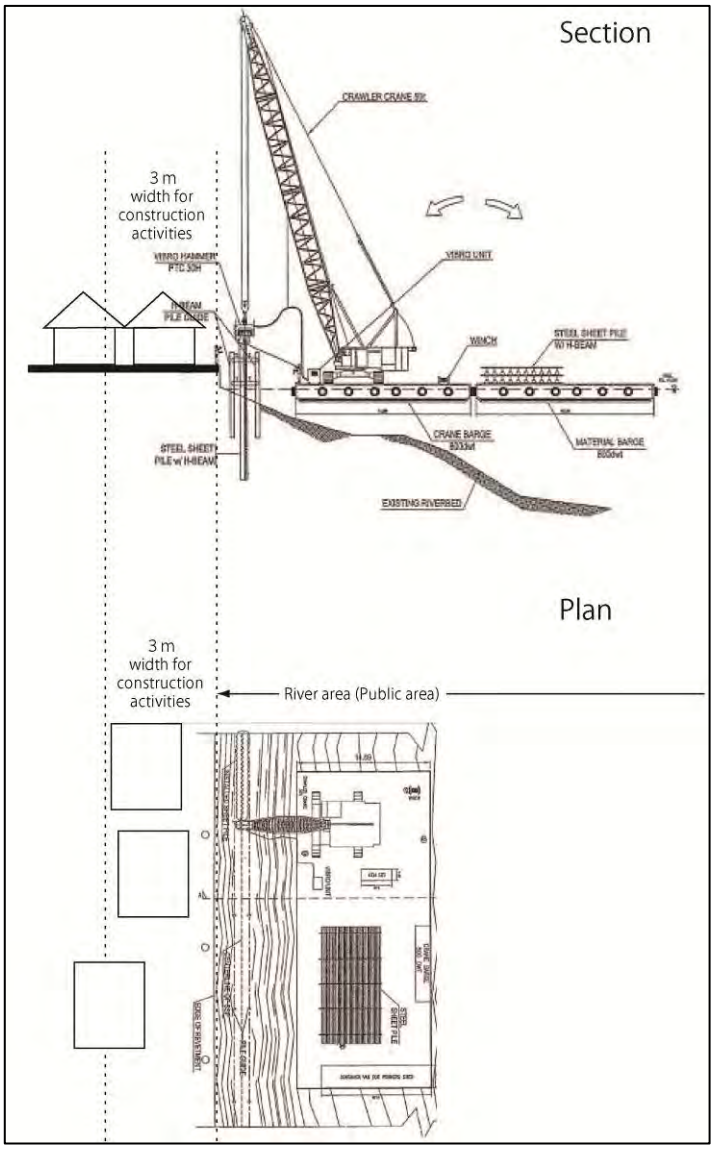



**Figure 1 Typical Design of River Improvement Works on Pasig River**


| Structure on existing parapet wall | Structure on the bank without river wall |
|---|---|

**Figure 2 Existing Condition of River Bank Sections along Pasig River**

**Figure 3 Images of Similar Construction Work on Pasig River**

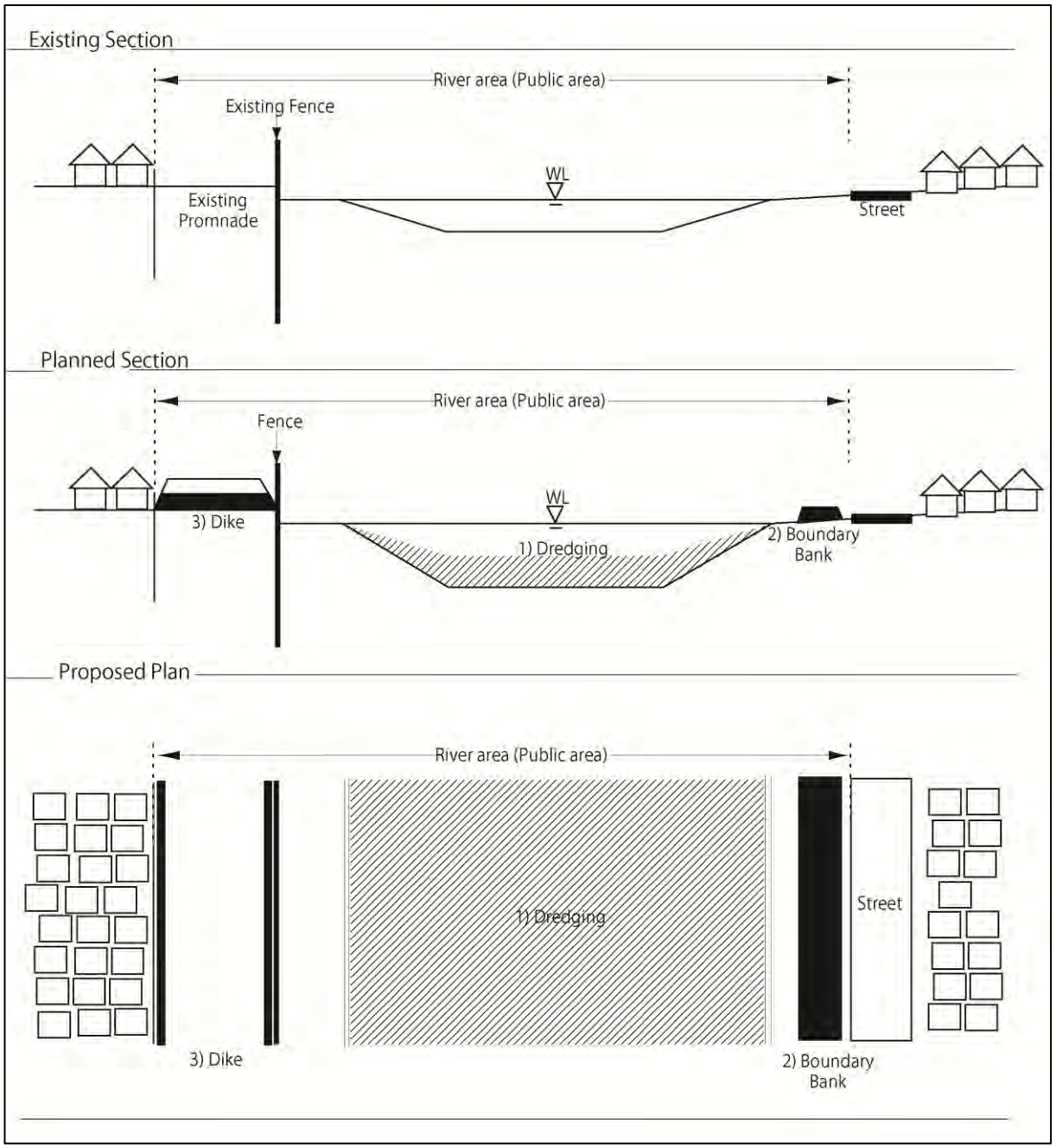



**Figure 4 Schematic Design of River Improvement Works along Lower Marikina River**

| | | |
|---|---|---|
|  |  |  |
| At the foot of Rosario Bridge | Existing outer wall of High School | Existing promenade |

**Figure 5 Existing Condition of Lower Marikina River**

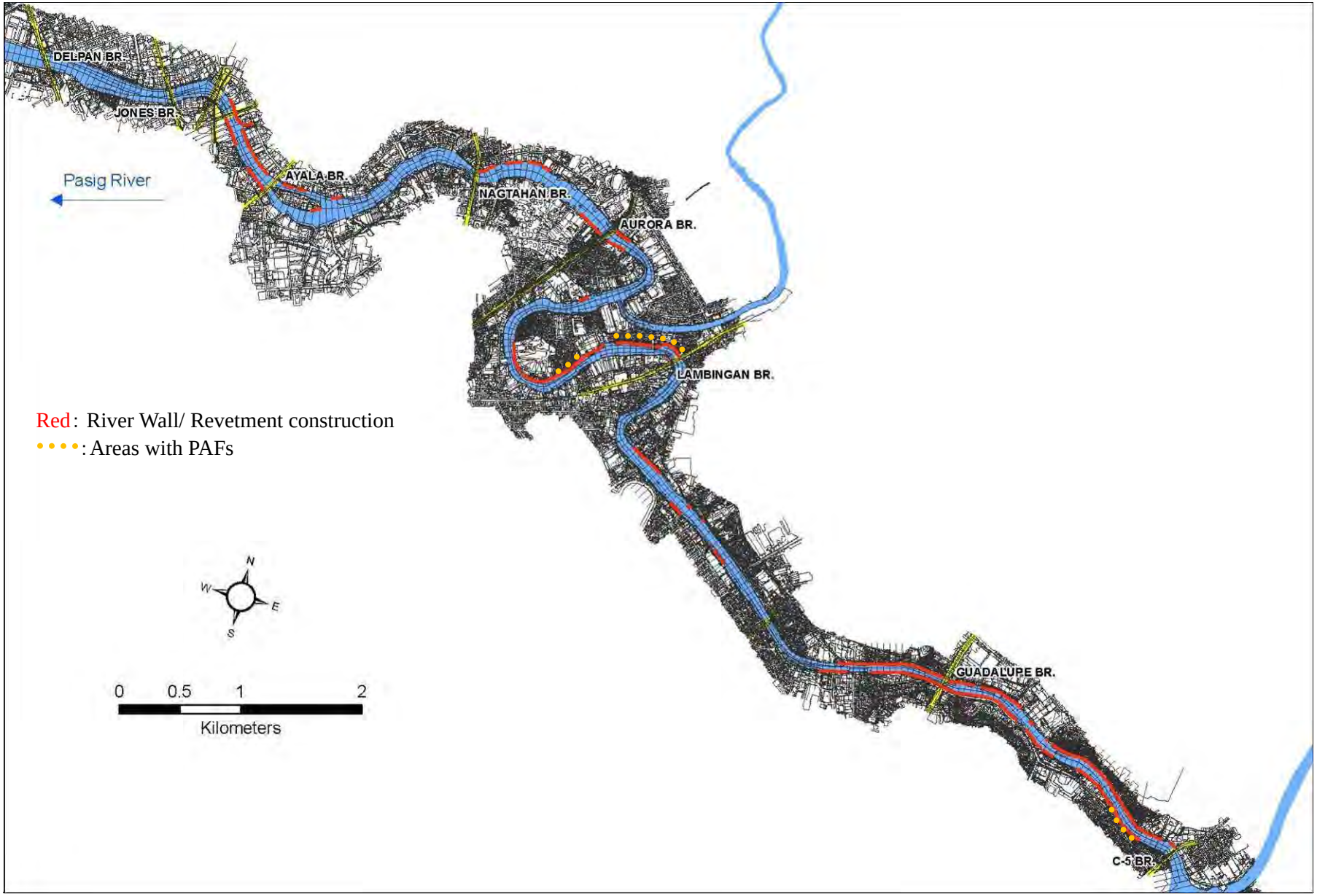



**Figure 6 Proposed River Improvement Works along Pasig River**

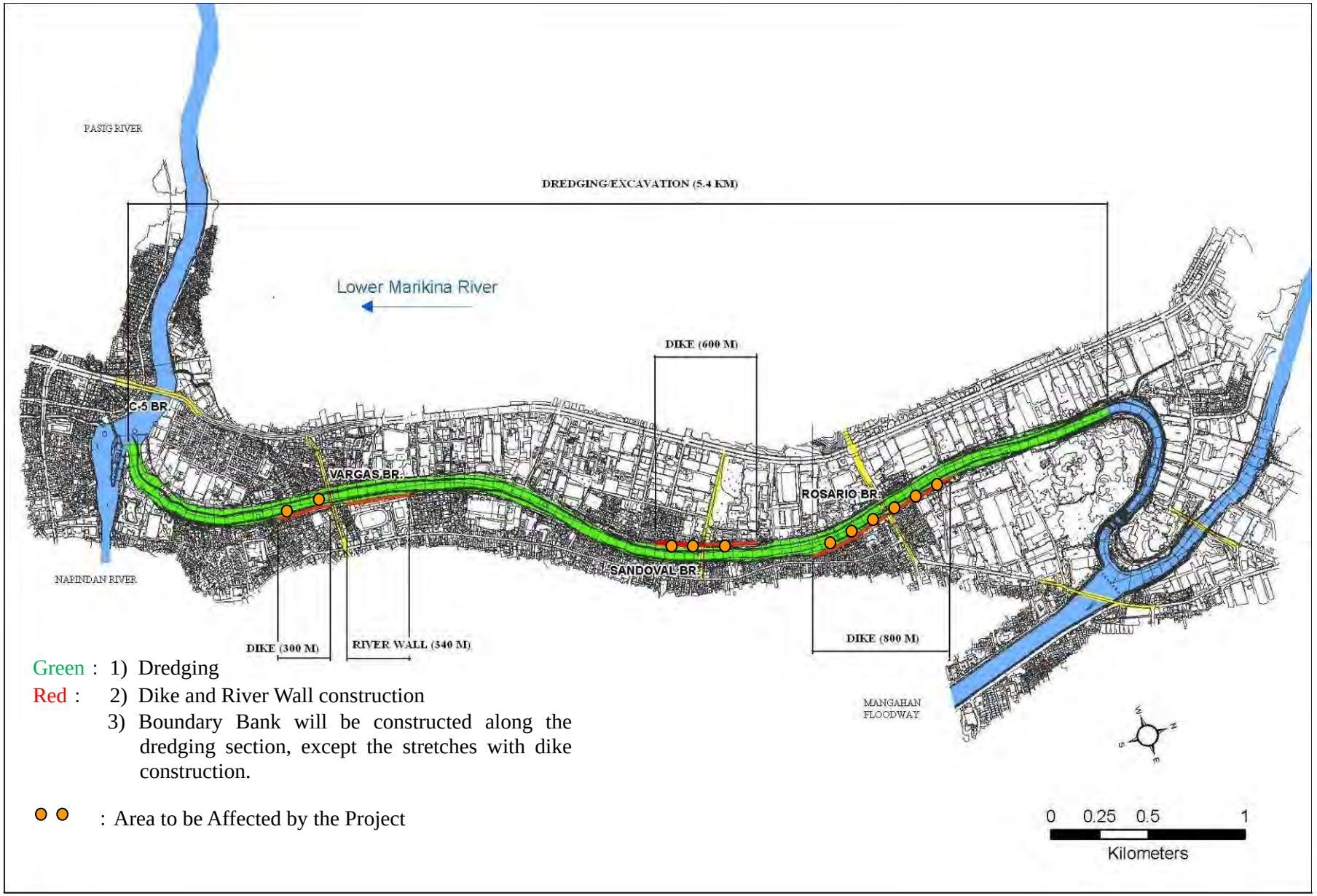



**Figure 7 Proposed River Improvement Works along Lower Marikina River**

# CHAPTER 2 POTENTIAL IMPACTS BY THE PROJECT

## 2.1 Identification of the Project Components that Give Rise to Resettlement and their Zone of Impact

The resettlements of the Project Affected Families (PAFs) and compensation for improvements are mainly caused by the implementation of the proposed PMRCIP (Phase III).

The proposed structures under the Project are to be constructed within the right-of-way limits (easement) of the river. Hence, the existing structures/improvements, cultivated lands situated within the riverbanks will be affected by the construction works.

At some sections, construction of revetment with steel sheet pile foundation will affect the existing houses situated on the said river easement area.

On the other hand, construction of the proposed dikes will temporarily affect the existing promenades (river parks), since, said dikes will be constructed thereat. However, during construction, temporary access road will be provided, in addition to the existing road at the city-side of the houses, so no loss of accessibility to residences is expected.

There is also no public infrastructure and social service facility identified to be affected by the Project.

In addition, there is no acquisition of private land is necessary for the project, since, construction of the entire scope of the project is covered by the river area, thus, considered as a public domain, only temporary used of private lands for the contractors' yards will be needed during construction..

## 2.2 Identification of the Alternative Measures Considered to Avoid or Minimize the Resettlement Impact

The Pasig-Marikina River flows in the center of Metro Manila which is the capital of the country. Both banks of the river are within the urban area, occupied with residential houses, factories, offices, roads, etc.

To increase the flow capacity of the river channel for flood control, alternative measures such as river channel widening and deepening, heightening of river wall as well as short-cut of channel have been studied as shown in Tables 1 and 2 below:

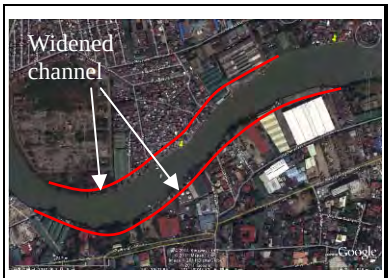
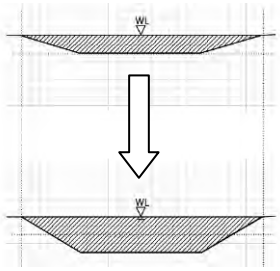
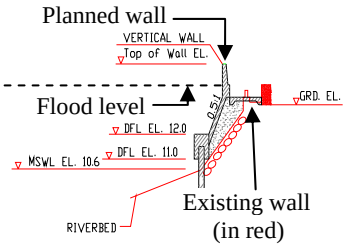
Therefore, among the above-mentioned alternative measures, (b) deepening of existing river channel (dredging) and (c) construction of higher river walls within the river channel were selected to be applied for the project in order to avoid or minimize the social problems on land acquisition and resettlement.

In addition, the construction methodology to be applied for the project will be a river based operation wherein construction materials, machines, and equipment will be brought in and out to the project site through river transportation, thus, most of the construction works will be undertaken using equipment on barge. With this operational plan, temporary resettlements are avoided during construction works.

**Table 1 Identification of the Alternative Measures Considered to Avoid or Minimize Resettlement Impacts**

| Goal | Alternatives | | Applied in project plan |
|---|---|---|---|
| To increase the flow capacity of river channel | a | Widening of channel | No (Land acquisition is necessary,. resulting to large scale of resettlement of PAPs) |
| | b | Deepening of channel | Yes |
| | c | Heightening of river wall | Yes |
| | d | Short-cut of meandering river channel | No (Land acquisition is necessary, also resulting to large scale of resettlement of PAPs) |
| To avoid and minimize the social problem of land acquisition and resettlement | e | Use of ground transportation and operation on ground. | No (Will cause traffic congestion,. and temporary displacement of residents caused by construction of access roads necessary for ground operation.) |
| | f | Use of river transportation and barges for construction materials, machines, equipment, and construction works. | Yes |

**Table 2 Schematic Images of the Alternative Measures Considered to Avoid or Minimize Resettlement**

| | | |
|---|---|---|
|  |  |  |
| a. Widening of river channel will require large scale resettlement of formal and informal settlers, businesses, and public facilities. | **b. Deepening of existing river channel will increase flow capacity without land acquisition and resettlement.** | **c. Heightening of river wall within the river channel will increase the flow capacity without land acquisition likewise, minimized resettlement.** |
|  |  |  |
| d. Short-cut of meandering river channel will bring the flood water faster down to ocean which is effective for flood control, but it requires large scale resettlement and land acquisition. | e. Use of ground transportation will cause traffic congestion with more than 100 dump trucks on major roads (mainly 2-lane) per day, likewise, operation on the ground will need access road for heavy equipments and stock yard which might cause temporary displacement of the residents currently living where the proposed access road will be constructed | **f. Use of river transportation and barges for construction materials, machines, equipments, and construction works will minimize disturbance on the ground. Impact on said river operation is expected to be minimal.** |

**Bold : Applied in Project plan.**

# CHAPTER 3 OBJECTIVES OF THE RESETTLEMENT ACTION PLAN

The Resettlement Action Plan (RAP) for the PMRCIP (Phase III) was formulated to ensure a just compensation and peaceful relocation procedure prior to the commencement of the project in accordance with the appropriate and applicable laws, policies and/or guidelines of the country as well as taking into consideration the policies/guidelines of the International Financing Institution particularly the World Bank and JICA's Resettlement Guidelines/Policies for Social Considerations, and other related institutions.

The objectives of this RAP are as follows:

- Provide project impact assessment to the Project Affected Families (PAFs);
- Quantify the private and public properties which shall not be taken for public use without just compensation;
- Present a strategic scheme/plan to ensure proper resettlement of the PAFs in a timely manner;
- Recognize and consider the involvement of the PAFs in the implementation of the RAP;
- Provide necessary resources that may be needed, particularly the funds needed for the social component of the project which include among other cost for the resettlement of the PAFs;
- Provide livelihood/income restoration.

# CHAPTER 4 SOCIO ECONOMIC INFORMATION AND RESTTLEMENT IMPACTS

## 4.1 Population Census

In total, there are 58 households and population of 204 of Informal Settler Families (ISFs) are expected to be affected by the implementation of the project and required to be resettled,[1] [2](Table 4).

Besides those residents, there are 16 Absentee Structure Owners (ASO). Detailed information of said ASO will be gathered during the community participation process which will be conducted prior to the commencement of resettlement activities.

The Cut-Off date of the RAP for this Project is November 2010. However, in case there is no resettlement activities conducted after two years from the said cut-off date, the census data shall be updated which is in November 2012 in accordance with the World Bank Operational Policy (OP) 4.12.

The project scopes and its impacts will be reviewed during the Detailed Design which is scheduled to be started in 2012, thus, validation of census/tagging survey will be conducted.

**Table 3 Dates of Census Commencement**

| River | City | Barangay | Starting Date |
|---|---|---|---|
| Pasig River | Manila | 894, 897 | 12 Nov. 2010 |
| | Manila | 896, 900 | 13 Nov. 2010 |
| | Makati | West Rembo | 18 Nov. 2010 |
| Lower Marikina River | Pasig | Ugong | 5 Nov. 2010 |
| | Pasig | Bagong Ilog | |
| | Pasig | Maybunga | |
| | Pasig | Caniogan | 4 Nov. 2010 |

## 4.2 Land and Asset Survey

There is no permanent acquisition of private lands necessary for the implementation of the Project.

Only temporary use of two (2) private lands for temporary storage of material, etc. will be needed during implementation of the project.

All affected structures, improvements, crops and trees are required to be removed.

[1] See Appendix 1 : TOR for Census Survey and Socio-Economic Study, Appendix 2 : Survey Format Sheet, and Appendix 3 : Master List of PAF and Structure.

[2] It is recognized that Pasig City has an on-going relocation program for the informal settlers living on the danger areas based on RA 7279, and this program covers the informal settlers living on the easement area along the Lower Marikina River. Such informal settlers are not covered by this RAP as they will not be affected by the construction works of the Project.

## Table 4 Number of PAFs / PAPs

| Type of loss | Number of Affected Households | | | Number of Affected Population | | |
|---|---|---|---|---|---|---|
| | Formal | Informal | Total | Formal | Informal | Total |
| **Required for displacement** | **-** | **58** | **58** | **-** | **204** | **204** |
| 1. Structure owner on public land | - | 49 | 49 | - | 163 | 163 |
| 2. Structure owner on private land | - | - | - | - | - | - |
| 3. Renters | - | 7 | 7 | - | 29 | 29 |
| 4. Rent-free Occupants (Sharers) | - | 2 | 2 | - | 12 | 12 |
| 5. Commercial and business enterprises owners on public land | - | - | - | - | - | - |
| 6. Commercial and business enterprises owners on private land | - | - | - | - | - | - |
| 7. Community owned structures including physical cultural resources | - | | - | - | - | - |
| **Not required for displacement** | **2** | **90** | **92** | **-** | **-** | **-** |
| 8. Land owners (temporary use of lands) | 2 | - | 2 | - | - | - |
| 9. Structure owners not residing in the project affected area (Absentee house owners) | - | 16 | 16 | - | - | - |
| 10. Owners of improvements, crops and trees that will be affected | - | 74 | 74 | - | - | - |
| 11. Wage earners | - | - | - | - | - | - |
| **Grand Total (1 – 10)** | **2** | **148** | **150** | **-** | **204** | **204** |

*

## Table 5 Number of Structures to be Affected 100 %

| LGU | Barangay | Salvaged | Light | Mixed | Strong | Total |
|---|---|---|---|---|---|---|
| Manila | Barangay 900 | 0 | 2 | 12 | 12 | 26 |
| | Barangay 896 | 0 | 0 | 13 | 5 | 18 |
| | Barangay 897 | 1 | 1 | 6 | 1 | 9 |
| | Barangay 894 | 0 | 0 | 2 | 0 | 2 |
| Makati | West Rembo | 0 | 1 | 2 | 2 | 5 |
| Pasig | Bagong Ilog | 0 | 0 | 0 | 0 | 0 |
| | Ugong | 0 | 0 | 0 | 0 | 0 |
| | Caniogan | 0 | 0 | 0 | 0 | 0 |
| | Maybunga | 0 | 0 | 0 | 0 | 0 |
| | Total | 1 | 4 | 35 | 20 | 60 |

## Table 6 Number of Improvements to be Affected 100 %

| LGU | Barangay | Fence | Pig Pen | Dog House | Pigeon House | Chicken Pen | Deep Well | Kitchen | Shack |
|---|---|---|---|---|---|---|---|---|---|
| Manila | Barangay 900 | 0 | 2 | 6 | 0 | 0 | 0 | 0 | 0 |
| | Barangay 896 | 0 | 1 | 8 | 0 | 0 | 0 | 0 | 0 |
| | Barangay 897 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 |
| | Barangay 894 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Makati | West Rembo | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Pasig | Bagong Ilog | 1 | 0 | 8 | 0 | 0 | 0 | 0 | 0 |
| | Ugong | 0 | 0 | 5 | 0 | 5 | 3 | 0 | 3 |
| | Caniogan | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| | Maybunga / Rosario (Under confirmation) | 1 | 0 | 20 | 1 | 27 | 1 | 5 | 12 |
| | Total | 2 | 3 | 46 | 1 | 32 | 4 | 5 | 15 |
| | Grand Total | 108 | | | | | | | |

Animals are not covered for compensation, because PAFs can bring them to relocation site if they wish.

**Table 7 Number of Gardens and Trees to be Affected**

| LGU | Barangay | Garden / Field | Trees (Fruit, timber) |
|---|---|---|---|
| Manila | Barangay 900 | 0 | 0 |
| | Barangay 896 | 8 | 0 |
| | Barangay 897 | 0 | 0 |
| | Barangay 894 | 0 | 0 |
| Makati | West Rembo | 1 | 0 |
| Pasig | Bagong Ilog | 2 | 20 |
| | Ugong | 19 | 284 |
| | Caniogan | 0 | 0 |
| | Maybunga / Rosario (Under confirmation) | 29 | 580 |
| Total | | 59 | 884 |

### 4.3 Socio-Economic Survey of the Identified Project Affected Families

Following are the findings about the profile of the PAFs. The survey was conducted in November 2010.

The sharers are counted as separate households from the structure owner families living in the same house.

#### 4.3.1 Demography of PAFs Residing in the Project Affected Areas

In total, 58 households (204 people) along the Pasig River are to be resettled caused by the channel improvement works along the Pasig River. They are counted in 5 Barangays in Manila and Makati Cities. For the channel improvement works along the Lower Marikina River, no households are found to be affected.

During census surveyed, all the PAFs have found no legal title to the land they are occupying, thus, considered as Informal Settlers Families (ISFs).

**Table 8 Number of PAFs to be Resettled and Structures to be Removed/Demolished**

| Bank of Pasig River | LGU | | Barangay | Households | Population | Structures | Cut-Off Date |
|---|---|---|---|---|---|---|---|
| Right | Manila | 1 | Barangay 900 | 26 | 96 | 26 | 13 Nov. 2010 |
| Right | | 2 | Barangay 896 | 13 | 28 | 18 | 13 Nov. 2010 |
| Right | | 3 | Barangay 897 | 7 | 35 | 9 | 12 Nov. 2010 |
| Right | | 4 | Barangay 894 | 2 | 2 | 2 | 12 Nov. 2010 |
| Left | Makati | 5 | West Rembo | 10 | 43 | 5 | 18 Nov. 2010 |
| | | | Total | 58 | 204 | 60 | |

Looking at the size of households, a quarter portions of the households has only one member and majority (53.4 %) of the households have equal to or less than 3 members.

**Table 9 Size of Households**

| Number of Household Members | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Manila | Barangay 900 | HH | 4 | 3 | 5 | 6 | 5 | 1 | 0 | 0 | 0 | 2 | 26 |
| | Barangay 896 | HH | 8 | 2 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 13 |
| | Barangay 897 | HH | 1 | 0 | 1 | 0 | 3 | 0 | 1 | 0 | 1 | 0 | 7 |
| | Barangay 894 | HH | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| Makati | West Rembo | HH | 0 | 4 | 0 | 2 | 0 | 2 | 1 | 1 | 0 | 0 | 10 |
| Total | | HH | 15 | 9 | 7 | 8 | 8 | 4 | 3 | 1 | 1 | 2 | 58 |
| % | | % | 25.9 | 15.5 | 12.1 | 13.8 | 13.8 | 6.9 | 5.2 | 1.7 | 1.7 | 3.4 | 100 |

Looking at sex ratio of the total population, the number of male and female are almost the same.

**Table 10 Population by Gender**

| | | Male | Female | Total |
|---|---|---|---|---|
| Manila | Barangay 900 | 47 | 49 | 96 |
| | Barangay 896 | 21 | 7 | 28 |
| | Barangay 897 | 17 | 18 | 35 |
| | Barangay 894 | 1 | 1 | 2 |
| Makati | West Rembo | 21 | 22 | 43 |
| Total | | 107 | 97 | 204 |
| % | | 52.5 | 47.5 | |

Among the total 204 persons, 14 are younger than the school age, 21 were those for elementary school, 8 were those for high school, and 24 were those for college. The number of senior citizens over 65 years of age was 7. Majority of the population were working, ages from 21 to 59 years old.

**Table 11 Age Structure : Children and Senior People**

| Age range | Manila | | Makati | | Total | |
|---|---|---|---|---|---|---|
| | N | % | N | % | N | % |
| 0 to 6 years old | 9 | 5.59% | 5 | 11.63% | 14 | 6.9% |
| 7 to 12 years old | 12 | 7.45% | 9 | 20.93% | 21 | 10.3% |
| 13 to 16 years old | 7 | 4.35% | 1 | 2.33% | 8 | 3.9% |
| 17 to 20 years old | 18 | 11.18% | 6 | 13.95% | 24 | 11.8% |
| 21 to 59 years old | 101 | 62.73% | 20 | 46.51% | 121 | 59.3% |
| 60 to 64 years old | 9 | 5.59% | 0 | 0.00% | 9 | 4.4% |
| 65 and over | 5 | 3.11% | 2 | 4.65% | 7 | 3.4% |
| TOTAL | 161 | 100.00% | 43 | 100.00% | 204 | 100.0% |

Among the 58 households, there are few persons who are in need of special care in the arrangement of relocation.

**Table 12 People Who Need Special Care (Multiple Answer)**

| | | HH | Physical and mental disabilities | Needing assistance to walk | Needing special medical care | Seriously ill | Difficulty in commu-nicating | Migrant/s from other countries |
|---|---|---|---|---|---|---|---|---|
| Manila | Barangay 900 | 26 | 0 | 0 | 0 | 1 | 0 | 0 |
| | Barangay 896 | 13 | 0 | 0 | 1 | 0 | 0 | 1 |
| | Barangay 897 | 7 | 0 | 0 | 0 | 0 | 0 | 2 |
| | Barangay 894 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Makati | West Rembo | 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | | 58 | 0 | 0 | 1 | 1 | 0 | 3 |

### 4.3.2 Income and Occupation

The poverty line in NCR (National Capital Region) in 2007 is P 19,345 per month.

Distribution of the income of 58 households shows that about 88 %, or 51 households, earned P 20,000 or less in a month, and belongs below the poverty line.

The minimum daily wage in the Metro Manila in 2010 is P 404 per day. When multiplied by 30, the monthly wage will be P 12,120, and the amount is about equal to the typical income of the majority of the target households.

**Table 13 Monthly Family Income**

| Income per month | | Manila | Makati | Total |
|---|---|---|---|---|
| P 3,000 or less | Count | 1 | 1 | 2 |
| | % | 2.08% | 10.00% | 3.4% |
| P 3,001 to 6,000 | Count | 7 | 1 | 8 |
| | % | 14.58% | 10.00% | 13.8% |
| P 6,001 to 10,000 | Count | 8 | 4 | 12 |
| | % | 16.67% | 40.00% | 20.7% |
| P 10,001 to 15,000 | Count | 20 | 2 | 22 |
| | % | 41.67% | 20.00% | 37.9% |
| P 15,001 to 20,000 | Count | 5 | 2 | 7 |
| | % | 10.42% | 20.00% | 12.1% |
| P 20,001 to 30,000 | Count | 4 | 0 | 4 |
| | % | 8.33% | 0.00% | 6.9% |
| P 30,001 to 40,000 | Count | 1 | 0 | 1 |
| | % | 2.08% | 0.00% | 1.7% |
| P 40,001 to 50,000 | Count | 2 | 0 | 2 |
| | % | 4.17% | 0.00% | 3.4% |
| P 50,001 or more | Count | 0 | 0 | 0 |
| | % | 0.00% | 0.00% | 0.0% |
| TOTAL | Count | 48 | 10 | 58 |
| | % | 100.00% | 100.00% | 100.00% |

Poverty line Source: Annual Per Capita Poverty Thresholds by Province, 2006 – 2007 (preliminary estimates as of 02 March 2007) http://www.nscb.gov.ph/poverty/2006-2007/pov_th_07.asp [2011/01/25 18:34:46])

The occupations of the household heads vary. Major income source of household heads are listed in Table 14.

**Table 14 Major Income Source of Household Heads**

| Type of income | Manila | | | | Makati | Total | % |
|---|---|---|---|---|---|---|---|
| | Barangay 900 | Barangay 896 | Barangay 897 | Barangay 894 | West Rembo | | |
| Employee | 10 | 5 | 4 | 0 | 2 | 21 | 36.2% |
| Pensioner | 4 | 3 | 0 | 0 | 2 | 9 | 15.5% |
| Own business/ self-employed | 2 | 0 | 2 | 0 | 0 | 4 | 6.9% |
| Driller assistant | 1 | 1 | 0 | 2 | 0 | 4 | 6.9% |
| Laborer/ carpenter/ mason construction worker | 3 | 0 | 0 | 0 | 0 | 3 | 5.2% |
| Driller | 0 | 3 | 0 | 0 | 0 | 3 | 5.2% |
| Vendor | 1 | 0 | 0 | 0 | 1 | 2 | 3.4% |
| Computer technician | 1 | 0 | 0 | 0 | 1 | 2 | 3.4% |
| Driver | 0 | 0 | 0 | 0 | 1 | 1 | 1.7% |
| OFW (Overseas Filipino Workers) remittance | 1 | 0 | 0 | 0 | 0 | 1 | 1.7% |
| Service personnel/ delivery boy | 1 | 0 | 0 | 0 | 0 | 1 | 1.7% |
| Security guard | 0 | 0 | 0 | 0 | 1 | 1 | 1.7% |
| Carenderia/ eatery/ burger stand | 0 | 0 | 0 | 0 | 1 | 1 | 1.7% |
| Cutter/ cutter dispatcher | 1 | 0 | 0 | 0 | 0 | 1 | 1.7% |
| Sewer/ tailor | 0 | 1 | 0 | 0 | 0 | 1 | 1.7% |
| Security guard | 0 | 0 | 0 | 0 | 1 | 1 | 1.7% |
| Teacher | 0 | 0 | 1 | 0 | 0 | 1 | 1.7% |
| Government employee | 1 | 0 | 0 | 0 | 0 | 1 | 1.7% |
| TOTAL | 26 | 13 | 7 | 2 | 10 | 58 | 100.0% |

Besides the household heads, 48 household members have occupations listed in Table 15.

**Table 15 Occupation of Household Members**

| Occupation | Manila | | | | Makati | Total |
|---|---|---|---|---|---|---|
| | Barangay 900 | Barangay 896 | Barangay 897 | Barangay 894 | West Rembo | |
| Office staff | 4 | 1 | 1 | 0 | 0 | 6 |
| Service/ delivery crew | 3 | 1 | 0 | 0 | 0 | 4 |
| Security guard | 0 | 0 | 1 | 0 | 3 | 4 |
| Private company employee | 2 | 2 | 0 | 0 | 0 | 4 |
| Driver | 2 | 1 | 0 | 0 | 0 | 3 |
| Cook | 2 | 0 | 0 | 0 | 1 | 3 |
| Promotion lady | 0 | 0 | 1 | 0 | 2 | 3 |
| Hotel/ restaurant personnel/ crew | 1 | 0 | 0 | 1 | 0 | 2 |
| Construction/ laborer | 1 | 1 | 0 | 0 | 0 | 2 |
| Factory worker | 2 | 0 | 0 | 0 | 0 | 2 |
| OFW | 1 | 0 | 1 | 0 | 0 | 2 |
| Dental technician | 1 | 0 | 0 | 0 | 1 | 2 |
| Municipal/ city kagawad (council member) | 0 | 0 | 1 | 0 | 0 | 1 |
| Janitor/ janitress | 0 | 0 | 0 | 0 | 1 | 1 |
| Skilled worker | 0 | 0 | 0 | 0 | 1 | 1 |
| Computer technician/ programmer | 0 | 0 | 1 | 0 | 0 | 1 |
| Electrician | 0 | 0 | 1 | 0 | 0 | 1 |
| Saleslady/ salesman | 0 | 1 | 0 | 0 | 0 | 1 |
| Welder | 1 | 0 | 0 | 0 | 0 | 1 |
| Midwife/ nurse | 0 | 0 | 0 | 0 | 1 | 1 |
| TOTAL | 20 | 8 | 6 | 3 | 11 | 48 |

About 47 % of the household heads work within their respective City Governments. In total, 38 household heads work within the Metro Manila.

**Table 16 Distribution by Place of Work**

| | Manila | | Makati | | Total | | Within Metro Manila Total |
|---|---|---|---|---|---|---|---|
| Residence/ house | 4 | 8.3% | 1 | 10.0% | 5 | 8.6% | |
| Neighborhood | 2 | 4.2% | 2 | 20.0% | 4 | 6.9% | 38 |
| Within LGU | 13 | 27.1% | 5 | 50.0% | 18 | 31.0% | 65.5% |
| Within MM | 8 | 16.7% | 3 | 30.0% | 11 | 19.0% | |
| Outside MM | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | |
| No definite area | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | |
| Abroad | 3 | 6.3% | 0 | 0.0% | 3 | 5.2% | |
| Not applicable | 7 | 14.6% | 0 | 0.0% | 7 | 12.1% | |
| No answer | 11 | 22.9% | -1 | -10.0% | 10 | 17.2% | |
| Total | 48 | 100.0% | 10 | 100.0% | 58 | 100.0% | |

Most of the households have no answer when asked about preferred skill and business.

Among the skills and businesses, cooking and eatery, computer operation, sewing/tailor, cosmetology / parlor, and automotive are the most highly ranked preferable skills and businesses.

**Table 17 Present and Preferred Skills, and Business Preferences**

| Present Skills | | | Preferred Skills | | | Business Preferences | | |
|---|---|---|---|---|---|---|---|---|
| | Manila | Makati | | Manila | Makati | | Manila | Makati |
| No answer | 43 | 8 | | 42 | 10 | | 35 | 10 |
| Cooking | 2 | 1 | Computer encoding/ Technician | 3 | 0 | Eatery | 7 | 0 |
| Computer operation | 1 | 1 | Cooking/ baking | 2 | 0 | Any business | 3 | 0 |
| Sewing/ tailoring | 1 | 0 | Cosmetology | 2 | 0 | Bakery | 2 | 0 |
| Automotive | 1 | 0 | Automotive/ Mechanic | 1 | 0 | Tailor | 1 | 0 |
| Electronic technician | 1 | 0 | Electrical work | 1 | 0 | Small-scale construction contracting | 1 | 0 |
| Electrical work | 1 | 0 | | | | Aircon/ refrigeration | 1 | 0 |
| Medicine/ traditional healing | 1 | 0 | | | | Junk shop | 1 | 0 |

### 4.3.3 Housing and Infrastructure

Majority of 55 % of the households live in the structures equal to or smaller than 40 $m^2$. Most houses in Makati City are equal to or smaller than 20 $m^2$. While, in Manila City, the most common houses size between 31 and 40 $m^2$. Those structures where sizes are unknown are owned by Absentee House Owners (AHO).

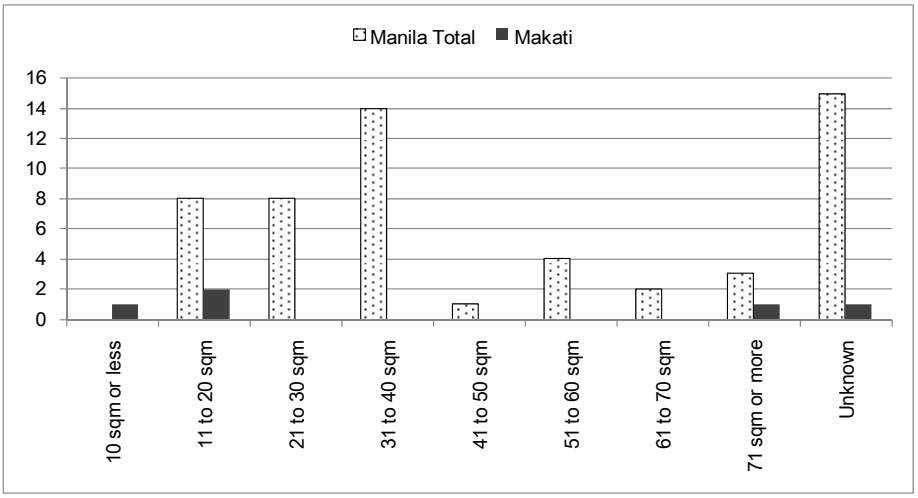



**Figure 8 Floor Area**

Out of the total 60 structures surveyed, structures built with light materials such as nipa and bamboo, counted 7 %, or equivalent to 4 structures. Structures with strong materials such as concrete blocks, galvanized iron sheets, counted about 33 % of the total, or equivalent to 20 structures, and those with light and strong materials mixed, counted the majority, about 58 %, or equivalent to 35 structures. One structure was built with salvaged materials such as plastic and cardboard.

**Table 18 Materials of Structures**

| Type of Structures by Materials | Manila | | Makati | | Total | |
|---|---|---|---|---|---|---|
| | N | % | N | % | N | % |
| Salvaged (plastic, tin, cardboard, etc.) | 1 | 1.8% | 0 | 0.0% | 1 | 1.7% |
| Light (nipa, cogon, bamboo, wood) | 3 | 5.5% | 1 | 20.0% | 4 | 6.7% |
| Mixed (light and strong) | 33 | 60.0% | 2 | 40.0% | 35 | 58.3% |
| Strong (hollow blocks, G.I. Sheets, wood) | 18 | 32.7% | 2 | 40.0% | 20 | 33.3% |
| TOTAL | 55 | 100.0% | 5 | 100.0% | 60 | 100.0% |

Out of the total 58 households, 84.5 %, or equivalent to 49 households, are structure owners, 12 %, or equivalent to 7 households are renters. The remaining 3%, or equivalent to 2 households, are rent-free-occupants/sharers.

**Table 19 Tenure Status of Households**

| CITY | BRGY | Total | | Structure Owner | | Renter | | Rent-Free-Occupant (Sharer) | | Structure | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | HH | Pop. | HH | Pop. | HH | Pop. | HH | Pop. | Owned | Absentee Owner* | Total |
| Manila | Barangay 900 | 26 | 96 | 22 | 80 | 3 | 12 | 1 | 4 | 19 | 7 | 26 |
| | Barangay 896 | 13 | 28 | 13 | 28 | 0 | 0 | 0 | 0 | 13 | 5 | 18 |
| | Barangay 897 | 7 | 35 | 7 | 35 | 0 | 0 | 0 | 0 | 6 | 3 | 9 |
| | Barangay 894 | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 2 |
| Makati | West Rembo | 10 | 43 | 5 | 18 | 4 | 17 | 1 | 8 | 4 | 1 | 5 |
| TOTAL | Number | 58 | 204 | 49 | 163 | 7 | 29 | 2 | 12 | 44 | 16 | 60 |
| | % | 100 | 100 | 84.5 | 79.9 | 12.1 | 14.2 | 3.4 | 5.9 | 73.3 | 26.7 | 100 |

* To be validated.

Among the 58 households, majority of those in Makati City live there equal to or less than 10 years. Those in Manila City live there longer and majority live there more than 21 years. In total, about 19 % live in their current residence for 10 years or less, and 81 % live more than 11 years.

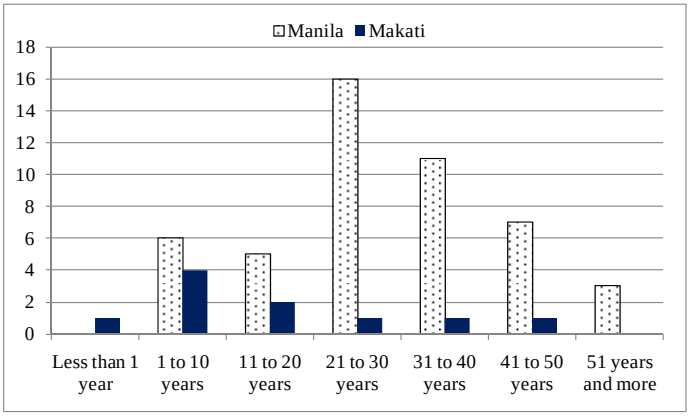



**Figure 9Length of Residence**

Looking at places of origin of the 58 households, 56 households moved to the current location from other places within the same LGU. Other two households are from within the Metro Manila.

**Table 20 Place of Origin of the Household**

| Place of origin | | Manila | | | | Makati | Total |
|---|---|---|---|---|---|---|---|
| | | Barangay 900 | Barangay 896 | Barangay 897 | Barangay 894 | West Rembo | |
| Within LGU | Count | 25 | 13 | 7 | 2 | 9 | 56 |
| | % | 44.6% | 23.2% | 12.5% | 3.6% | 16.1% | 100.0% |
| Outside LGU but within MM | Count | 1 | 0 | 0 | 0 | 1 | 2 |
| | % | 50.0% | 0.0% | 0.0% | 0.0% | 50.0% | 100.0% |
| TOTAL | Count | 26 | 13 | 7 | 2 | 10 | 58 |
| | % | 44.8% | 22.4% | 12.1% | 3.4% | 17.2% | 100.0% |

About 83 % of the total households use water from MWSS for drinking. The source of major energy for lighting is electricity for all households. The majority of 85 % households use LPG as cooking fuel. But various energy sources, such as charcoal, wood, and kerosene, are also used.

**Table 21 Source of Drinking Water**

| | Manila | | Makati | | Total | |
|---|---|---|---|---|---|---|
| | N | % | N | % | N | % |
| Community water system (Communal tap) | 8 | 16.7% | 0 | 0.0% | 8 | 13.8% |
| Deep well | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Shallow well | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| MWSS (Metropolitan Waterworks and Sewerage System) | 40 | 83.3% | 8 | 80.0% | 48 | 82.8% |
| Other | 0 | 0.0% | 1 | 10.0% | 1 | 1.7% |
| Mineral water | 0 | 0.0% | 1 | 10.0% | 1 | 1.7% |
| TOTAL | 48 | 100.0% | 10 | 100.0% | 58 | 100.0% |

**Table 22 Energy Source for Lighting (multiple choice)**

| | Manila | | Makati | | Total | |
|---|---|---|---|---|---|---|
| | N | % | N | % | N | % |
| Electricity | 48 | 100.0% | 10 | 100.0% | 58 | 100.0% |
| Kerosene (gas) | 1 | 2.1% | 0 | 0.0% | 1 | 1.7% |
| Rechargeable battery | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| LPG | 1 | 2.1% | 0 | 0.0% | 1 | 1.7% |
| Other | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| TOTAL | 48 | 100.0% | 10 | 100.0% | 58 | 100.0% |

**Table 23 Energy Source for Cooking (multiple choice)**

| | | Manila | Makati | Total |
|---|---|---|---|---|
| Electricity | Count | 1 | 1 | 2 |
| | % | 2.1% | 10.0% | 3.4% |
| Kerosene (gas) | Count | 4 | 1 | 5 |
| | % | 8.3% | 10.0% | 8.6% |
| LPG | Count | 42 | 7 | 49 |
| | % | 87.5% | 70.0% | 84.5% |
| Charcoal | Count | 3 | 0 | 3 |
| | % | 6.3% | 0.0% | 5.2% |
| Wood | Count | 1 | 1 | 2 |
| | % | 2.1% | 10.0% | 3.4% |
| Other | Count | 0 | 0 | 0 |
| | % | 0.0% | 0.0% | 0.0% |
| TOTAL | Count | 48 | 10 | 58 |
| | % | 100.0% | 100.0% | 100.0% |

**Garbage Collection**

About 60 % of the Informal Settlers along Pasig and Marikina River have their domestic garbage collected through the LGU's truck at their door-front. The rest 40 % disposed their garbage onto open ground or river

**Toilet Facility**

About 60 % of the households along Pasig and Marikina River have own toilet facilities wherein about 20 % of them uses shared toilet. The remaining 40 % of the households does not have toilet, thus, released their wastes directly to river or open land.

**Table 24 General Condition of Toilet Facility**

| Location | | General Condition (HH %) | Sanitation System | General Condition (HH %) |
|---|---|---|---|---|
| In-door | At each house | 40% | Septic tank, overflow to river | 50% |
| Out-door | Shared toilet | 20% | | |
| | | | Pit latrine (simple hole) | 10% |
| Out-door | At each house | 20% | Release to river, etc. | 40% |
| Out-door | No facility (release to river, etc.) | 20% | | |

### 4.3.4 Formal and Informal Institution in the Affected Communities

PAFs are members of Peoples Organizations (PO's) and Home Owner's Associations in the Barangays. Each Barangay is headed by a Barangay Captain who is elected by his/her constituents and has its own governing policies system, as well as committees that plan and operate various cultural activities.

One of the responsibilities of the Barangay Captain is to assist the resettlement of Informal Settlers (IS), and keeping its community against further influx of the IS. Hence, the Barangay Captain and his/her council play an important role in the resettlement of the PAFs through their regular communication/consultation and assistance.

In this project, resettlement activities shall be coordinated to each Barangays so that the PAFs living in short distances can easily communicate together about their resettlement.

and once they are already relocated in the same location, the social relationship among the PAFs may be preserved.

The Barangay Officials are also responsible for monitoring/controlling the cleared easement area from the influx of Informal Settlers being a self governing body.

### 4.3.5 Awareness of the Project and Preference on Possible Relocation Site

About two thirds of the surveyed households are aware about the PMRCIP of the DPWH.

**Table 25 Households Awareness on the Project**

| | | Aware | | Not Aware | | Total | |
|---|---|---|---|---|---|---|---|
| | | Count | % | Count | % | Count | % |
| Manila | Barangay 900 | 13 | 50.0% | 13 | 50.0% | 26 | 100.0% |
| | Barangay 896 | 0 | 0.0% | 13 | 100.0% | 13 | 100.0% |
| | Barangay 897 | 4 | 57.1% | 3 | 42.9% | 7 | 100.0% |
| | Barangay 894 | 1 | 50.0% | 1 | 50.0% | 2 | 100.0% |
| Makati | West Rembo | 9 | 90.0% | 1 | 10.0% | 10 | 100.0% |
| Total | | 27 | 66.5% | 31 | 33.5% | 58 | 100.0% |

Out of the 58 households, 31 households, or about 53 %, chose to be accommodated to the social housing of the LGUs located outside Metro Manila. On the other hand, about 41% are preferred to be relocated within the in-city relocation of the LGU or within the Metro Manila area.

**Table 26 Households by Preference on Possible Relocation Site**

| | | Manila | | | | Makati | Total | |
|---|---|---|---|---|---|---|---|---|
| | | Barangay 900 | Barangay 896 | Barangay 897 | Barangay 894 | West Rembo | | |
| Metro-manila | Count | 1 | 1 | 1 | 0 | 0 | 3 | |
| | % | 3.85% | 7.69% | 14.29% | 0.00% | 0.00% | 5.2% | |
| Jaime Cardinal Sin Village ( JCSV) in Manila | Count | 0 | 0 | 0 | 1 | 0 | 1 | 24 |
| | % | 0.00% | 0.00% | 0.00% | 50.00% | 0.00% | 1.7% | 41.4% |
| Anywhere within the city | Count | 7 | 9 | 3 | 1 | 0 | 20 | |
| | % | 26.92% | 69.23% | 42.86% | 50.00% | 0.00% | 34.5% | |
| Laguna | Count | 0 | 0 | 0 | 0 | 1 | 1 | |
| | % | 0.00% | 0.00% | 0.00% | 0.00% | 10.00% | 1.7% | |
| Calauan relocation/ Makati | Count | 0 | 0 | 0 | 0 | 9 | 9 | |
| | % | 0.00% | 0.00% | 0.00% | 0.00% | 90.00% | 15.5% | 31 |
| Montalban | Count | 16 | 2 | 3 | 0 | 0 | 21 | 53.4% |
| | % | 61.54% | 15.38% | 42.86% | 0.00% | 0.00% | 36.2% | |
| Bulacan | Count | 0 | 0 | 0 | 0 | 0 | 0 | |
| | % | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.0% | |
| Anywhere with no flooding | Count | 0 | 1 | 0 | 0 | 0 | 1 | |
| | % | 0.00% | 7.69% | 0.00% | 0.00% | 0.00% | 1.7% | |
| Anywhere/ does not matter | Count | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| | % | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.0% | 5.2% |
| Back to province/ site outside MM | Count | 2 | 0 | 0 | 0 | 0 | 2 | |
| | % | 7.69% | 0.00% | 0.00% | 0.00% | 0.00% | 3.4% | |
| TOTAL | Count | 26 | 13 | 7 | 2 | 10 | 58 | 58 |
| | % | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.0% | 100.0% |

# CHAPTER 5 LEGAL FRAMEWORK

The objectives of the legal framework are to ensure that all affected households will be compensated for their losses and provided with rehabilitation measures, in order to assist them to improve, or at least maintain, their pre-project living standards and income generating capacity.

## 5.1 1987 Constitution of the Republic of the Philippines

The following provisions in the 1987 Philippine Constitution will serve as the basic legal foundation of resettlement policies.

**Article II, Section 10:** The State shall promote social justice in all phases of development.

**Article II, Section 11:** The State values the dignity of every human person and guarantees full respect for human rights.

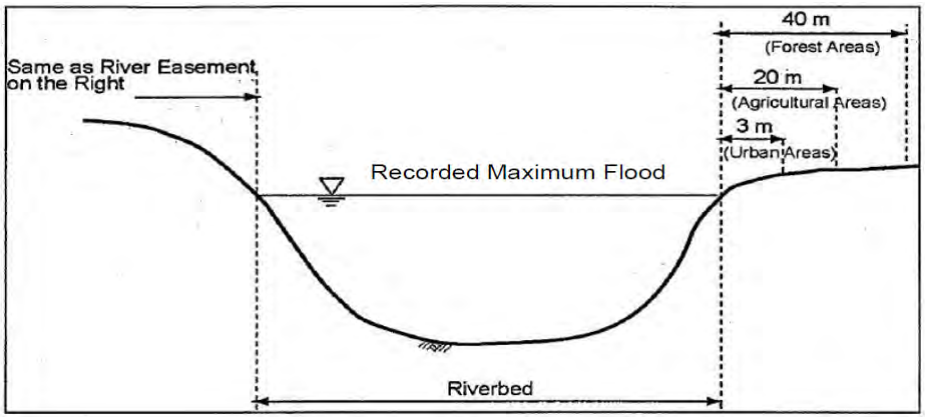
**Article III, Section 9:** Private property shall not be taken for public use without just compensation.

**Article III, Section 11:** Free access to the courts and quasi-judicial bodies and adequate legal assistance shall not be denied to any person by reason of poverty.

**Article XIII, Section 10:** Urban or rural poor dwellers shall not be evicted nor their dwellings demolished, except in accordance with the law and in a just humane manner. No resettlement of urban or rural dwellers shall be undertaken without adequate consultation with them and the communities where they are to be relocated.

## 5.2 Presidential Decree NO. 896, otherwise known as the Water Code of the Philippines Article 51 : River Easement

The banks of rivers and streams and the shores of the seas and lakes throughout their entire length and within a zone of three (3) meters in urban areas, 20 m in agricultural areas, and 40 m in forest areas along their margins, are subject to the easement of public use in the interest of recreation, navigation, float, fishing and salvage. No person shall be allowed to stay in this zone longer than what is necessary for recreation, navigation, floatage, fishing, or salvage or to build structures of any kind.




Source: Manual on Maintenance of Flood Control and Drainage Structures, 2005, Department of Public Works and Highways

**Figure 10 River Easement for Non-Flood Control Area**

## 5.3 Republic Act 7279. Urban Development and Housing Act of 1992

### 5.3.1 Government Infrastructure Project

Based on **Section 28 (b)**, eviction or demolition as a practice are discouraged, however, it may be allowed when government infrastructure projects with available funding are about to be implemented.

**Table 27 Legal Base for Eviction and Demolition Related to Government Infrastructure Projects**

| |
|---|
| *Republic Act 7279* otherwise known as the "Urban Development and Housing Act of 1992" |
| **SECTION 28. Eviction and Demolition.** — Eviction or demolition as a practice shall be discouraged. Eviction or demolition, however, may be allowed under the following situations:<br>(a) When persons or entities occupy danger areas such as esteros, railroad tracks, garbage dumps, riverbanks, shorelines, waterways, and other public places such as sidewalks, roads, parks, and playgrounds;<br>(b) When government infrastructure projects with available funding are about to be implemented; or<br>(c) When there is a court order for eviction and demolition. |

### 5.3.2 Resettlement Sites

**Section 29.** Within two (2) years from the effectivity of this Act (RA7279), the local government units, in coordination with the National Housing Authority, shall implement the relocation and resettlement of persons living in danger areas such as esteros, railroad tracks, garbage dumps, riverbanks, shorelines, waterways, and in other public places as sidewalks, roads, parks, and playgrounds. The local government unit, in coordination with the National Housing Authority, shall provide relocation or resettlement sites with basic services and facilities and access to employment and livelihood opportunities sufficient to meet the basic needs of the affected families.

### 5.3.3 Livelihood Component

**Section 22**. to the extent feasible, socialized housing and resettlement projects shall be located near areas where employment opportunities are accessible. The government agencies dealing with the development of livelihood programs and grant of livelihood loans shall give priority to the beneficiaries of the Program.

### 5.3.4 Participation of Beneficiaries

**Section 23**. the local government units, in coordination with the Presidential Commission for the Urban Poor and concerned government agencies, shall afford Program beneficiaries or their duly designated representatives an opportunity to be heard and to participate in the decision-making process over matters involving the protection and promotion of their legitimate collective interest which shall include appropriate documentation and feedback mechanisms.

They shall also be encouraged to organize themselves and undertake self-help cooperative housing and other livelihood activities. They shall assist the Government in preventing the incursions of professional squatters and members of squatting syndicates into their communities.

In instances when the affected beneficiaries have failed to organized themselves or form an alliance within a reasonable period prior to the implementation of the program of

projects affecting them, consultation between the implementing agency and the affected beneficiaries shall be conducted with the assistance of the Presidential Commission for the Urban Poor and the concerned Non-government Organization (NGOs).

### 5.4 RA 8974. An Act to Facilitate the Acquisition of Right-Of-Way (ROW), Site or Location for National Government Infrastructure Projects and for other Purposes (November 2000)

The above acts provide bases for land valuation for the acquisition of ROW Site or Location for National Government Projects through negotiated sale, expropriation and other mode of acquisition.

The law also states that valuation of the improvements and structures on the land to be acquired shall be based on the replacement cost which is defined as the amount necessary to replace the structure or improvement based on the current market prices for materials, equipment, labor, contractor's profit and overhead, and all other attendant costs associated with the acquisition and installation in place of the affected improvements/installation.

#### 5.4.1 Improvement and Structures

**Section 1** states that private property shall not be taken for public use without just compensation. Towards this end, the State shall ensure that owners of real property acquired for national government infrastructure project are promptly paid just compensation.

**Section 2** states that the term “national government project” shall referred to all national infrastructure, engineering works and service contracts, including projects undertaken by government thus owned and controlled corporation, all projects covered by R.A. no. 6957, as amended by R.A. no. 7718, otherwise known as the Build-Operate-and-Transfer Law, and other related and necessary activities, such as site acquisition, supply and/or installation of equipment and materials, implementation, construction, completion, operation, maintenance, improvement, repair, and rehabilitation, regardless of the source of funding.

**Section 3** states that the government may acquire real property needed as right–of-way, site or relocation for any national government infrastructure project through donation, negotiated sales, expropriation or any other mode of acquisition as provided by law.

**Section 5.** Standard for the Assessment of the Value of Land Subject of Expropriation Proceedings or Negotiated Sale – In order to facilitate the determination of just compensation, the court may consider, among other well-established factors, the following relevant standards:

(a) The classification and use for which the property is suited;

(b) The development costs for improving the land;

(c ) The value declared by the owners;

(d) The current selling price of similar lands in the vicinity;

(e) The reasonable disturbance compensation for the removal and/or demolition of certain improvements on the land and for the value for improvements thereon;

(f) The size, shape and location, tax declaration and zonal valuation of the land by Bureau of Internal Revenue;

(g) The price of the land as manifested in the ocular findings, oral as well as documentary evidence presented; and

(h) Such facts and events as to enable the affected property owners to have sufficient funds to acquire similarly-situated lands of approximate areas as those required from them by the government, and thereby rehabilitate themselves as early as possible.

On the other hand, the Standard Bases to determine the assessment value of the affected structures of the PAFs that are considered as ISF are as follows:

(a) Classification of the type of the structure

(b) Size (area) of the affected structure

(c ) Prevailing cost of type of materials used on the affected structure

## 5.5 Land Acquisition, Resettlement, Rehabilitation and Indigenous People's Policy (LARRIPP) (2007) : DPWH Policy and Guideline on Resettlement

Policy and guidelines of DPWH on resettlement are expressed in the Infrastructure Right of Way Procedural Manual (April, 2003) and the Land Acquisition, Resettlement, Rehabilitation and Indigenous People's Policy (LARRIPP) (3rd edition in April, 2007).

Criteria for Eligibility for Compensation described in LARRIPP are as follows.

1. **Landowners**
   a. Legal owners (agricultural, residential, commercial and institutional) who have full title, tax declaration, or who are covered by customary law (e.g. possessory rights, usufruct, etc.) or other acceptable proof of ownership.
   b. Users of arable land who have no land title or tax declaration
   c. Agricultural lessees

2. **PAFs with Structures**
   a. Owners of structures who have full title, tax declaration, or who are covered by customary law (e.g. possessory rights, usufruct, etc.) or other acceptable proof of ownership.
   b. Owners of structures, including shanty dwellers, who have no land title or tax declaration or other acceptable proof of ownership.
   c. Renters

3. **Indicators of Severity of Impacts**
   Properties to be acquired for the project may include the entire area or a portion of it. Hence, compensation for such assets or properties depends on whether the entire property will be affected or just a portion of it.

   a. Severe – The portion of the property to be affected is more than 20% of the total land area or even less than 20% if the remaining portion is no longer economically viable or it will no longer function as intended. The owner of this property (land or structures, etc.) shall be entitled to full compensation in accordance to RA 8974.
   b. Marginal – the impact is only partial and the remaining portion of the property or asset is still viable for continued use. Compensation will be on the affected portion only.

**4. Compensation per Category of Assets Affected.**

The classifications or categories of assets to be compensated include Land, Structures, other Improvements and Crops, Trees and Perennials. Described below are the compensation and entitlements provisions for which the PAFs are eligible, per classification of assets affected.

**a. Compensation for Structures**

i. Compensation in cash for the affected portion of the structure, including the cost of restoring the remaining structure, as determined by the concerned Appraisal Committee, with no deduction for salvaged building materials.

**b. Compensation for Other Improvements**

i. Compensation in cash at replacement cost for the affected portion of public structures to government or non-government agencies or to the community in case of a donated structure by agencies that constructed the structure.

ii. Compensation to cover the cost of reconnecting the facilities, such as water, power and telephone.

**c. Compensation For Crops, Trees and Perennials**

i. Cash compensation for perennials of commercial value as determined by the DENR or the concerned Appraisal Committee

ii. PAFs will be given sufficient time to harvest crops on the subject land

iii. Compensation for damaged crops (rice and corn) at market value at the time of taking. The compensation will be based on the cost of production per ha. pro-rata to the affected area.

iv. Entitlement for fruit-bearing trees will be based on the assessment of the Provincial or the Municipal Assessors where the project is located.

**d. Other Types of Assistance or Entitlements**

i. **Disturbance Compensation** For agricultural land severely affected the lessees are entitled to disturbance compensation equivalent to five times the average of the gross harvest for the past 3 years but not less than P. 15,000.

ii. **Income Loss** For loss of business/income, the PAF will be entitled to an income rehabilitation assistance to be based on the latest copy of the PAFs' Tax record for the period corresponding to the stoppage of business activities, otherwise not to exceed P 15,000 for severely affected structures.

iii. **Inconvenience Allowance** in the amount of P 10,000 shall be given to PAFs with severely affected structures, which require relocation and new construction.

iv. **Rehabilitation Assistance** Skills training and other development activities equivalent to P 15,000 per family per municipality will be provided in coordination with other government agencies, if the present means of livelihood is no longer viable and the PAF will have to engage in a new income activity.

v. **Rental Subsidy** Will be given to PAFs without sufficient additional land to allow the reconstruction of their lost house under the following circumstances:

**a.** The concerned properties are for residential use only and are considered as severely affected.

**b.** The concerned PAFs were physically residing in the affected structure and land at the time of the cut-off date.

**c**. The amount to be given will be equivalent to the prevailing average monthly rental for a similar structure of equal type and dimension to the house lost.

**d**. The amount will be given for the period between the delivery of house compensation and the delivery of land compensation.

vi. **Transportation Allowance or Assistance** If relocating, PAFs to be provided free transportation. Also, informal settlers in urban centers who opt to go back to their place of origin in the province or be shifted to government relocation sites will be provided free transportation

## 5.6 LARRIPP (2007) : DPWH Policy on Public Participation and Consultation

The information campaign will convey to all PAPs as follows:

1. The road project that has triggered the Involuntary Resettlement Safeguard Policy. Why is it important? Who would benefit from it? What are it benefits to the affected families;

2. Each PAP is entitled to receive just compensation for his/her affected lot at a rate to be negotiated between the Bureau of Internal Revenue (BIR) zonal valuation and the fair market value as provided by RA 8974;

3. The BIR zonal valuation and the fair market value may be substantially different;

4. The negotiations process detailed in RA 8974 provides that:

   a. DPWH first asks the PAPs to donate their affected land, provided that the following conditions shall be met:

      i. The AP's have decided to donate their land based on informed consent, that is: prior to the decision, they have been (a) informed of their compensation entitlements at market rates; (b) actually offered the relative compensation amounts;
      ii. Land redistribution or donations do not affect the donor's livelihood;
      iii. Land to be donated is titled, un-rented, has no encumbrances nor is occupied by informal settlers;
      iv. The voluntary aspect of land redistribution or donations is documented by a document signed by the donor that he/she is aware of the above conditions. The inclusion of the document in the RAP will be the basis for its approval. In addition, based on BIR rules, arrear taxes for donated plots need to be paid or waived. If waiver is not possible, the taxes will have to be paid by the LGU.

   b. If they do not agree, DPWH will offer them compensation at the BIR zonal valuation rates;

   c. If also in this case they do not agree, the DPWH will promptly seek the services of Land Bank, Development Bank of the Philippines or an independent appraiser to determine the fair market value based on the following parameters:

      i. land use classification
      ii. development costs for improving the land
      iii. value declared by PAPs
      iv. current selling price of similar properties in the vicinity, based on deeds of sale
      v. disturbance
      vi. tax declaration and BIR zonal valuation

vii. replacement cost.

d. DPWH will go back to the PAPs and communicate to them the current market value so determined by an independent land appraiser to specify the negotiation limits (BIR zonal value and current market value);

e. DPWH then begins negotiations with the PAPs to determine the final compensation;

f. If the PAPs do not accept the terms of this negotiation and the land valuation possible under RA 8974, their affected properties will be expropriated;

g. DPWH shall immediately pay the PAP whose property is under expropriation the amount equivalent to the sum of one hundred percent (100%) of the BIR zonal valuation and the court shall determine the just compensation to be paid to the PAP within sixty (60) days from the date of filing of the expropriation case. When the decision of the court becomes final and executory, DPWH shall pay the PAP the difference between the amounts already paid and the just compensation as determined by the court. In the interim, DPWH will deposit 100% of the BIR valuation into an escrow account.

The information campaign will also convey to the PAPs the available channels for complaints and grievances and related procedures.

The information campaign will be carried out by the PMO with the assistance of ESSO, the Regional Offices and District Engineering Offices and will be implemented through community meetings and leaflets according to the following specifications:

1. **Community Meetings** : Community meetings to be organized in sufficient number and at the appropriate location and time so as to allow the potential participation of all PAPs or their authorized representatives. In the course of the meetings DPWH personnel will explain the reasons for the meeting and will provide the information detailed above. PAPs will be free to ask for clarification and to propose procedures that may facilitate the implementation of the compensation program. When necessary DPWH will provide the PAPs with transportation to reach the meeting venue. At each meeting the numbers and names of the participants will be recorded and minutes of the discussions will be taken by DPWH.

2. **Leaflets** : A leaflet, printed in the language understandable to the PAPs, providing a statement of purpose, project details and clearly indicating the information listed above to be distributed by the District Engineering Offices to each PAP. Additional copies of the leaflet will be distributed during the community meetings. It will also be posted in enlarged poster form in strategic locations like the municipal, city and barangay halls.

The women, elderly who are among the PAPs shall likewise be consulted and mobilized to participate in the consultation meeting, and discussed with them the socio-cultural implication of the Resettlement Action Plan.

To ensure that the DPWH District Engineering Offices (DEOs) fully understand the purposes and mechanisms of the information campaign, workshops on the matter shall be organized and conducted at the DPWH Central Office in Manila or in the DPWH Regional Offices as maybe necessary. Representatives of DEOs affected by the project component shall be the main participants in these workshops.

Internal monitoring will be done by ESSO which at the same time shall be called the Internal Monitoring Agent (IMA) while external monitoring will be carried out by an External Monitoring Agent (EMA) to be hired by DPWH. Reports of the IMA and EMA will be made available to the Regional Offices (ROs) and/or the DEOs and to all concerned parties, including the PAPs.

### 5.7 Executive Order No. 152 (2002) : Designating the Presidential Commission for the Urban Poor

The Presidential Commission for the Urban Poor (PCUP) is designated as the sole clearing house for the conduct of demolition and eviction activities involving the homeless and underprivileged citizens.

In pursuit of its mandate under this Order, the PCUP shall exercise, among others, the following powers and functions:

1. Monitor all evictions and demolitions, whether extra-judicial or court-ordered, involving homeless and underprivileged citizens;
2. Require the concerned departments and agencies, including concerned local government units (LGUs), proposing to undertake demolition and eviction activities to secure first from either the PCUP Central Office (in the case of national projects) or from the PCUP Regional Office (in the case of regional or local projects) the checklist, guidelines and compliance certificates on demolition and eviction prior to the actual implementation thereof and thereafter, submit to the PCUP the completed checklist, attested to under oath by the proponent and indicating that:
3. Based on the completed checklist, and subject to further verification, issue demolition and eviction compliance certificates to proposed demolitions and evictions involving the homeless and underprivileged citizens;

The concerned department and agencies of the government, the LGUs, or other proponents of eviction and demolition activities shall be provided authorized police assistance only upon their prior compliance with the statutory requirements under Section 28 of RA 7279 or its implementing rules and regulations as well as with the checklist and compliance certificate requirements, as certified by the PCUP. Police assistance, as used in this Order, shall be limited to peace-keeping and law enforcement and shall, in no way, mean participation in actual eviction or demolition.

### 5.8 Executive Order NO. 708. Amending Executive Order No. 152, Series of 2002, and Devolving the Functions of the Presidential Commission for the Urban Poor as the Clearing House for the Conduct of Demolition and Eviction Activities Involving the Homeless and Underprivileged Citizens to the Respective Local Government Units (LGUS) Having Territorial Jurisdiction Over the Proposed Demolition and Eviction Activities of Government Agencies

**Section 1. Devolution of Clearinghouse Functions**. The clearing house functions of the PCUP stated in Section 1 of Executive Order No. 152, series of 2002, are hereby devolved to the respective cities and municipalities in whose territorial jurisdiction the proposed demolition and eviction activities of government agencies are to be undertaken.

**Section 2. Creation of Local Housing Boards**. The Local Government Units must create their own Local Housing Boards or any similar body through an appropriate ordinance before conducting the clearinghouse functions granted to them in the Executive Order.

**Section 4**. **Residual Functions**. The PCUP shall continue with its monitoring and reporting functions. However, all clearinghouse functions, including issuance of notices and clearances to affected families shall be the primary responsibility of the Local Government

Unit concerned,. The power and functions mentioned in subsections 4 to 11 of Section 1 and Section 9 of Executive Order No. 152, series of 2002, shall remain with PCUP.

## 5.9 JICA Policies on Involuntary Resettlement

The key principle of JICA policies on involuntary resettlement is summarized below:

1. Involuntary resettlement and loss of means of livelihood are to be avoided when feasible by exploring all viable alternatives.
2. When population displacement is unavoidable, effective measures to minimize the impact and to compensate for losses should be taken.
3. People who must be resettled involuntarily and people whose means of livelihood will be hindered or lost must be sufficiently compensated and supported, so that they can improve or at least restore their standard of living, income opportunities and production levels to pre-project levels.
4. Compensation must be based on the full replacement cost[1] as much as possible.
5. Compensation and other kinds of assistance must be provided prior to displacement.
6. For projects that entail large-scale involuntary resettlement, resettlement action plans must be prepared and made available to the public. It is desirable that the resettlement action plan include elements laid out in the World Bank Safeguard Policy, OP 4.12, Annex A.
7. In preparing a resettlement action plan, consultations must be held with the affected people and their communities based on sufficient information made available to them in advance. When consultations are held, explanations must be given in a form, manner, and language that are understandable to the affected people.
8. Appropriate participation of affected people must be promoted in planning, implementation, and monitoring of resettlement action plans.
9. Appropriate and accessible grievance mechanisms must be established for the affected people and their communities.

[1] Description of "replacement cost" is as follows.

| | | |
|---|---|---|
| Land | Agricultural Land | The pre-project or pre-displacement, whichever is higher, market value of land of equal productive potential or use located in the vicinity of the affected land, plus the cost of preparing the land to levels similar to those of the affected land, plus the cost of any registration and transfer taxes. |
| | Land in Urban Areas | The pre-displacement market value of land of equal size and use, with similar or improved public infrastructure facilities and services and located in the vicinity of the affected land, plus the cost of any registration and transfer taxes. |
| Structure | Houses and Other Structures | The market cost of the materials to build a replacement structure with an area and quality similar or better than those of the affected structure, or to repair a partially affected structure, plus the cost of transporting building materials to the construction site, plus the cost of any labor and contractors' fees, plus the cost of any registration and transfer taxes. |

The above principle is complemented by the World Bank OP 4.12, since it is stated in JICA Guideline that "JICA confirms that projects do not deviate significantly from the World Bank's Safeguard Policies". Additional key principle based on World Bank OP 4.12 is as follows.

10. Affected people are to be identified and recorded as early as possible in order to establish their eligibility through an initial baseline survey (including population census that serves as an eligibility cut-off date, asset inventory, and socioeconomic survey), preferably at the project identification stage, to prevent a subsequent influx of encroachers of others who wish to take advance of such benefits.

11. Eligibility of Benefits include, the PAPs who have formal legal rights to land (including customary and traditional land rights recognized under law), the PAPs who don't have formal legal rights to land at the time of census but have a claim to such land or assets and the PAPs who have no recognizable legal right to the land they are occupying.

12. Preference should be given to land-based resettlement strategies for displaced persons whose livelihoods are land-based.

13. Provide support for the transition period (between displacement and livelihood restoration.

14. Particular attention must be paid to the needs of the vulnerable groups among those displaced, especially those below the poverty line, landless, elderly, women and children, ethnic minorities etc.

15. For projects that entail land acquisition or involuntary resettlement of fewer than 200 people, abbreviated resettlement plan is to be prepared.

In addition to the above core principles on the JICA policy, it also laid emphasis on a detailed resettlement policy inclusive of all the above points; project specific resettlement plan; institutional framework for implementation; monitoring and evaluation mechanism; time schedule for implementation; and, detailed Financial Plan etc (JICA Guidelines for Environmental and Social Considerations (Appendix 1. Environmental and Social Considerations Required for Intended Projects).

### 5.10 Gaps between Philippines' Legal Framework and JICA Guidelines

The existing LARRIPP (2007) of DPWH was prepared based on the World Bank Resettlement Policy.

As shown in Table 28 below, it is found that there is no significant difference between the DPWH and JICA's Legal and Program Frameworks.

However, there are several gaps in the qualification of eligibility of persons, as well as composition of losses covered by compensation.

Hence, appropriate approaches were designed/formulated to complement the gaps between the Philippine legal framework resettlement and JICA's Policy on Involuntary Resettlement that conforms to the Government and JICA policies and/or practices, to come up with a Project Policy for this RAP.

**Table 28 Gaps in Local and JICA Legal and Program Frameworks**

| No. | (A) JICA Guidelines | (B) Laws of the Republic of Philippines | Gaps between (A) and (B) | Project Policy in this RAP |
|---|---|---|---|---|
| 1. | Involuntary resettlement and loss of means of livelihood are to be avoided when feasible by exploring all viable alternatives. (JICA GL) | ditto (LARRIPP*) | None | Involuntary resettlement and loss of means of livelihood are to be avoided when feasible by exploring all viable alternatives. |
| 2. | When population displacement is unavoidable, effective measures to minimize impact and to compensate for losses should be taken. (JICA GL) | ditto (LARRIPP) | None | When population displacement is unavoidable, effective measures to minimize impact and to compensate for losses should be taken. |
| 3. | People who must be resettled involuntarily and people whose means of livelihood will be hindered or lost must be sufficiently compensated and supported, so that they can improve or at least restore their standard of living, income opportunities and production levels to pre-project levels. (JICA GL) | ditto (LARRIPP) | None | People who must be resettled involuntarily and people whose means of livelihood will be hindered or lost must be sufficiently compensated and supported, so that they can improve or at least restore their standard of living, income opportunities and production levels to pre-project levels. |
| 4. | Compensation must be based on the full replacement cost. (JICA GL) | ditto (LARRIPP) | None | Compensation must be based on the full replacement cost. |
| 5. | Compensation and other kinds of assistance must be provided prior to displacement. (JICA GL) | LARRIPP does not clearly state the timing of provision. In socially accepted procedure, compensation and other kinds of assistance for resettling informal setters is provided on site, prior to displacement, right after the ISFs and staff of governmental institutions together inspect the completion of the demolition of existing structures. | None | Compensation and other kinds of assistance must be provided either prior to forced displacement in the case of voluntary relocation, or prior to physical relocation in the case of programmed relocation. |
| 6. | For projects that entail large-scale involuntary resettlement, resettlement action plans must be prepared and made available to the public. (JICA GL) | ditto (LARRIPP) | None | For projects that entail large-scale involuntary resettlement, resettlement action plans must be prepared and made available to the public. |
| 7. | In preparing a resettlement action plan, consultations must be held with the affected people and their communities based on sufficient information made available to them in advance. (JICA GL) | ditto (LARRIPP) | None | In preparing a resettlement action plan, consultations must be held with the affected people and their communities based on sufficient information made available to them in advance. |
| 8. | When consultations are held, | ditto | None | When consultations are held, |

| No. | (A) JICA Guidelines | (B) Laws of the Republic of Philippines | Gaps between (A) and (B) | Project Policy in this RAP |
|---|---|---|---|---|
| | explanations must be given in a form, manner, and language that are understandable to the affected people. (JICA GL) | (LARRIPP) | | explanations must be given in a form, manner, and language that are understandable to the affected people. |
| 9. | Appropriate participation of affected people must be promoted in planning, implementation, and monitoring of resettlement action plans. (JICA GL) | ditto (LARRIPP) | None | Appropriate participation of affected people must be promoted in planning, implementation, and monitoring of resettlement action plans. |
| 10. | Appropriate and accessible grievance mechanisms must be established for the affected people and their communities. (JICA GL) | ditto (LARRIPP) | None | Appropriate and accessible grievance mechanisms must be established for the affected people and their communities. |
| 11. | Affected people are to be identified and recorded as early as possible in order to establish their eligibility through an initial baseline survey (including population census that serves as an eligibility cut-off date, asset inventory, and socioeconomic survey), preferably at the project identification stage, to prevent a subsequent influx of encroachers of others who wish to take advance of such benefits. (WB OP 4.12 Para. 6) | LARRIPP states the cut-off date as the date of commencement of the census.<br><br>Resettlement project conducted by LGUs nationwide notifies to public the last day of the census work, and use the date as the cut-off date, so that no eligible PAFs are left un-censussed. | General public, including PAFs, may have preconception that cut-off date is either the starting date or the ending date of the census work. | Affected people are to be identified and recorded as early as possible in order to establish their eligibility through an initial baseline survey (including population census that serves as an eligibility cut-off date, asset inventory, and socioeconomic survey), preferably at the project identification stage, to prevent subsequent influx of encroachers of others who wish to take advance of such benefits.<br>The cut-off date for this RAP is the date of commencement of the census. For those who are eligible for compensation but absent during the census survey shall be encouraged to communicate with barangay captains and to attend community consultation meetings to be validated by DPWH. |
| 12. | Eligibility of benefits includes, the PAPs who have formal legal rights to land (including customary and traditional land rights recognized under law), the PAPs who don't have formal legal rights to land at the time of census but have a claim to such land or assets and the PAPs who have no recognizable legal right to the | Professional Squatters (as defined by Republic Act 7279) applies to persons who have previously been awarded home lots or housing units by the government but who sold, leased or transferred the same to settle illegally in the same place or in another urban area, and non bona fide occupants and intruders of lands reserved for socialized housing. | Professional Squatters and Squatting Syndicates are not eligible for compensation. They may salvage the structure materials by themselves. | All affected people will be eligible for compensation and rehabilitation assistance, regardless of tenure of status, social or economic standing and any such factors that may discriminate against achievement of the objectives of JICA Guidelines.<br>However those who have previously been awarded |

| No. | (A) JICA Guidelines | (B) Laws of the Republic of Philippines | Gaps between (A) and (B) | Project Policy in this RAP |
|---|---|---|---|---|
| | land they are occupying. (WB OP 4.12 Para. 15) | Squatting Syndicates (as defined by Republic Act 7279) refers to groups of persons who are engaged in the business of squatter housing for profit or gain.<br>Those persons are ineligible for structure compensation, relocation, and rehabilitation/ inconvenience/ income-loss assistance in case their structures are to be demolished in resettlement project according to Republic Act 7279.<br>This definition excludes individuals or groups who simply rent land and housing from professional squatters or squatting syndicates. | | home lots or housing units by the government but who sold, leased or transferred the same to settle illegally in the same place or in another urban area, and non *bona fide* occupants and intruders of lands reserved for socialized housing will not be eligible for compensation. |
| 13. | Preference should be given to land-based resettlement strategies for displaced persons whose livelihoods are land-based. (WB OP 4.12 Para. 11) | If feasible, land for land will be provided in terms of a new parcel of land of equivalent productivity, at a location acceptable to PAFs. (LARRIPP) | None | Preference should be given to land-based resettlement strategies for displaced persons whose livelihoods are land-based.<br>(In this project, no PAFs are farmers, agricultural lesser, or fishers.) |
| 14. | Provide support for the transition period (between displacement and livelihood restoration). (WB OP 4. 12 Para. 6) | * Income Loss.<br>For loss of business/income, the PAF will be entitled to an income rehabilitation assistance to be based on the latest copy of the PAFs' Tax record for 3 months, or not to exceed P 15,000 for severely affected structures.<br><br>* Inconvenience Allowance<br>The amount of P 10,000 shall be given to PAFs with severely affected structures, which require relocation and new construction.<br><br>* Rehabilitation assistance<br>Skills training and other development activities equivalent to P 15,000 per family will be provided in coordination with other government agencies, if the present means of livelihood is no longer viable and the PAF will have to engage in a new income activity. | The resettlement projects currently conducted by many LGUs in Metro Manila based on RA 7279 also apply similar assistance with similar level of cash amount.<br><br>The amount of planned financial assistance and eligibility are explained in the community consultation in April and July 2011, and no objection has been raised from participants so far.<br><br>However, whether the assistances and allowances are sufficient to support for the transition period is unknown. | All PAFs shall be considered for Livelihood Rehabilitation Assistance.<br>Quarterly monitoring shall be conducted by the Project Proponent (DPWH) to monitor the change/status of the standard of living of the PAFs before and after the resettlement.<br>When the PAF are found that their living standard worsen, or whose present means of livelihood became not-viable, DPWH, in coordination with other appropriate institutions, will provide assistances, such as skills and livelihood trainings. |

| No. | (A) JICA Guidelines | (B) Laws of the Republic of Philippines | Gaps between (A) and (B) | Project Policy in this RAP |
|---|---|---|---|---|
| | | * Transportation allowance or assistance.<br>If relocating, PAFs to be provided free transportation. Also, informal settlers in urban centers who opt to go back to their place of origin in the province or be shifted to government relocation sites will be provided free transportation.<br>(LARRIP (April, 2007, p. 18, 19) | | |
| 15. | Particular attention must be paid to the needs of the vulnerable groups among those displaced, especially those below the poverty line, landless, elderly, women and children, ethnic minorities etc. (WB OP 4.12 Para. 8) | ditto<br>(LARRIPP) | None | Particular attention must be paid to the needs of the vulnerable groups among those displaced, especially those below the poverty line, landless, elderly, women and children, ethnic minorities etc. |
| 16. | For projects that entail land acquisition or involuntary resettlement of fewer than 200 people, abbreviated resettlement plan is to be prepared. (WB OP 4.12 Para. 25) | Minimum number of PAPs for regular RAP is not mentioned in related laws. | Minimum number of PAPs for regular RAP is not mentioned in Laws of the Republic of Philippines. | For projects that entail land acquisition or involuntary resettlement of fewer than 200 people, abbreviated resettlement plan is to be prepared.<br>(Not applicable in this RAP) |

LARRIPP : Land Acquisition, Resettlement, Rehabilitation and Indigenous Peoples' Policy, Department of Public Works and Highways, Republic of the Philippines, April. 2007.

# CHAPTER 6 POLICY ON ELIGIBILITY, COMPENSATION AND OTHER ENTITLEMENTS

## 6.1 Basic Policy

1. The Government of the Philippines (GOP) will adopt the Project Resettlement Policy (the Project Policy) for the PMRCIP Phase III, since, the existing national laws and regulations have gaps with the JICA's policies and guidelines for involuntary resettlement.

   The Project Policy aims to fill-in any gaps to enhance the resettlement program for the PAFs/PAPs taking into consideration the JICA policies/guidelines which will be helpful for them to at least rehabilitate/restore their social/economic condition the earliest possible time.

   This section discusses the principles of the Project Policy and the entitlements of the PAPs based on the type and degree of their losses.

   As mentioned earlier, gaps between the Philippine legal framework for resettlement and JICA's Policy on Involuntary Resettlement will be filled in by appropriate approaches designed which conforms to the Government and JICA's Policies, as follows.

2. Identify project design alternatives, if possible, to avoid and/or minimize the adverse social impact of the project such as land acquisition and/or involuntary resettlement.

3. When displacement of households is unavoidable, all losses of the PAPs (including communities) such as assets, livelihoods or resources shall be fully compensated as well as providing assistance to improve or at least restore their economic and social conditions.

4. Compensation and rehabilitation support will be provided to any PAPs, that is, any person or household or business which on account of project implementation would have his, her or their:

   - *Standard of living* adversely affected;

   - *Right, title or interest in any kind of structures, improvements, crops and trees, or any other fixed or moveable assets, acquired or possessed, temporarily or permanently* affected;

   - *Income earning opportunities, business, occupation, work or place of residence or habitat* adversely affected; or

   - *Social and cultural activities and relationships* affected or any other losses that may be identified during the process of resettlement planning.

5. All affected people shall be eligible for compensation and rehabilitation assistance, regardless of tenure of status, social or economic standing.

   The PAPs shall no be hindered from compensation entitlements and rehabilitation measures due to lack of legal rights to the losses of assets, affected tenure of status and social or economic status.

All PAPs residing, working, doing business and/or cultivating land identified to be affected by the project as of the date of the latest census and Inventory of Lost Assets (ILA) shall be entitled for compensation of their losses of assets at replacement cost. If possible, restoration of incomes and businesses shall also be provided with sufficient rehabilitation measures to assist them to improve or at least maintain their pre-project living standards, income-earning capacity and production levels.

6. For those affected portion of physical structures of the PAPs, they shall not be left out without any just and humane compensation.

7. People who will be temporarily affected by the project shall also be considered as PAPs with resettlement measures and/or plans.

8. The community to be affected by the development of a resettlement site shall be involved in the resettlement planning and decision-making to minimize the adverse impacts of the resettlement to the said community.

9. The design of the resettlement plans shall be in accordance with the Land Acquisition, Resettlement, Rehabilitation and Indigenous Peoples' Policy (LARRIPP) of DPWH (April, 2004) and JICA's Policy on Involuntary Resettlement.

10. Resettlement Action Plan translated in local languages shall be made available through brochures/leaflets, etc. for ready reference by the PAPs and other concerned groups and same shall be disclosed to the said PAPs.

11. Payment for land and/or non-land assets will be based on the principle of replacement cost.

12. Compensation for PAPs dependent on agricultural activities will be land-based whenever possible. In this Project, it is found that there is no PAPs dependent on agricultural activities.

13. Resettlement assistance will be provided not only for immediate loss, but also for the transition period needed to restore livelihood and standards of living of the PAPs. Such support could be taken in the form of short-term jobs, subsistence support, salary maintenance, or similar arrangements.

14. The resettlement plan should pay particular attention to the needs of the vulnerable group affected and/or displaced especially those affected by the adverse impact of the resettlement (including the poor, those without legal title to land, ethnic minorities, women, children, elderly and disabled) and ensure that they are considered in resettlement planning and mitigation measures identified. Assistance should be provided to help them improve their socio-economic status.

15. The PAPs shall be involved in the preparation and implementation of the resettlement action plans.

16. The Project as well as the resettlement action plans for the PAFs including its mitigation measures on the adverse effects, their rights and available resettlement options shall be properly informed and discussed to the PAPs and their respective communities and to the extent possible be involved in the decisions concerning their resettlement.

17. Adequate budgetary support will be fully committed and made available to cover the costs of land acquisition (including compensation and income restoration measures) within the agreed implementation period.

18. Displacement shall not be done prior to compensation and provision of other necessary assistance for relocation.

    Sufficient civic infrastructure shall be provided in the resettlement site prior to relocation.

    Resettlement process and activities such as acquisition of assets, compensation and/or introduction of livelihood rehabilitation activities shall be completed prior to undertaking any kind of construction works/activities, except when a court of law orders so, in the cases of expropriation.

    Livelihood restoration measures shall at least be established prior to construction activities.

19. Organization and administrative arrangements for the effective preparation and implementation of the resettlement action plan shall be identified and established/set up prior to the commencement of the resettlement process; these shall include provision of adequate human resources for supervision, consultation, and monitoring of land acquisition and rehabilitation activities.

20. Appropriate reporting (including auditing and redress functions), monitoring and evaluation mechanisms, shall be identified and set in place as part of the resettlement management system.

    An external monitoring group shall be hired for the project to evaluate the resettlement process and results. Such groups may include qualified consultants, NGOs, research institutions or universities.

## 6.2 Cut-Off Date of Eligibility

The cut-off-date of eligibility is set prior to the implementation of the Project and that is during the preparation/planning stage wherein the residents/users of the areas required by the Project are eligible to be categorized as the PAPs, thus, may be eligible to the resettlement entitlements under the Project..

Based on the DPWH LARRIP and IROW Procedural Manual, the Cut-Off Date refers to the starting date of the Census Work.

Table 29, shows the starting date of the census survey conducted for each Barangay.

**Table 29 Cut-Off Date of Eligibility**

| River | LGU | Barangay | Cut-Off Dates |
|---|---|---|---|
| Pasig River | Manila | 894, 897 | 12 Nov. 2010 |
| | Manila | 896, 900 | 13 Nov. 2010 |
| | Makati | West Rembo | 18 Nov. 2010 |
| Lower Marikina River | Pasig | Ugong | 5 Nov. 2010 |
| | Pasig | Bagong Ilog | |
| | Pasig | Maybunga | |
| | Pasig | Caniogan | 4 Nov. 2010 |

The dates indicated above have been disclosed to each affected Barangay by the concerned LGU and accordingly same have been disclosed by the respective Barangays to their constituents. The establishment of the eligibility cut-off date aimed to prevent the influx of ineligible non-residents who might take advantage of the resettlement entitlements under the Project.

Those listed below are not eligible for compensation:

1) Those that sold or bought the structures of PAFs after the cut-off date
2) Those that moved in after the cut-off date
3) Those that moved out after the cut-off date

### 6.3 Principle of Replacement Cost

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

All compensation for land and non-land assets owned by households/shop owners who meet the cut-off-date shall be based on the principle of replacement cost, as follows:

a. Existing applicable regulations, methods and available market price survey results of the DPWH, DENR, DA, or LGUs shall be used for the calculations of the compensation for structures, crops and trees.

b. Houses and other related structures are computed based on the actual current market prices of affected materials, labor and mark-up cost.

   Unit costs for the materials are updated every year, using the standard price in each region. Labor cost is added as 25 % of the material cost. In addition, 20% mark up cost representing the transportation and applicable taxes is also added to the total estimated direct cost to come up with the total estimated replacement cost.

c. Annual crops are compensated based on the equivalent current market value of the crops at the time of compensation;

d. For perennial crops, cash compensation at replacement cost should be in accordance with the applicable local government regulations, and shall be based on the equivalent current market value at the time of compensation.

e. For timber trees, cash compensation at replacement cost should be in accordance with the applicable local government regulations, and shall be based on the equivalent current market value at the time of compensation based on the diameter at breast height of each tree.

# CHAPTER 7 MEASURES OF COMPENSATION AND ASSISTANCE

## 7.1 Compensation for Loss of Assets

### 7.1.1 Compensation for Structures

Owners of structures, including shanty dwellers, included in the census survey shall be compensated by DPWH at full replacement cost assessed by the DPWH Assessor.

A total of 60 structures shall be totally removed from existing locations. Out of said 60 structures, 44 are owned by the PAFs, and the remaining 16 are owned by the Absentee Structure Owners (ASO).

In case the owner owns more than one structure, the owner is eligible/entitled for compensation for all the affected structures if he/she can prove the ownership.

Renters, sharers and/or care-takers living on the affected structures are not eligible/entitled for compensation for the affected structures.

### 7.1.2 Compensation for Improvements, Crops and Trees

For the improvements, such as dog-pens, wells, outdoor toilets, fences and barges, etc. to be affected by the project, replacement cost shall be compensated based on the current/prevailing market material, labor and transportation costs.

Also, PAFs who cultivate public lands along the riverbanks area, replacement cost of the affected crops, vegetables and fruit trees/animals shall be compensated based on their prevailing/current market value.

DPWH shall notify owners on the commencement date of the construction work to encourage them to harvest crops.

For those who own fruit trees and non-perennial crops, DPWH will compensate them based on the prevailing/current market price surveyed and publicized by DENR, LGU, or Department of Agriculture, in accordance with the LARRIPP guideline. Moreover, further survey and validation of market prices shall be undertaken by the DPWH in order to apply a rational/reasonable unit price on those fruit trees and non-perennial crops on the computation of their respective compensation cost.

## 7.2 Livelihood Assistance defined in LARRIPP (April, 2007)[1]

### (a) Transportation Assistance

Relocated people shall be eligible/entitled for transportation assistance.

### (b) Inconvenience Allowance

Inconvenience Allowance in the amount of P 10,000 as a livelihood assistance shall be given to the PAFs, both categorized as Affected Structure Owners and Renters.

### (c) Rental subsidy

Rental subsidy shall be provided to the Renters affected by the project, equivalent to 3-months of their current rental fee but not to exceed P 15,000.

### (d) Livelihood Rehabilitation Assistance

The status/changes of living standard of the PAF before and after the resettlement shall be monitored by the DPWH.

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

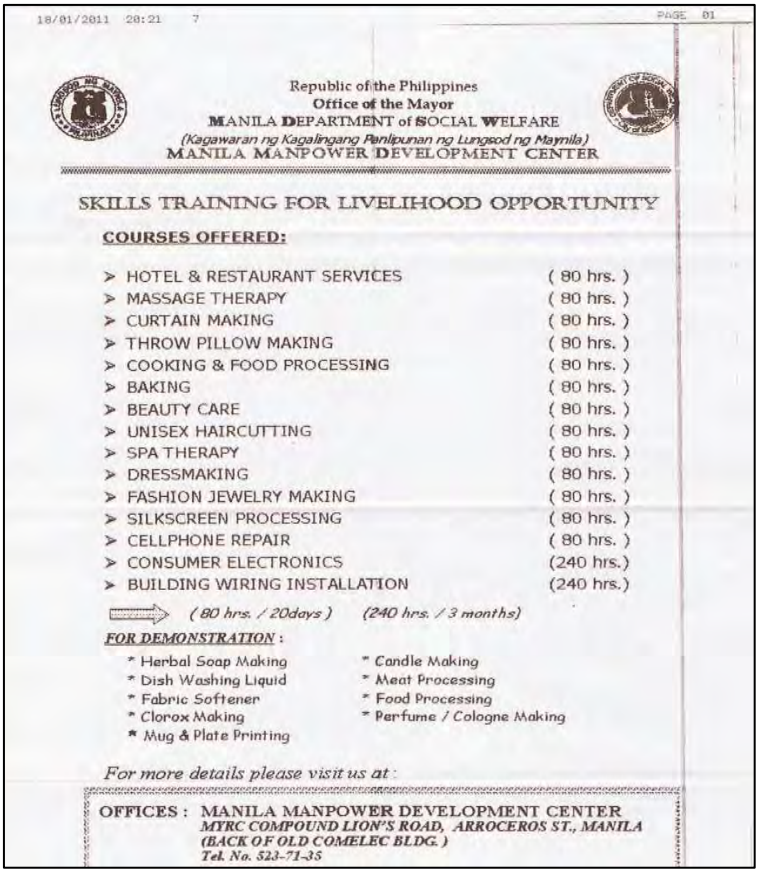
The proposed livelihood rehabilitation programs shall be coordinated to the concerned LGUs, considering that similar training programs conducted in the existing socialized housing sites of the concerned LGUs may be adopted and also the opinions and/or suggestions of the PAFs during public consultation in the implementation phase of the project shall also be considered. The DPWH shall be responsible to fund the said rehabilitation programs as well as look for the appropriate institutions that will assist and provide such livelihood programs/trainings/skills to the PAFs under the DPWH resettlement/compensation programs.

Agencies like the Department of Agriculture (DA), Department of Trade and Industry (DTI), Technical Education and Skills Development Authority (TESDA), Cooperative Development Authority (CDA) and other institutions have extension programs which can be linked to the strategic plan. Figure 11 is a list of training courses given by Manila Manpower Development Center in 2011. All the courses are free of tuition fee and targeted the youths, ages 16 to 24 years old. NGOs in Metro Manila and Provinces where relocation housings are located, also have

[1] The resettlement projects currently conducted by the LGUs in Metro Manila based on RA 7279 also apply similar assistance with similar level of cash amount. The amount of the planned financial assistance and eligibility are explained in the community consultation in April and July 2011, and no objection has been raised from participants during the said activity.
However, whether the assistances and allowances are sufficient to support for the transition period is unknown.
DPWH, therefore, will target all PAFs for Livelihood Rehabilitation Assistance. DPWH will conduct quarterly monitoring about the change of living standard of the PAFs before and after the resettlement. When the PAF are found that their living standard worsen, or whose present means of livelihood became not-viable, DPWH, in coordination with other appropriate institutions, will provide assistances, such as skills and livelihood trainings.

significant expertise and resources that the project should utilized. Social Welfare Department of LGUs and National Housing Authorities (NHA) may also have useful information in finding appropriate NGOs that can provide such kind of livelihood trainings.

The DPWH in collaboration with concerned institutions together with the representatives of PAFs shall work together in planning and/or developing an appropriate livelihood program.



18/01/2011 20:21 7 PAGE 01

Republic of the Philippines
Office of the Mayor
MANILA DEPARTMENT of SOCIAL WELFARE
(Kagawaran ng Kagalingang Panlipunan ng Lungsod ng Maynila)
MANILA MANPOWER DEVELOPMENT CENTER

SKILLS TRAINING FOR LIVELIHOOD OPPORTUNITY

COURSES OFFERED:

- HOTEL & RESTAURANT SERVICES ( 80 hrs. )
- MASSAGE THERAPY ( 80 hrs. )
- CURTAIN MAKING ( 80 hrs. )
- THROW PILLOW MAKING ( 80 hrs. )
- COOKING & FOOD PROCESSING ( 80 hrs. )
- BAKING ( 80 hrs. )
- BEAUTY CARE ( 80 hrs. )
- UNISEX HAIRCUTTING ( 80 hrs. )
- SPA THERAPY ( 80 hrs. )
- DRESSMAKING ( 80 hrs. )
- FASHION JEWELRY MAKING ( 80 hrs. )
- SILKSCREEN PROCESSING ( 80 hrs. )
- CELLPHONE REPAIR ( 80 hrs. )
- CONSUMER ELECTRONICS (240 hrs.)
- BUILDING WIRING INSTALLATION (240 hrs.)

⟹ *( 80 hrs. / 20days )* *(240 hrs. / 3 months)*

FOR DEMONSTRATION :

- Herbal Soap Making
- Dish Washing Liquid
- Fabric Softener
- Clorox Making
- Mug & Plate Printing
- Candle Making
- Meat Processing
- Food Processing
- Perfume / Cologne Making

*For more details please visit us at :*

OFFICES : MANILA MANPOWER DEVELOPMENT CENTER
*MYRC COMPOUND LION'S ROAD, ARROCEROS ST., MANILA*
*(BACK OF OLD COMELEC BLDG. )*
*Tel. No. 523-71-35*

**Figure 11 Examples of Livelihood Trainings**

## 7.3 Temporal Use of Private Land

Vacant parcels of land along the river bank of Pasig River and Lower Marikina River shall be used by DPWH for the temporary storage of materials, work sites, etc., through renting or leasing. Two (2) parcels of land are needed with an approximate area of 7,500 $m^2$ each. Suitable parcels of land will be identified and selected upon commencing the construction works in 2013.

## 7.4 Entitlement Matrix

Types of loss due to implementation of the project, eligibility and qualification of persons including entitlements are summarized in Table 30, which represent the Entitlement Matrix.

The entitlements adopted are based on the DPWH LARRIP, IROW Procedural Manual, and JICA Guidelines for Environmental and Social Considerations 2010.

If there are PAFs who wishes otherwise to be relocated, they may apply for the Resettlement Program provided by LGUs particularly the PRRC and Makati City, depending on the location of their current residency.[1]

[1] Resettlement Programs offered by LGUs are summarized in table below.

| | |
|---|---|
| PAF with legal ownership of the structure | • Relocation to social housing site, or Financial Assistance based on RA 7279 or City Ordinance, and<br>• Free transportation of persons and belongings to relocation site if relocating to the social housing. Otherwise, free transportation of persons and belongings to places of the choice of PAF within the Metro Manila, or to original province. |
| PAF without legal ownership of the structure (Renters, Sharers) | • Financial Assistance based on RA 7279 or City Ordinance. If social housing lots are available after allocation of structure owners, renters may be accommodated. And,<br>• Free transportation of persons and belongings to relocation site if relocating to the social housing. Otherwise, free transportation of persons and belongings to places of the choice of PAF within the Metro Manila, or to original province. |

## Table 30 Entitlement Matrix for Compensation

| Type of Loss | Application | Entitled Person | Compensation / Entitlements | Organization Responsible |
|---|---|---|---|---|
| STRUCTURES<br><br>(Classified as Residential/ Commercial/ Industrial) | More than 20% of the total structure loss or where less than 20% loss but the remaining structures no longer function as intended or no longer viable for continued use. | Owners of structures, including shanty dwellers, who have no land title, but are able to present voter's ID or certificate from Barangay.<br><br>**44 structures owned by resident households (44 owner households, 5 co-owner households)** | • Cash compensation for entire structure at full replacement cost, and<br>• Transportation assistance | DPWH |
| | | Absentee house owners<br>**16 structures owned by absent owners** | • Cash compensation for entire structure at full replacement cost | DPWH |
| | | Renter and Rent-free Occupants (sharer) of the structure<br><br>**9 households (7 renter, 2 rent-free occupants)** | • Transportation assistance , and<br>• (For renters) Rental subsidy equivalent for 3-month, maximum P 15,000, if relocating in Metro Manila. | DPWH |
| | Less than 20% of the total structure loss or where more than 20% loss but the remaining structures still function as intended or viable for continued use. | Owners of Structures, including shanty dwellers, who have no land title, but are able to present voter's ID or certificate from Barangay.<br><br>Absentee House Owners | • Cash compensation for the affected portion of the structure as replacement cost. | DPWH |
| IMPROVEMENTS<br><br>Pig pens, dog houses, pigeon houses, fences. | Severely or marginally affected | PAF with or without tax declaration, etc.<br>Owner of the improvement<br>**108 Improvements** | • Cash compensation for the affected improvements at full replacement cost | DPWH |
| CROPS, TREES, PERENNIALS | | Socially recognized owner<br>**59 Gardens**<br>**884 Trees** | • Cash compensation for crops (which are not yet suitable for harvesting), trees, and perennials at current market value as prescribed by the concerned LGUs and DENR, confirmed by DPWH as the same level with market value. | DPWH |
| POOR AND VULNERABLE HOUSEHOLDS | Landless, informal occupants of public land, except Professional Squatters and Squatting Syndicates as defined in RA 7279. | 58 households<br><br>**(structure owner (to be resettled) : 49**<br>**renter : 7**<br>**rent-free occupants (sharer) : 2)** | • Inconvenience allowance P 10,000.<br>• For transportation assistance, microbuses will be used for free transportation of families that include children, women and senior people, instead of trucks.<br>• For the families with persons who need special physical or medical care, DPWH will request respective LGUs to provide nurses or social workers to help them before and during the resettlement activities. | DPWH<br>LGU |
| LIVELIHOOD REHABILITATION ASSISTANCE / TRAINING | PAF to be resettled. | **58 households**<br><br>**(structure owner (to be resettled) : 49**<br>**renter : 7**<br>**rent-free occupants (sharer) : 2)** | • DPWH will monitor the change of living standard of the PAF before and after the resettlement.<br>• When the PAF are found that their living standard worsen, or whose present means of livelihood became not-viable, DPWH, in coordination with other appropriate institutions, will provide assistances, such as skills and livelihood trainings. | DPWH |
| TEMPORAL LOSS OF CONTROL OF LAND USE | Owners of unused land parcels located along the bank of Pasig River and Lower Marikina River. (Required land : two (2) parcels, about 15,000 m2 in total) | Locations and necessary size of land parcels will be validated before the commencement of construction works in 2013. | • Land owners will be paid for the rent / lease of the land parcels based on the market value, for the length of the DPWH occupation.<br>• DPWH will return the land parcels to the owner at the end of the rent / lease contract. DPWH is responsible to recover the condition of the parcel the same as 'before-project' condition. | DPWH |
| OTHER LOSS OR IMPACT NOT PREDICTED WHEN THE RAP IS PREPARED | Those who are severely or marginally affected. | Households or persons affected by any unforeseen impact identified during implementation of the Resettlement Plan | DPWH, in coordination with other appropriate institutions, will be responsible to recognize the impact, to assess the severity, and to negotiate with the PAF/PAP so that the loss or impact are adequately compensated and the PAF/PAP is adequately assisted. | DPWH |

Note : Professional Squatters and Squatting Syndicates, who have previously been awarded home lots or housing units by the government but who sold, leased or transferred to settle illegally in the same place or in another urban area, and non bona fide occupants and intruders of lands reserved for socialized housing, will not be eligible for compensation and assistance.

Table format source: Land Acquisition, Resettlement, Rehabilitation and Indigenous Peoples' Policy, 3rd edition (2007), DPWH, p. 14-16, and JICA16

# CHAPTER 8 PUBLIC PARTICIPATION AND CONSULTATION

In the scope of PMRCIP Phase II, the Consultant, Information Campaign and Publicity (ICP) Team has continuously conducting various information campaigns in the target area of the proposed construction works which includes Manila, Makati, and Pasig Cities. The campaigns are coordinated for various groups such as government officials, general public, and students. The contents of the campaign cover various educational subjects such as importance of flood control, and necessity of river bank management work.

The DPWH, with assistance of the JICA Study Team on the Preparatory Study for the PMRCIP which was completed in July 2011 had conducted information dissemination meetings in every barangays with PAFs on April 19, 28, 29 and 30, 2011 (1st undertaking), on July 15 and 20, 2011 (2nd undertaking), and August 12 and 20, 2011 (3rd undertaking) as shown in Table 31. The concerned LGUs including the respective Barangay Officials, and its constituents especially the PAFs were invited on said undertaking to inform and discuss information relative to the implementation of the project including its importance, objective and possible impacts as well as to discuss and attend on the concerns of the participants[1].

The said public information dissemination was conducted within the premises of each concerned Barangays for the convenience of their concerned constituents to attend on said activity.

The agenda listed in Table 32 were covered during the said activity. In addition, information regarding the contact names and numbers of the Key Officials of the Project has been given during the 2nd and 3rd Public information/consultation held on July and August 2011, for any additional clarification, queries and/or complaints relative to the Project.

All questions and/or opinions raised during said activity were answered/discussed and/or noted. The summary of questions and answers raised are shown in Table 34, Table 35 and Table 36.

**Table 31 Record of Public Consultation**

| No. | Date | Time | Target Group | Venue | No. of Participants* | No. of Resident PAFs Relocating 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 | Caniogan Barangay Hall | Residents: 43 (19) Officials: 3 | - |
| 8 | Fri. April 29,2011 | 13:30 – 15:05 | Maybunga, Pasig | Maybunga Barangay Hall | Residents: 18 (7) Officials: 3 | - |
| 9 | Sat. April 30,2011 | 11:30 – 12:10 | Bagong Ilog, Pasig | Bagong Ilog Barangay Hall | Residents: 54 (29) Officials: 2 | - |
| 10 | Fri. July 15, 2011 | 14:35 - 16:35 | PAFs in Manila | Barangay 894 Barangay Hall | Residents: 67(28) Officials: 8 | 48 |
| 11 | Wed. July 20, 2011 | 10:00 – 11:45 | PAFs in Makati | West Rembo Barangay Hall | Residents: 20(9) Officials: 8 | 10 |

[1] See Appendix 4 to 8 for agenda, photos, and minutes of Public Meetings.

| No. | Date | Time | Target Group | Venue | No. of Participants* | No. of Resident PAFs Relocating in the Barangay / LGU |
|---|---|---|---|---|---|---|
| 12 | Fri. Aug. 12, 2011 | 10:00 – 10:45 | Potential PAFs (owners of improvements and crops) | Maybunga Barangay Hall | Residents: 24(11) Officials: 2 | - |
| 13 | Fri. Aug. 12, 2011 | 11:00 – 12:15 | Potential PAFs (owners of improvements and crops) | Ugong Basket Ball Court | Residents: 27(10) Officials: 2 | - |
| 14 | Sat. Aug. 20, 2011 | 11:00 – 11:45 | Potential PAFs (owners of improvements and crops) | Bagong Ilog Barangay Hall | Residents: 12(9) Officials: 2 | - |
| 15 | Sat. Aug. 20, 2011 | 8:00 – 10:30, 14:00 – 15:30 | Potential PAFs (owners of improvements and crops) | Existing promnade, Barangay Rosario, Pasig City | Residents: 42(14) Officials: 2 | - |

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

**Table 32 Standard Agenda of Public Consultation**

| Minutes | Agenda | In Charge |
|---|---|---|
| 15 | Recognition of the Participants | Barangay Staff |
| 15 | Overview of the Project/Project Presentation | PMO-MFCP I |
| 20 | Environmental Impacts | DPWH-ESSO, PMO-MFCP I |
| 20 | Resettlement, including general schedule, compensation and assistances, monitoring programs, grievance redress procedure | PMO-MFCP I, LGUs |
| 30 | OPEN FORUM | Moderator: DPWH, Barangay Staff |
| 10 | Closing Remarks | Barangay Staff |

**Table 33 Main Topics of Information Provided Regarding Resettlement Plan**

1. The project are planned to be constructed at river bank sections/areas with low elevations and identified as flood prone areas, without adequate protection works. Construction works will be done within the limits of the 3 m easement area of the river.
2. If there are people residing within the 3 m river easement area, DPWH, together with the concerned LGUs (PRRC and Makati City), will inform/discuss and/or consult those Informal Settler Families (ISFs) regarding their resettlement. Resettlement is scheduled to be completed prior to the commencement of the construction works which is scheduled in December 2013.
3. DPWH will compensate the asset loss in full replacement cost at prevailing/current market value. The project affected structures and improvements will be compensated. For the vegetables and crops, DPWH will encourage the owners to harvest them before the construction works. Those harvested crops will no longer be compensated. If there are crops and/or trees not suitable for harvesting at the time of compensation, like mango tree, DPWH will negotiate with the owner regarding the amount of loss, based on the condition of the crops or trees and the amount of investment of the owners.
4. Before the actual resettlement activities, there will be at least three open forums for information dissemination and discussion. DPWH will also conduct family-by-family consultations for assessment of their assets and any necessary coordination and assistances.
5. The DPWH through the PMO-MFCPI including its field office are opened to accept opinions and questions relative to the Project and other related concerns on the resettlement. (contact names, addresses, and phone numbers are publicized during the meetings.)

**Table 34 Summary of Questions and Answers Raised in 1st Public Consultation**

| | Topics | Questions | Answers |
|---|---|---|---|
| 1 | Construction works | What kind of structure should be constructed along Pasig River? | For Pasig River, Sheet Pile will be driven to areas with destroyed revetment, in low lying areas parapet wall or raised wall will be constructed. |

| | Topics | Questions | Answers |
|---|---|---|---|
| 2 | Work schedule | What is the implementation schedule of the Project specially the sheet pile driving to areas who were really destroyed? | The construction works will start by November 2013.<br>In this year a series of public information dissemination for the PMRCIP III Project/social preparation to the affected ISF will be started.<br>With regards to the relocation process, no forced demolition will be conducted. Demolition operation only occurs when the ISF agree with the operation in voluntary base. |
| 3 | Working hours | What time the work start and what time it ends? | Working hour is day time from 8:00 am to 5: pm only. |
| 4 | River environment | After the dredging of Pasig River by PRRC, still the river was the same with foul odor and un cleaned water? | This project does not include dredging of Pasig River. Only Lower Marikina River will be dredged. |
| 5 | Affected area | How many meters from the river bank are affected by the Project?<br>In our Barangay are there houses to be affected?<br>I want to know the exact area affected by the Project with the existing houses along Lower Marikina River? | With regards to DPWH Project PMRCIP Phase III, Affected Area is 3 meters from the riverbanks.<br>If houses are within the three (3) meter easement after the riverbanks, definitely it will be affected. |
| 6 | Linear park plan | Why PRRC will clear the area of ten (10 meters)?<br>What will the Government do to the vacated areas within the ten (10) meters? | PRRC will continue the Linear Parks Project along Pasig River using the 10 m ROW. |
| 7 | Question on location of river bank | In areas near the Barangay Maybunga Hall, the current riverbank is not the original riverbank. We recommend further survey. | DPWH will coordinate with the Barangay regarding the conduct of further survey. |
| 8 | Number of PAFs | How many ISF are affected by the Project? | Final validation of the ISF will be conducted before the implementation of the Project. |
| 9 | Compensation for asset losses | How about the compensation for improvement of the house, trees, dog house? | DPWH will identify the affected structure, trees etc., and will pay compensation by cash based on the replacement cost at market value. |
| 10 | Partial impact | What if only portion of the house is affected? | If the remaining portion is still habitable, the only portion affected will be compensated. |
| 11 | Formal Settlers | How about if the affected constituent is not an ISF? | Titled lot are considered to be private property, we called it “Formal Settlers”. If it is a private property owner, DPWH-IROW Office will ask the owner to submit the legal documents like (title/tax declaration/subdivision plan etc.) needed to justify the proof of ownership as bases for the compensation. The computations will vary on the zonal valuation of the area. |
| 12 | Structure owners | What happens in our case we are renting the lot but we owned the house? | “ISF” are those families who owned the structure but did not own the lot. The structure owner is qualified for relocation. |
| 13 | Renters | Are renters qualified for relocation? | Renters on Master List will receive rental subsidy for 3-month, inconvenience allowance, transportation assistance, and livelihood rehabilitation assistance / training with DPWH compensation program.<br>In LGU resettlement program, Renters are categorized as 2nd priority for the relocation allocation, and will be awarded resettlement housing if any lots are available. |
| 14 | Agree to resettle but wish not to go to the relocation site | If we do not want the relocation site, what other option you can offer? | DPWH can offer compensation package option. |

| | Topics | Questions | Answers |
|---|---|---|---|
| 15 | Relocation sites | 1) If incase this Project will be implemented, is there relocation Site ready for the affected ISF?<br>2) Are there other areas of resettlement site aside from Montalban, Rizal and Calauan, Laguna?<br>3) Are there in city relocation?<br>4) I hear that in Montalban Rizal, the relocates has no job in the relocation site (economic dislocation) and the problem with the facilities like water and electricity. | DPWH is now identifying areas for possible relocation site as the 1st option for relocation aside from the relocation site of LGUs identified in Montalban and Calauan Laguna and Compensation Package Options.<br>The PRRC Resettlement Site in Montalban has complete facilities (Roads/ drainages/ Water connection/ Electricity and even with garbage collection by the LGU). Also there is a livelihood program, cooperative to conduct trainings for small scale industries, financial assistance as loan for the startup capital for any business. |
| 16 | Public Consultation | When will be the next meeting? | This coming month will conduct the 2nd public information dissemination of the project. |

**Table 35 Summary of Questions and Answers Raised in 2nd Public Consultation**

| | Topics | Questions | Answers |
|---|---|---|---|
| 1 | Phase III dredging | Where will the phase III dredging be situated? | Dredging will only be at the Lower Marikina River. |
| 2 | 3-meter easement | Where do you measure the 3 meter easement? | From the edge of the river bank. |
| 3 | | Thus the Project only requires 3-meter easement?<br>What is really the exact total easement needed by the Project? | As for the PMRCIP (Phase III) Project, a 3-meter legal easement is required. ISF who are affected by the Project will be entitled for the DPWH Compensation. |
| 4 | | Is the 3-meter easement safe? | Under the Supreme Court Mandamus all the concerned agencies are directed to clean up Manila Bay. Thus, the LGU and Barangay Officials are mandated to clean the waterways.<br>There is an order to clear areas along the waterways. For major rivers 10-meter easement and for river tributaries 3-meter easement are required to be cleared..<br>A series of coordination will be conducted to prevent influx of ISF on the easement.<br>If there are new returnees, the barangay should coordinate with LGU for the necessary and appropriate action. |
| 5 | I am not listed | I have a tag number, but when I looked at the PRRC master list, I am not listed.<br>why is it so? | You may clarify your tag number to the PRRC Office why you have a tag number but not included on the master list.<br>We will discuss your inquiry once we get a schedule on your barangay. We will have to verify it with our office's census. |
| 6 | Previously accepted the resettlement package | Will those who have previously accepted the resettlement package of the PRRC project avail of the compensation that will be offered by DPWH for the Phase III? | The option for compensation from the DPWH is for Phase III only and just compensation will be done once. If PAF have been awarded home lots or housing units by the government as resettlement compensation, the PAF is no longer entitled for a new compensation. |
| 7 | IRR of DPWH and PRRC | For Phase III, is IRR (Implementing Rules and Regulations) the same for PRRC to be used to calculate the compensation ? | IRR or Policy Guidelines of the DPWH is different to that of the PRRC.<br>For the compensation option, it is your choice whether you will choose the DPWH or PRRC. However, you can only choose one of the two options. |
| 8 | Compensation for private property | What is the compensation for private property? | Compensation for private property (land) has a different calculation and will be subject for assessment and verification on supporting documents. DPWH will compensate the private |

| | Topics | Questions | Answers |
|---|---|---|---|
| | | | property, if affected by the project, by cash as a replacement cost at current market value. |
| 9 | | Regarding the just compensation, is there a process to be undertaken for private owners? Will there be proper expropriation? | With regards to private property, DPWH-IROW Office will require the owner to submit legal documents like tax declaration and title. |
| 10 | Possibility of In-City Relocation | A vacant/idled lot near C-5 that can be identified as relocation site.<br>There is also an area which is the former target range area was now occupied by two big buildings. | The LGU have plans/programs on the idled lands that is why the LGU bought a land in Calauan, Laguna as resettlement site to all affected ISF of the Makati City.<br>The second mentioned site is a disputed area between Makati and Taguig Cities. |
| 11 | Management of the resettlement site | Once the program of or PRRC is finished, who will be managing the resettlement site especially those in Jaime Cardinal Sin Village? | PRRC will hand over the management of the resettlement site to NHA (National Housing Authority) once the PRRC resettlement program is complete. |
| 12 | Big companies, industries | How come other private areas like those owned by big companies are not experiencing the same removal as us informal settlers with regards to the 10 meter easement from PRRC? Is there a law justifying this? | DPWH project implementation covers 3 m, and DPWH concern is different from the 10 meter easement width of PRRC. |
| 13 | | With regards to the garbage that is dumped in the river, not only the informal settlers are the cause of it.<br>How about those big industries that plying the Pasig river? | There is a Mandamus from the Supreme court to clear obstructions that is polluting the river. Other government agencies like the PPA, Coast guard, DENR, and other local government units are involved in implementing this mandamus, including educational activities for big industries. |
| 14 | Garbage in the river. | I am involved in the environmental protection through the Disaster Risk Reduction Management Council (DrRMC).<br>On the part of our area of jurisdiction, we should be given an authority to prevent the people throwing garbage in the river.<br>I suggest to include the beautification on Pasig River to the Project. | There is no need to seek an authority/permit to prevent people throwing garbage in the river because we should be responsible for our surroundings. We should have social responsibility on areas of concern. |

**Table 36 Summary of Questions and Answers Raised in 3rd Public Consultation**

| | Topics | Questions | Answers |
|---|---|---|---|
| 1 | The affected area | What is the affected area by the Project? | The affected area of the Project is within the river area and it is also within the limits of 3meter easement of the river. |
| 2 | | What project are you going to construct in the area.<br>Where it will be constructed? | -As explained earlier, the major scope of the PMRCIP (Phase III) Project is dredging an approximately 5.4 km stretch of Lower Marikina River, dike/revetment, river wall are proposed to be constructed along the said area. The Projects is scheduled to commence by end month of 2013. |
| 3 | The low lying areas | The only problem is the low lying areas at the landside, there are collapsed areas even without rains or typhoon. I suggest said areas to be included in the Project. | Your suggestion is also noted, during detailed design which is tentatively scheduled to commence in 2012, extensive analyses/studies will be conducted to determine the actual condition of the river sections/areas especially those who need urgent protection works. |
| 4 | The measurement of the 3meters | Will the measurement of the 3meters start from the river bank to landside?<br>How about the crops/trees affected by the Project? | -Yes, the measurement of the said 3 meters will start from the riverbank towards the landside.<br><br>-The crops/trees/vegetables planted will be compensated at current market price at the time of taking, except to those crops which are ready/good for harvest, which will also revalidated during the resettlement process. |
| 5 | | - After the river park, are you going to get another 3 meter easement to the | -No, as explained earlier, the river park will only be affected temporarily. During construction works, |

| | | | |
|---|---|---|---|
| | | landside during the construction? | river based operation for the project will be applied wherein the construction activities will be undertaken in the riverside. |
| 6 | Outside of the 3m easement | How about if houses are affected outside the 3m easement? | - There is no houses identified to be affected by the construction of the said dike/ revetments, since, it is proposed to be constructed within the limits of the river park at landside area.<br>On the other hand, because of the Supreme Court Decision /Mandamus to clean up the Manila Bay, all LGUs are mandated to clear areas along the 10 meter easement for major rivers including Pasig-Marikina River and 3 meter for tributary (small) rivers in Metro Manila and NCR. Hence, the ISF along the Lower Marikina River which is within the said 10m will be relocated by LGUs in coordination with NHA and MMDA. |
| 7 | Impacts on the river park | In the implementation of the Project, will the river park be affected? | During the implementation of the Project, the river park will temporarily be affected, since, dike/revetment is being proposed to be constructed on said river park area to protect the neighborhood communities from overflowing of water on the river specially during flood.<br>After construction, the river park will be heightened since it will be restored on top of the said dike. |
| 8 | Drainage outlet at the river park | During Typhoon Ondoy, the river park was affected by water with sand and mud and went up to the residence area.<br>There is no sufficient drainage outlet for water to pass through the river.<br>I suggest to have drainage outlet. | Your suggestion is well taken, it might be reviewed during detailed design and you may also bring the said drainage outlet problem with the LGU, so that they can act immediately and appropriately on your concerned. |
| 9 | Compensation | Is there any compensation/ payments to the affected improvements like crops/trees/vegetables? | Yes, if there are improvements identified to be affected by the project, they will be compensated at current market value, except to those crops which are ready for harvest. |
| 10 | | Will DPWH conduct surveys on the improvements along the River? | Yes, actually we are now conducting the census survey of all the improvements of the PAFs along the Lower Marikina River. |
| 11 | Consultation meetings plan | Before the implementation of the Project, will DPWH also conduct series of consultation meetings with us? | Yes, prior to the implementation of the Project, DPWH will still conduct series of consultation meetings especially with the PAFs.<br>Likewise, the DPWH is continuously coordinating with the LGU relative to the Project. |
| 12 | Impacts from the current dredging work | Is DPWH the one presently dredging the River?<br>Our plants were affected and they put the dredged materials to our plants. | The proposed PMRCIP (Phase III) is not yet started. The tentative schedule for the implementation of the project is in 2013. Right now it is still under the preparation/ preparatory stage wherein this consultation activity is included. |
| 13 | Willingness to vacate the project area | If in case our area will be affected by the this DPWH Project, we are very willing to vacate the area once the project is implemented, we will support this flood control project since we are the first that will be benefited. | Thank you for your cooperation and support to the Project. |
| 14 | Flood in Marikina City | Why is it in Marikina City area are flooded than areas in Pasig City? | Because all the water coming from Antipolo and other areas upstream directly discharge and runs to the Upper Marikina River. The PMRCIP (Phase IV) which will be the next construction stage after the proposed PMRCIP (Phase III) will also be proposed in the future which will cover channel improvement of Upper Marikina River. |

# CHAPTER 9 INSTITUTIONAL FRAMEWORK FOR THE IMPLEMENTATION OF THE RESETTLEMENT ACTION PLAN

## 9.1 Identification of Related Institutions

Organizational coordination in implementation of the resettlement action plan is summarized in Table 37. The organizational arrangement among the responsible institutions is described in Figure 12.

**Table 37 Organizational Coordination**

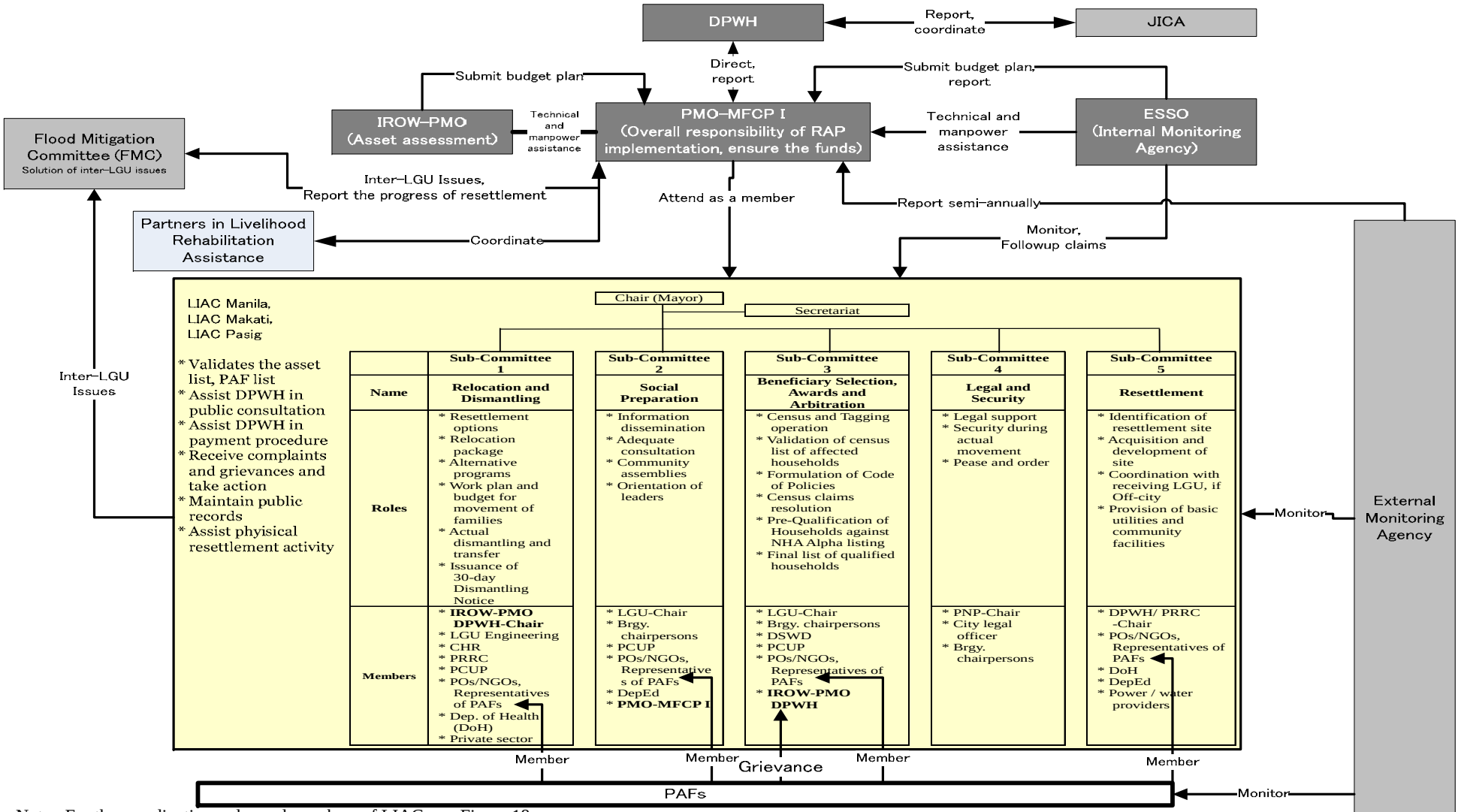
| Procedure of Resettlement | Responsible Organization |
|---|---|
| Household census, structure tagging, verification of eligibility of PAFs | DPWH-PMO-MFCP I in coordination with LGUs and LIAC |
| Estimation of compensation cost | DPWH-IROWR－PMO, to be validated by LIAC |
| RAP implementation | DPWH-PMO-MFCP I (implementing office) in coordination with LIAC and DPWH, IROWR－PMO and DPWH-ESSO |
| RAP monitoring | PMO-MFCP I and ESSO, in coordination with LIAC |
| Complaints and grievances handling | LIAC in coordination with PMO-MFCP I and ESSO |
| Consultation and coordination with PAFs, making agreement with PAFs regarding the choice of compensation, relocation and financial assistance | LIAC in coordination with IROWR－PMO, PMO - MFCP I |
| Issuance of notification for structure demolition | LIAC in coordination with IROWR－PMO, PMO - MFCP I |
| Preparation of necessary documents for demolition, relocation, and financial assistance | LIAC in coordination with IROWR－PMO, PMO - MFCP I |
| Preparation of necessary funding for demolition, relocation, and financial assistance | PMO-MFCP I in coordination with IROWR－PMO |
| Official demolition of structures and clearance of the site | LIAC in coordination with IROWR－PMO, PMO - MFCP I |
| Provision of compensations, assistances, and allowances | DPWH IROWR－PMO in coordination with LIAC and PMO-MFCP I |
| Preventing further in-flow of ISFs on the cleared easement area | Barangay Captains and Officials, assisted with LGU police |
| Job training and livelihood rehabilitation | PMO-MFCP I in coordination with the appropriate concerned agencies : Department of Education, Various NGOs, Dept. of Social Welfare and Development, etc. |

PMO-MFCP I : Project Management Office, Major Flood Control Projects, Cluster I
LGU : Local Government Unit
LIAC : Local Inter-Agency Committee
IROWR-PMO : Infrastructure Right-Of-Way and Resettlement-Project Management Office
ESSO : Environmental and Social Services Office

DPWH-PMO-MFCP I as the implementing office of the Project shall be the responsible organization for all the preparation and activities in this resettlement plan. DPWH,-IROWR-PMO shall assist the PMO-MFCP I by providing man-power and technical assistance regarding the assessment and payment of compensations. DPWH ESSO will also assist the PMO-MFCP I regarding the internal monitoring and due process of decision making.

PMO-MFCP I shall be part of the Local Inter-Agency Committee (LIAC) Meeting of Manila and Makati Cities. Estimation of compensation cost proposed by IROWR-PMO shall be discussed and deliberated during LIAC meeting. The implementation of the RAP by the PMO-MFCP I shall be reviewed/conformed by LIAC prior to its actual activities.

The PMO-MFCPI shall conduct internal and external monitoring of the RAP, thus, the monitoring report shall be discussed during LIAC meeting.




Note : For the coordination, roles and members of LIAC, see Figure 18.

**Figure 12 Organizational Coordination for RAP Implementation**



52

The complaints and grievances relative to resettlements issues/concerns received by the DPWH-PMO-MFCP I and/or ESSO shall be endorsed to the Beneficiaries Selection, Awards and Arbitrations Committee (BSAAC) through the LIAC for discussion and final decision and/or appropriate action/solution.

On the other hand, if relevant resettlement issues and/or concerns arise that necessitate discussions among concerned LGUs, the Flood Mitigation Committee (FMC) to be established/set up under the project, which will serve as a coordinating body among the concerned agencies and LGUs, shall assist in handling such discussions to facilitate addressing solutions and/or actions on said issues/concerns.

## 9.2 Capacities, Roles and Responsibilities

### 9.2.1 DPWH- Project Management Office - Major Flood Control Project I (PMO-MFCPI)

The Organizational Structure of the Department of Public Works and Highways is shown in Figure 13.

The PMO-MFCP I of the DPWH has an overall responsibility for the implementation of the project. The PMO shall manage and supervise the project, including the resettlement activities and land acquisition in coordination with other concerned agencies. It shall ensure that funds for the implementation of the RAP are available and that expenses are properly accounted in a timely manner.

The PMO-MFCP I shall be assisted by the ESSO in providing technical guidance and support in the implementation of the RAP especially with regards to social issues and/or considerations.

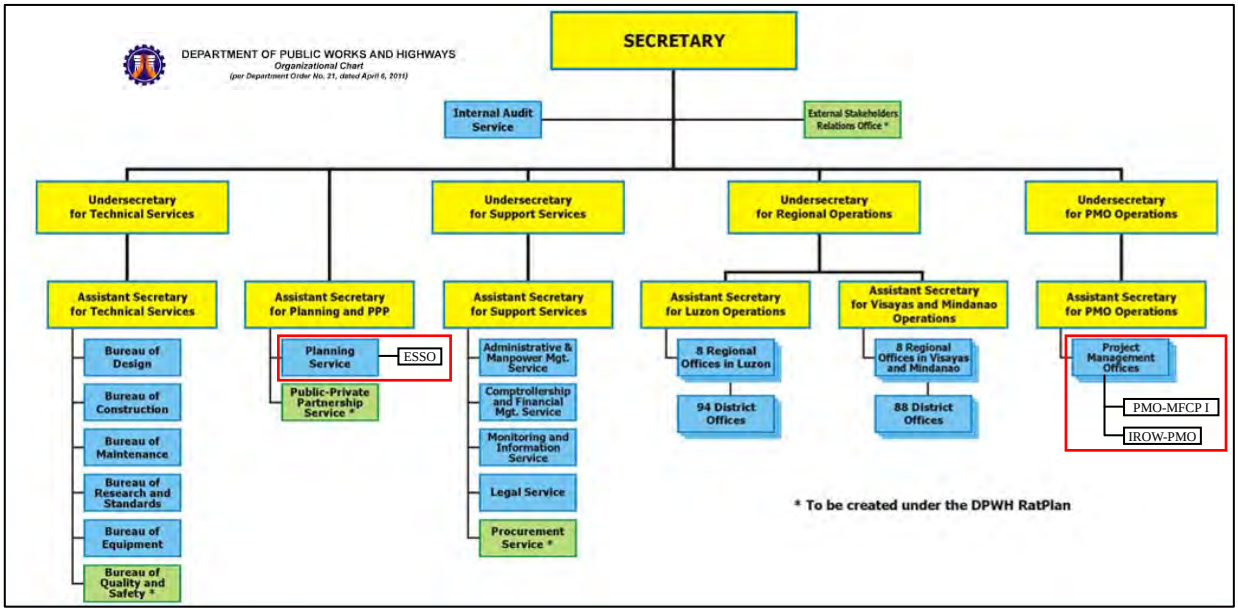
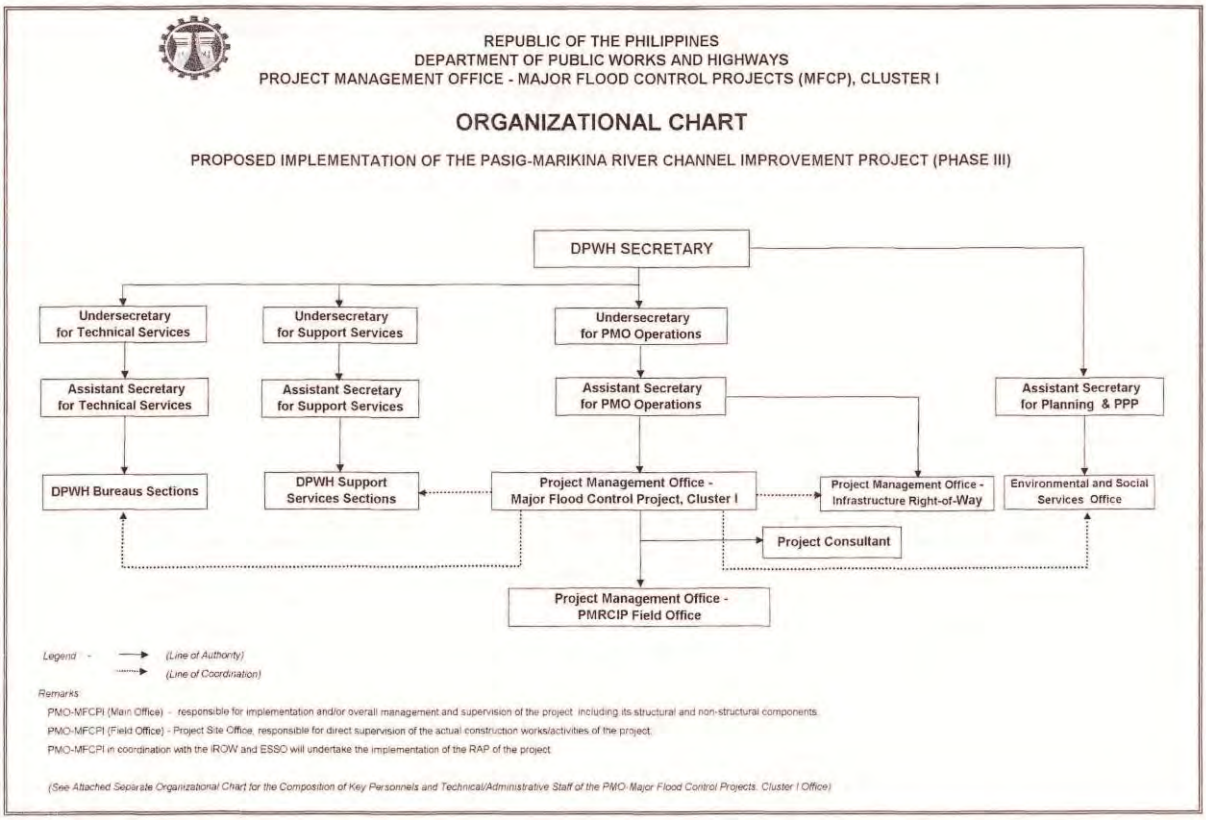



**Figure 13 Organization Chart of DPWH**



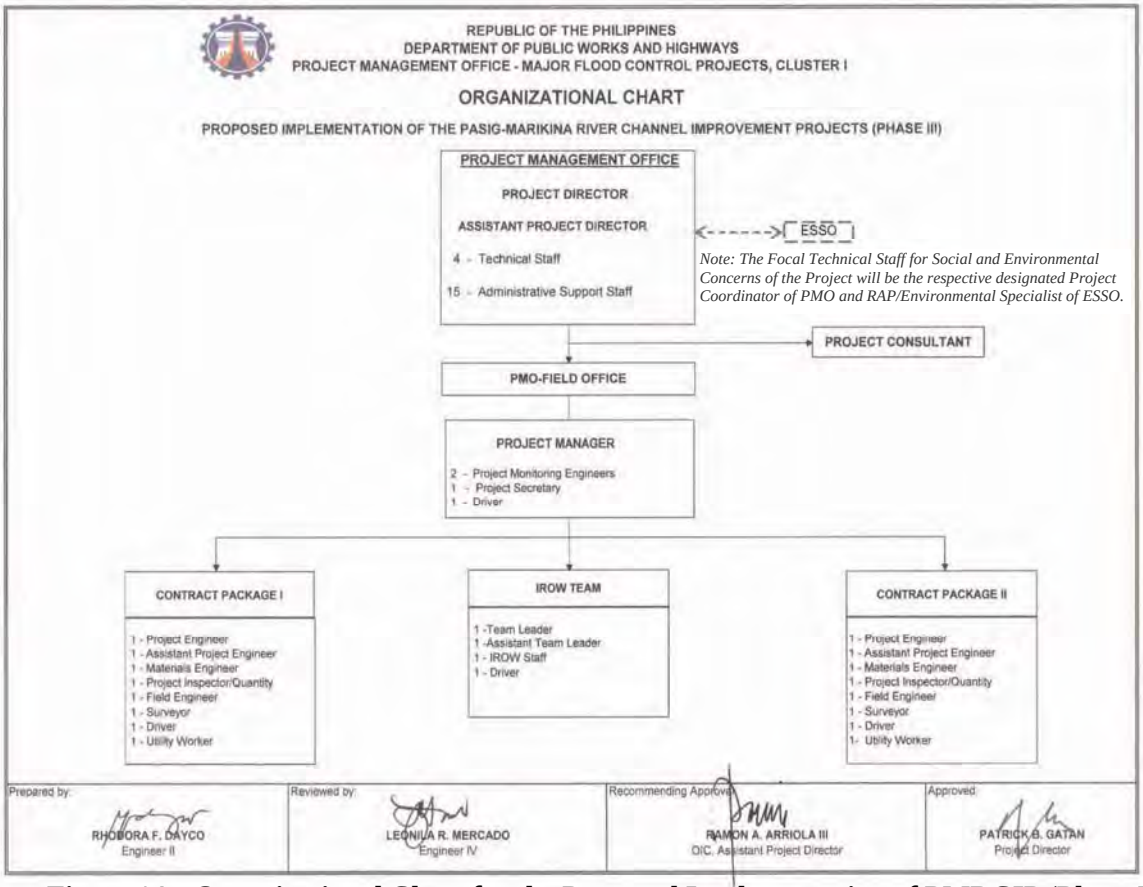




**Figure 14 Organizational Chart for the Proposed Implementation of PMRCIP (Phase III)**

**PMO-MFCP I (Field Office)** - responsible for the management and /or supervision of all activities related to actual project construction including right-of-way acquisition and/or resettlement of the Project Affected Families (PAFs).

**Project Consultant** – give assistance to the PMO-MFCP I relative to the implementation of the project including monitoring for resettlement.

The roles and functions of the upper ranking staff are as follows:

**a. Project Director**

* Direct and supervise the planning, formulation and implementation of the project as well as coordinate with all the concerned agencies
* Supervise field and actual operations of the project
* Recommend and/or take remedial action on the issues and concerns in connection with the implementation of the project

**b. Assistant Project Director**

* Assist the Project Director in overseeing the implementation of the project
* Direct and supervise all technical activities of its subordinates relative to the implementation of the project
* Perform other related functions as maybe assigned

**c. Project Manager**

* Administer, supervise and inspect all administrative and technical aspects of the project
* Recommend appropriate measure on the issues and/or concerns encountered during project implementation for the approval of the Project Director

**d. Project Engineer**

* Directly supervise, inspect and monitor all on-going activities of the project

### 9.2.2 DPWH - Infrastructure Right-of-Way and Resettlement– Project Management Office (IROWR-PMO)

The DPWH-IROWR PMO handles all acquisition of Right-of-Way and related resettlement nationwide. Figure 15 shows the overall organization of the PMO.

The Right-of-Way Acquisition (ROWA) Division is responsible for appraisal of land and assets. Details of ROWA Organization are shown in Figure 16.

The Removal and Relocation Operation (RRO) Division conducts relocation activities related to the DPWH ROW acquisition.

The Administration and Finance Division is the section responsible for preparation of necessary funding and provision of the compensation and assistances.

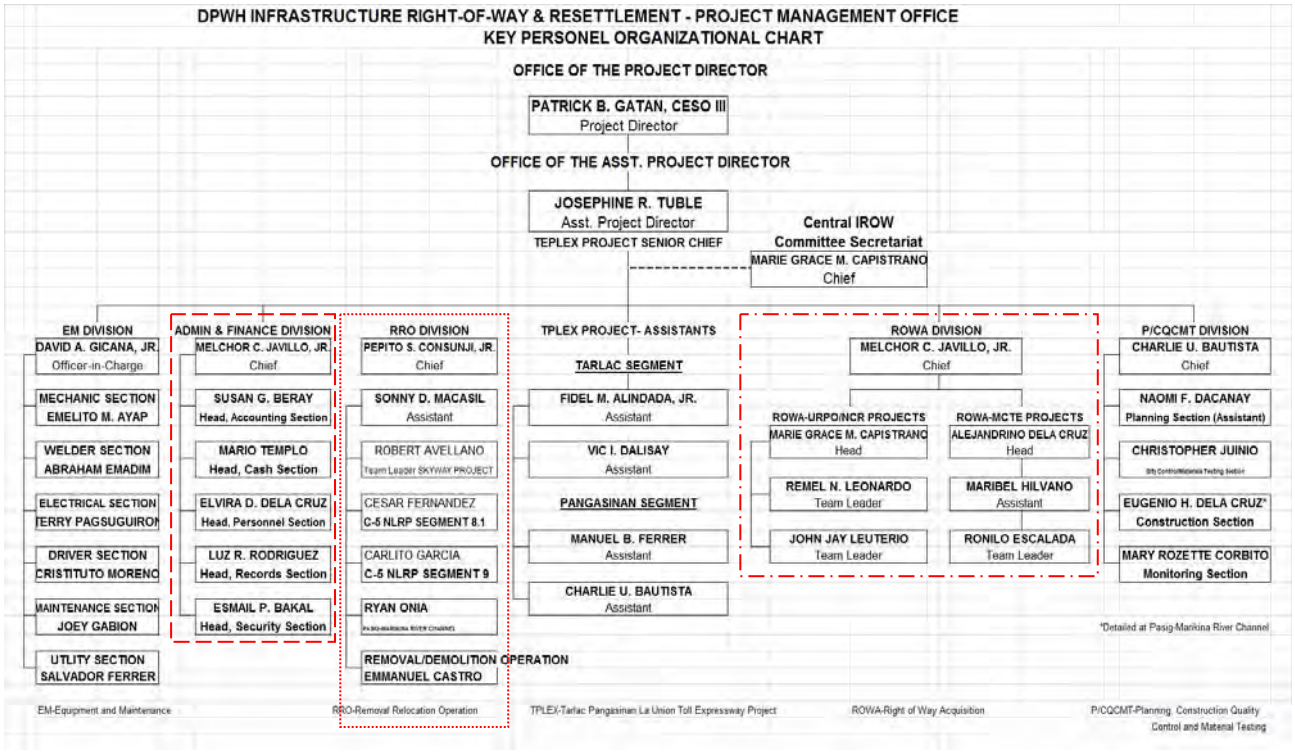



**Figure 15 Overall Organizational Chart of DPWH IROWR-PMO**

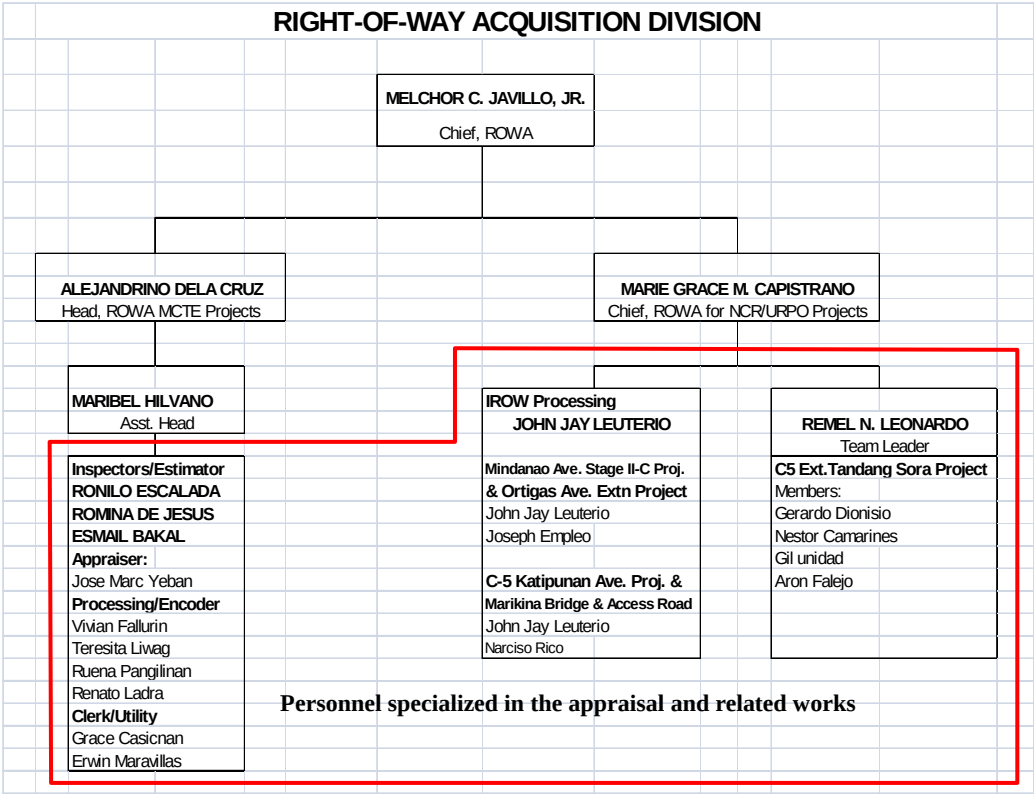



**Figure 16 Organizational Chart of Appraiser Section of IROWR-PMO**

### 9.2.3 DPWH - Environmental and Social Services Office (ESSO)

The DPWH-ESSO is an ad-hoc organization within the DPWH Planning Service that was created by a Department Order. Personnel and resources from various divisions of DPWH were assigned to this office, one of which is the Environmental Impact Assessment Division under the Planning Service.

The structure of ESSO is shown in Figure 17. The staff is divided into three groups and each group supervises different region of the Republic.

The functions of the ESSO are as follows:

1. Conduct assessments for environmental, social impact and land acquisition.
2. Prepare relevant reports such as Initial Environmental Examinations (IEE), Environmental Impact Statements (EIS), Environmental Management Plans (EMP), Resettlement Action Plans (RAP) and other necessary document.
3. Facilitate consultation and information dissemination to project affected persons and other relevant stakeholders.
4. Conduct environmental monitoring; Monitor RAP implementation and conduct post implementation evaluation.
5. Provide guidance to the PMO's regional and district level DPWH staff and local authorities in carrying out the above studies, preparation of documents and RAP implementation.
6. Provide training at regional, district and local level for consultation/participation, RAP implementation, environmental management planning, environmental monitoring, EIA tools and other new techniques.
7. Maintain and update the existing data bank and Geographical Information System (GIS).
8. Coordinate environmental concerns with other DPWH Offices, concerned Government Agencies, Local Government Units and Non Governmental Organizations.

The ESSO shall provide assistance and support in the implementation of the RAP for the Project, as follows:

1) Assists the PMO in the preparation and planning of the RAP;
2) Assists the PMO in preparation of the necessary budget plans for the RAP of the Project;
3) Assists the PMOs in resolving all resettlement concerns and activities;
4) Assists the PMO in amending/revising the RAP, if necessary, to incorporate identified resettlements concerns/issues encountered during RAP implementation;
5) Assists in monitoring and follow-up processing the compensation claims of the PAFs in coordination with the concerned LIAC;
6) Assists the PMO in supervising periodic monitoring on RAP implementation prior to submission of monitoring report to JICA.

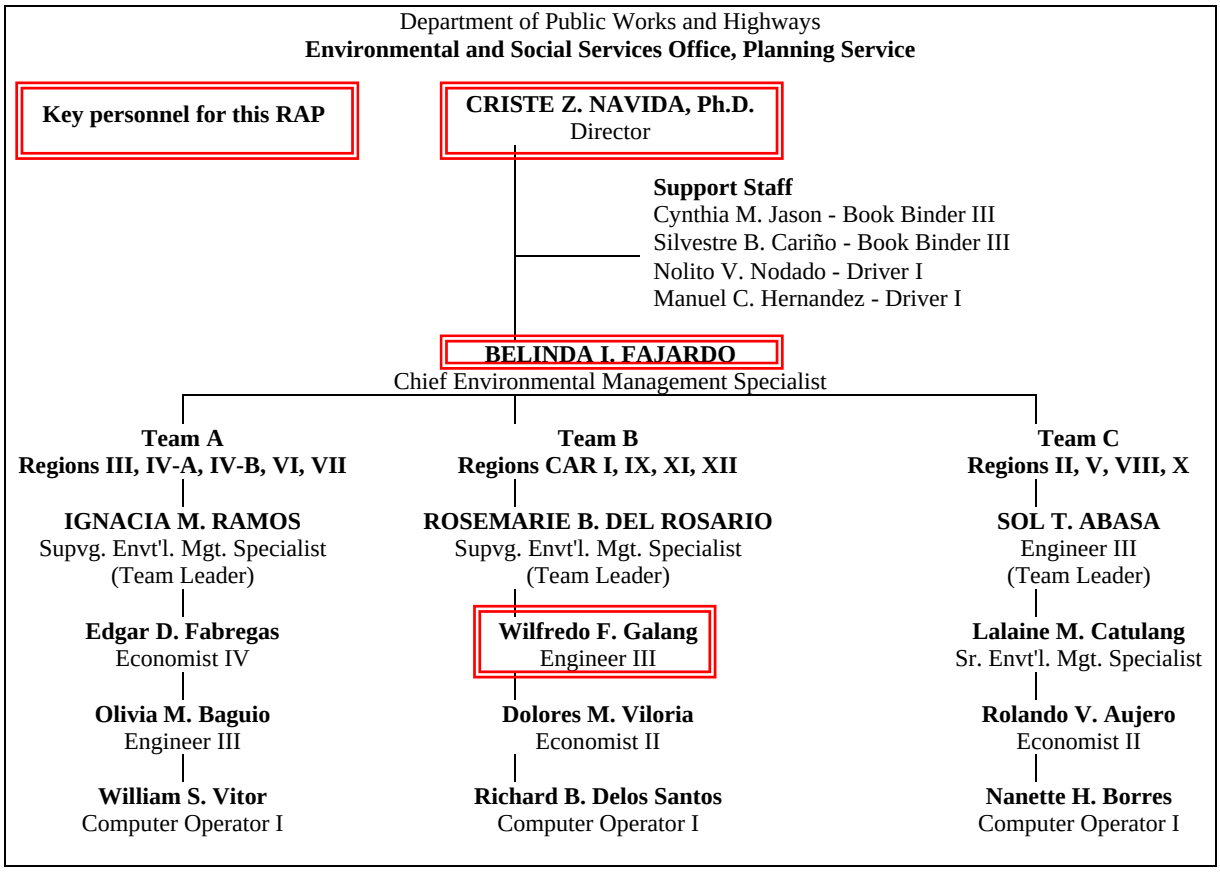
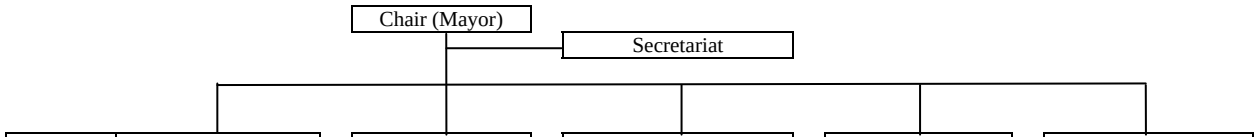



**Figure 17 Organizational Chart of DPWH Environmental and Social Services Office**

### 9.2.4 Local Inter-Agency Committee (LIAC)

The LIAC are created and institutionalized to be involved actively in the implementation of the government relocation and resettlement program. It shall be headed by the concerned city/municipal mayor under whose jurisdiction the project area is located.

Representatives of the PAF will shall be invited as one of the POs (Peoples' Organization).




| | Sub-Committee 1 | Sub-Committee 2 | Sub-Committee 3 | Sub-Committee 4 | Sub-Committee 5 |
|---|---|---|---|---|---|
| **Name** | **Relocation and Dismantling** | **Social Preparation** | **Beneficiary Selection, Awards and Arbitration** | **Legal and Security** | **Resettlement** |
| **Roles** | * Resettlement options<br>* Relocation package<br>* Alternative programs<br>* Work plan and budget for movement of families<br>* Actual dismantling and transfer<br>* Issuance of 30-day Dismantling Notice | * Information dissemination<br>* Adequate consultation<br>* Community assemblies<br>* Orientation of leaders | * Census and Tagging operation<br>* Validation of census list of affected households<br>* Formulation of Code of Policies<br>* Census claims resolution<br>* Pre-Qualification of Households against NHA Alpha listing<br>* Final list of qualified households | * Legal support<br>* Security during actual movement<br>* Pease and order | * Identification of resettlement site<br>* Acquisition and development of site<br>* Coordination with receiving LGU, if Off-city<br>* Provision of basic utilities and community facilities |
| **Members** | * **IROW-PMO DPWH-Chair**<br>* LGU Engineering<br>* CHR<br>* PRRC<br>* PCUP<br>* POs/NGOs, Representatives of PAFs<br>* Dep. of Health (DoH)<br>* Private sector | * LGU-Chair<br>* Brgy. chairpersons<br>* PCUP<br>* POs/NGOs, Representatives of PAFs<br>* DepEd<br>* **PMO-MFCP I** | * LGU-Chair<br>* Brgy. chairpersons<br>* DSWD<br>* PCUP<br>* POs/NGOs, Representatives of PAFs<br>* **IROW-PMO DPWH** | * PNP-Chair<br>* City legal officer<br>* Brgy. chairpersons | * DPWH/ PRRC -Chair<br>* POs/NGOs, Representatives of PAFs<br>* DoH<br>* DepEd<br>* Power / water providers |

Note: CHR : Commission on Human Rights, PCUP : Presidential Commission for the Urban Poor

**Figure 18 Organization Chart of LIAC**

LIAC is the central decision-making, coordinating and consultative body, a pool of manpower, resources and expertise of concerned local government units and national government agencies, as well as the working group that implements and/or causes the carrying out of the various activities, plans, programs and projects regarding resettlement. LIAC members gather periodically, attend all open dialogues, and observe all demolition works to secure the right of the affected families/persons as well as to prevent rough conflicts.

Figure 18 shows the proposed coordination of LIAC regarding the Project.

Specifically, the LIAC shall:

a. Serve as the local clearing house of all relocation and resettlement activities, and resolve issues and concerns that may arise in the actual conduct of census and

tagging operations and dismantling operations, as well as in the planning and development of resettlement sites;

b. Facilitate the orderly, peaceful and humane relocation of the ISFs occupying the affected areas;

c. Ensure that all qualified families are relocated to acceptable, secure, and affordable resettlement sites that are provided with basic utilities, facilities and services;

d. Enable all project stakeholders to participate in planning and implementing the program through a coordinative and integrated multi-sectoral approach; and

e. Monitor the implementation of plans, programs and projects as well as the operations of the subcommittees under it.

### 9.2.5 Pasig River Rehabilitation Commission (PRRC)

The PRRC was created on January 1999 through Executive Order 54 to ensure that the Pasig River is rehabilitated to its historically pristine condition conducive to transport, recreation and tourism.

Consolidating the various government offices in charge of aspects of Pasig River rehabilitation into a single body, the Commission has the mandate to plan, coordinate, evaluate, approve, implement, supervise, and monitor plans, programs, projects and activities; and enforce rules and regulations towards the rehabilitation of the river.

PRRC, based on a Memorandum of Agreement (MOA) with the City Government of Manila,, is the responsible institution for resettlement of residents within the 10-m easement of the Pasig River. The resettlement project was previously funded by the ADB, but now it is funded under the national budget.

PRRC will assist the resettlement activities of the DPWH through coordination with LIAC and/or provide information concerning status/developments of resettlement/relocation of ISF to the DPWH.

### 9.2.6 Makati Social Welfare Development (MSWD), Makati City

The MSWD is responsible for the Census, consultation, coordination relocation, compensation, and monitoring of the residents within the danger zones.

Engineering Department is responsible for preparation of the relocation housing site owned by Makati City.

The MSWD will assist the resettlement activities of the DPWH through coordination with the LIAC and/or provide information concerning status/developments of resettlement/relocation of ISF to the DPWH.

### 9.2.7 Urban Poor Affairs Office (UPAO) and Housing and Home Site Regulatory Unit (HHSRU), Pasig City

The UPAO and HHRSRU, Special Projects Office of the City Mayor, are responsible for the census, consultation, and compensation.

The UPAO and HHRSRU will assist the resettlement activities of the DPWH through coordination with the LIAC and/or provide information concerning status/developments of resettlement/relocation of ISF to the DPWH.

### 9.2.8 Institutions Related to Livelihood Rehabilitation Assistances and Trainings

Institutions such as Department of Agriculture (DA), Technical Education and Skills Development Authority (TESDA), Cooperative Development Authority (CDA), and Department of Social Welfare and Development (DSWD) are expected to provide the Livelihood Rehabilitation Trainings to PAFs relocated.

**Table 38 Recent Example of Training Programs Provided at Relocation Site or Targeting for Urban Poor**

| Institution | Relocation Site Location or Target Groups | Training Program and Achievement |
|---|---|---|
| Department of Agriculture | NHA site, Calauan, Laguna | Training for vegetable and flower farming |
| Technical Education and Skills Development Authority | NHA site, Calauan, Laguna | Training for carpentry, masonry, electrical work, cosmetics, crafts making |
| Cooperative Development Authority | PRRC site, Montalban, Rizal | Setting up cooperative for water bottling business with micro-finance from PRRC |
| | Makati site, San Jose, Bulacan, | Training for cooperative formation and management |
| Department of Social Welfare and Development | Residents of DSWD residential facilities and other needy adults identified by DSWD in Mandaluyong | 5-day Training for basic baking as a part of livelihood cum hunger mitigation project of DSWD |

# CHAPTER 10 IMPLEMENTATION SCHEDULE

Implementation Schedule of the RAP for the PMRCIP (Phase III) is planned as shown in Table 38. During Detailed Design (D/D) Stage of the Project, which will be carried out in Calendar Year 2012, revalidation of the census/tagging survey result shall be conducted as part of the Consulting Services for the D/D. Hence, if there will be identified additional households to be affected due to changes in the design/plan and construction areas of the project as compared to the preliminary design/plan proposed under the preparatory study, the RAP shall be revised to include those additional PAFs. Accordingly, current cut-off date will be set for the census/tagging of the newly identified PAFs.

The implementation of the RAP is planned to be completed prior to the commencement of construction/civil works of the project which is scheduled in December 2013.

Therefore, resettlement of all PAFs including removal/demolition of their affected structures are planned to be completed by November 2013. The actual demolition of the structures shall be conducted with the presence of the PAFs and representatives/members of LIAC. Transportation assistance will be provided to the PAFs, if needed, and also financial and food assistance shall be provided prior to the resettlement.

## Table 39 RAP Implementation Schedule (Tentative)

| | | Responsible Organization | 2011 | | | | 2012 | | | | 2013 | | | | 2014 | | 2015 | | 2016 | | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | | | | | | | |
| A | Detailed design and other consulting services of Phase III Project | DPWH | | | | | | | | | | | | | | | | | | | |
| B | (If project area and design are changed)<br>Census survey, Socio-economic study, and Revision of RAP to include new PAFs | DPWH | | | | | | | | | | | | | | | | | | | |
| D | Other consulting services | DPWH | | | | | | | | | | | | | | | | | | | |
| E | Construction work for PMRCIP Phase III | DPWH | | | | | | | | | | | | Dec.- | | | | | | | |
| 1 | Preparation of RAP | DPWH | | | | | | | | | | | | | | | | | | | |
| 2 | Pre-resettlement monitoring at Project Site | DPWH | | | | | | | | | | | | -Nov. | | | | | | | |
| 3 | Coordination of sending LGUs, LIAC members regarding resettlement scope and schedule | DPWH | | | | | | | | | | | | | | | | | | | |
| 4 | Verification of eligibility of PAFs | DPWH/LIAC | | | | | | | | | | | | | | | | | | | |
| 5 | Coordination and implementation of the Open Dialogue with attendance of LIAC<br>= Finalization of resettlement program | DPWH/LIAC | | | | | | | | | | | | | | | | | | | |
| | (If project area and design are changed)<br>Adjustment of resettlement program | DPWH/LIAC | | | | | | | | | | | | | | | | | | | |
| 6 | Grievance redress regarding the eligibility decision | DPWH/LIAC | | | | | | | | | | | | | | | | | | | |
| 7 | Decision of PAFs regarding the choice or acceptance of compensation | PAF | | | | | | | | | | | | | | | | | | | |
| 8 | Preparation of necessary documents and funding by PAFs and LGUs (and other LIAC member institutions) for demolition, relocation, and financial assistance | PAF/LGU | | | | | | | | | | | | | | | | | | | |
| 9 | Issuance of 30-day notification for structure demolition | LIAC | | | | | | | | | | | | | | | | | | | |
| 10 | Resettlement Activities Monitoring at Project Site | DPWH/LIAC | | | | | | | | | | | | -Nov. | | | | | | | |
| 11 | Voluntary demolition by PAFs<br>Payment of compensation before physical relocation. | PAF<br>DPWH/LIAC | | | | | | | | | | | | -Nov. | | | | | | | |
| 12 | Official demolition of structures with the attendance of the affected settler(s) and LIAC members<br>Payment of compensation before physical relocation | PAF<br>DPWH/LIAC | | | | | | | | | | | | -Nov. | | | | | | | |
| 13 | After demolition and clearing the affected project area, the Barangay Police patrols/monitor the cleared area to prevent the returnees (ISF) | Barangay | | | | | | | | | | | | | | | | | | | |
| 14 | DPWH, in coordination with other related institution, provide man power and equipment to clear and level the site of demolition | DPWH/LIAC | | | | | | | | | | | | -Nov. | | | | | | | |
| 15 | Post-Resettlement Monitoring at resettled locations | DPWH | | | | | | | | | | | | | | | | | | | |
| 16 | Job training to be provided or introduced based on the monitoring results . | DPWH | | | | | | | | | | | | | | | | | | | |

# CHAPTER 11 GRIEVANCE PROCEDURES

The PMO-MFCP I will be responsible for receiving the complaints and grievances regarding the design and implementation of the proposed construction works. The said PMO will also be responsible for preparation and implementation of appropriate measures. PAF may also bring their concerns to LIAC-BSAAC (Beneficiaries Selection, Awards and Arbitrations Committee), or concerned sections/divisions of the LGUs being the secretariat of the sub-committee. All the complaints and grievances received by PMO and LGU are to be brought to the Sub-Committee for resolution. PMO will also endorse the complaints and grievances to ESSO for advise and assistance.

During the community meetings prior to the resettlement activities, the channels for complaints and grievances and related procedures shall be announced/publicized to the public including the PAFs in the form of hand-outs like pamphlets brochures/ leaflets . After the community meetings, all concerned institutions, including Barangay, LGU, PMO-MFCP I, shall use the same hand-outs to explain the grievance redress procedures to those who come to them for filing their concerns.

Grievances from the PAFs related to the resettlement implementation or any related issues to the project will be handled, free of monetary charge, through negotiations and are aimed to have consensus decision to the following procedures:

1. The PAFs will lodge their grievances by writing to the LIAC for immediate resolution. When received verbally, the grievances may be written by the staff of LIAC, LGU, or PMO-MFCP I, or staff assigned by PMO-MFCP I, for submission.
2. If the complaint is not satisfactory resolved in 15 days or the PAF does not receive any response from the LIAC, the PAF can forward the complaint or file an appeal to the DPWH NCR Regional Office (RO).
3. If the complaint is not satisfactory resolved in 15 days or the PAF does not receive any response from the DPWH RO, the PAF can file a legal complaint in any appropriate Court of Law.

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

After the relocation, PMO-MFCP I will be responsible for monitoring the living condition of PAFs quarterly, be responsible for receiving all the appeals/complaints and will also be the first window to receive the grievances. All the appeals received will also be documented, and be brought to LIAC for immediate action.

Documentations of the received appeals/complaints/grievances shall be discussed in the LIAC meetings for immediate actions.

# CHAPTER 12 RESETTLEMENT COSTS

## 12.1 Compensation Cost for Affected Structures

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

A comparative unit cost of the affected structure based on the market price in May 2011 and sample of DPWH assessment in certain DPWH resettlement project is shown in Table 39. Hence, the higher unit cost per square meter of the affected structures based on the floor area and structure type was used/adopted in estimating the compensation cost of affected structure.

Based on the applied unit cost as shown in Table 40, the total compensation cost for the affected structures is estimated at P 5,286,787 (Table 42).

In the preparation process of compensation, DPWH shall conduct assessment of each structure, using the same unit-price for public work contracts, and the value shall be presented to and discussed with the owners. Therefore, it is reasonable to use DPWH procedure for calculation of market value of the affected structure.

**Table 40 Unit Cost of Affected Structure based on Floor Area and Structure Type**

| | | | Market Value Survey Results | | | | | DPWH Assessment Example | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type 1 | Type 2 | Type 3 | Floor Area M2 | Replacement cost total P | Unit cost P /m2 | Location | Year | Floor Area M2 | Replacement cost total P | Unit cost P /m2 | Location | Year |
| One-story | Salvaged | Salvaged (Tin, plastic, cardboard, etc) | | | **92*** | | | | | 42 | | |
| One-story | Wooden | Light (nipa, cogon, Bamboo, wood) | 45 | 41,468 | **922** | Barangay 900 | 2011 | 45 | 18,965 | 421 | Pura, Tarlac | 2009 |
| One-story | Semi-concrete | Mixed (Mixture of Light and Strong materials) | 78 | 99,136 | **1,271** | Barangay 900 | 2011 | 78 | 97,756 | 1,258 | Pura, Tarlac | 2009 |
| One-story | concrete | Strong (hollow blocks, G.I. Sheets, wood) | 141 | 265,783 | 3,407 | Barangay 900 | 2011 | 141 | 675,310 | **4,787** | Pura, Tarlac | 2009 |

*: 10 % of the cost of Wooden Structure. Bold : Used for estimation of compensation cost.
Source: JICA Study Team, IROWR-PMO, DPWH P. 1.000 = Y. 1.905. (Dec., 2010)

**Table 41 Number of Structures to be Affected 100 %**

| | Barangay | Salvaged | Light | Mixed | Strong | Total |
|---|---|---|---|---|---|---|
| Manila | Barangay 900 | 0 | 2 | 12 | 12 | 26 |
| | Barangay 896 | 0 | 0 | 13 | 5 | 18 |
| | Barangay 897 | 1 | 1 | 6 | 1 | 9 |
| | Barangay 894 | 0 | 0 | 2 | 0 | 2 |
| Makati | West Rembo | 0 | 1 | 2 | 2 | 5 |
| | Total | 1 | 4 | 35 | 20 | 60 |

**Table 42 Estimated Compensation Cost for Affected Structure**

| Structure Materials | | A No. of Structures | B Unit Cost /m2 | C Average Floor Area m2 | D Compensation Cost Total P | E=D/A Average Compensation per Structure P |
|---|---|---|---|---|---|---|
| Salvaged | (Cost = 10% of Light structure) | 1 | 92 | 80 | 7,360 | 7,360 |
| Light | Wooden | 4 | 922 | 24 | 88,512 | 29,504 |
| Mixed | Semi-concrete | 35 | 1,271 | 40 | 1,784,166 | 63,720 |
| Strong | Concrete | 20 | 4,787 | 36 | 3,406,748 | 283,896 |
| Total | | 60 | | 39 | 5,286,787 | 88,113 |

P 1.000 = Y 1.905 (Dec., 2010)
B : Higher number of the two estimation for the same structure type in Table 40.
C : Calculated from Census Survey results.
D : Calculated using floor area of each target structure in Census Survey results.
Note : In the preparation process of compensation, DPWH shall conduct assessment of each structure, using the same unit-price for public work contracts, and the value shall be presented and discussed to owners.
*: In existing social housing program, NHA program require PAFs to pay total P. 65,000 for housing (Strong-type) in 30 years.

This sample cost was calculated using the DPWH standard assessment format. Items included in the standard format for the concrete structure is shown in Table 43. The standard format requires the assessor to evaluate the details of materials used in the structure, using the same unit-prices applied for public work contracts, which are updated every year. Also, the format requires the measured drawings of the structure to give concrete base for the volume / number of the calculation. Unit costs for the materials are updated every year, using standard price in the respective regions. Labor cost is added as 25 % of the material cost. In addition to the total estimated direct cost, 20 % mark-up is included in the total of replacement cost, covering transportation cost and taxes.

The necessary estimation/calculation on the affected structures are being prepared by the IROWR technical staff and subsequently evaluated/reviewed by the Assistant Project Director for eventual recommendation for approval by the head of the office. Finally, said prepared documents will be approved by the Project Director. Based on these intensive assessment works, the computed replacement cost is considered justifiable and reasonable.

In the Implementation Phase of the RAP, the DPWH Assessor shall assess each affected structure, and subsequently, discuss the corresponding cash compensation to the structure owner.

**Table 43 Standard Format of Assessment of Structure Replacement Cost**

| Items | Detailed contents / materials assessed |
|---|---|
| Earthworks | i.e. excavation |
| Concrete works | i.e. cement, sand, gravel, formworks |
| Masonry works | i.e. mortar, Plaster, |
| Steel reinforcements | i.e. rebar (footing, wall footing, wall, column), tie wires |
| Ceiling works | i.e. ceiling joints, plywood, nails |
| Roofing works | i.e. wooden truss, nails, ridge roll, corrugated sheet |
| Electrical works | i.e. switch, outlet, utility box, junction box, box cover, pipe, breaker, wire, tape |
| Plumbing works | i.e. septic tank, slab flooring, walling, cement plaster |
| Doors, windows and grills | i.e. built-in cabinet, door, steel window, panel door, flush door, hinges, door knob |
| Painting works | i.e. Patching compound, paint thinner, lacquer thinner, baby roller, paint brush, rags, masking tape |
| Tile works | i.e. Floor tiles, sand, grout |
| 25 % labor cost for each items | |
| Total estimated direct cost | |
| Soft Cost (20 % mark-up) | |
| Total replacement cost | |

## 12.2 Compensation Cost for Improvements

There are fences, pig pens, dog houses, and a pigeon house to be compensated. The unit cost for compensation is still subject for verification.

**Table 44 Number of Improvements to be Affected 100 %**

| LGU | Barangay | Fence | Pig Pen | Dog House | Pigeon House | Chicken Pen | Deepwell | Kitchen | Shelter |
|---|---|---|---|---|---|---|---|---|---|
| Unit Cost | | Under survey | | | | | | | |
| Manila | Barangay 900 | 0 | 2 | 6 | 0 | 0 | 0 | 0 | 0 |
| | Barangay 896 | 0 | 1 | 8 | 0 | 0 | 0 | 0 | 0 |
| | Barangay 897 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 |
| | Barangay 894 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Makati | West Rembo | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Pasig | Bagong Ilog | 1 | 0 | 8 | 0 | 0 | 0 | 0 | 0 |
| | Ugong | 0 | 0 | 5 | 0 | 5 | 3 | 0 | 3 |
| | Caniogan | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| | Maybunga / Rosario (Under confirmation) | 1 | 0 | 20 | 1 | 27 | 1 | 5 | 12 |
| Total | | 2 | 3 | 46 | 1 | 32 | 4 | 5 | 15 |
| Grand Total | | 108 | | | | | | | |

Animals are not covered for compensation, because PAFs can bring them to relocation site if they wish.

## 12.3 Compensation Cost for Crops and Trees

Under this RAP, the compensation cost for the gardens are not considered/included in the computation of compensation cost considering that the annual crops and vegetables in the gardens are expected to be harvested prior to the commencement of construction work which will be notified by DPWH.

However, if the affected plants, shrubs, and other improvements in the garden are justified for compensation, DPWH shall discuss to the owner about the arrangement for compensation.

The estimated total compensation cost for the affected trees is P 8,140,000. Out of the said total cost, P 5,035,160 or equivalent to 62% refers to the total cost of those trees listed below using their respective current market unit prices (unit price for other affected kind of trees are still under survey/verification).

**Table 45 Estimated Compensation Cost for Crops and Trees**

| LGU | Barangay | Household | Garden / Field | Trees (Fruit, timber) | Banana | Coconut | Guyabano | Mango | Papaya |
|---|---|---|---|---|---|---|---|---|---|
| Unit cost P. | | | | | 2,500 | 720 | 12,000 | 63,000 | 200 |
| Manila | 900 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 896 | 8 | 8 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 897 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 894 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Makati | West Rembo | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pasig | Bagong Ilog | 10 | 2 | 20 | 1 | 11 | 6 | 2 | 0 |
| | Ugong | 22 | 19 | 284 | 72 | 7 | 3 | 13 | 42 |
| | Caniogan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Maybunga /Rosario (Under confirmation) | 52 | 29 | 580 | 213 | 65 | 51 | 41 | 20 |
| Total | | 93 | 59 | 884 | 286 | 83 | 60 | 56 | 62 |
| Compensation cost P. | | | To be validated | | 715,000 | 59,760 | 720,000 | 3,528,000 | 12,400 |
| Total (part of Grand Total) P. (61.9 % of the total number of trees) | | | | | 5,035,160 | | | | |

Tree species not listed in the above Table include such as Bamboo (126 trees), Malungay (38), Lemon (35), Alagaw (27), Mahogany (21), Guava (17), and Langka (Jack fruit) (13).

**Table 46 Unit Cost of Vegetables at Market Price (May 2011)**

| Type /Kind | Unit | Price |
|---|---|---|
| Amplaya (bitter gourd) | 1 kg. | P 35-40.00 |
| Cabbage | 1 kg. | P 25-30.00 |
| Carrots | 1 kg. | P 30-35.00 |
| Tomatoes | 1 kg. | P 10.00 |
| Red Onion | 1 kg. | P 45.00 |
| Eggplant | 1 kg. | P 25-30.00 |
| Root Crop (Cassava) | 1 kg. | P 10-20.00 |
| Okra | 1 kg. | P 25-50.00 |
| Root Crop (Red Camote) | 1 kg. | P 10-15.00 |
| Garlic | 1 kg. | P 100.00 |

Price survey was conducted at Nepa-Q Market (Quezon City) and Divisoria Market (Manila).

## 12.4 Cost for Preparation and Implementation of Resettlement Plan

The logistic cost for resettlement programs/activities of the DPWH is under survey/preparation.

Table 47 shows the logistic costs for resettlement plan per household under the NHA Pasig Office in 2010.

Using the NHA unit cost, the cost for preparation and implementation of resettlement plan for 58 PAFs is estimated at P 423,400.

**Table 47 Cost Estimation for Preparation and Implementation of Resettlement Plan**

| | | | P. per household | Administration and implementation | P. per 58 households |
|---|---|---|---|---|---|
| Serviced lot | | | 100,000 | | |
| Serviced house | | | 75,000 | | |
| Community facilities | Multi-purpose | hall, day-care center | 10,000 | | |
| Relocation cost | | | 12,000 | | |
| | Pre-relocation | Census and tagging | 350 | 350 | 20,300 |
| | | Community preparation | 300 | 300 | 17,400 |
| | | Information dissemination | 200 | 200 | 11,600 |
| | | Livelihood planning | 250 | 250 | 14,500 |
| | | Field trips to proposed resettlement sites including transportation and fuel | 200 | | |
| | | Inter-agency organization / coordination (administration cost) | 200 | 200 | 11,600 |
| | | Project mobilization (administration cost) | 500 | 500 | 29,000 |
| | Relocation | Manpower assistance teams | 2,300 | 2,300 | 133,400 |
| | | Transportation (trucks for materials) including fuel | 4,000 | | |
| | | Service vans for women, children, elders | 1,500 | | |
| | | LIAC food allowance | 300 | 300 | 17,400 |
| | | Security allowance | 200 | 200 | 11,600 |

| | | | P. per household | Administration and implementation | P. per 58 households |
|---|---|---|---|---|---|
| | Post-relocation | Manpower assistance teams | 600 | 600 | 34,800 |
| | | Transportation (truck for hauling debris) including fuel | 500 | 500 | 29,000 |
| | | LIAC food allowance | 100 | 100 | 5,800 |
| | | Security allowance | 100 | 100 | 5,800 |
| | | Turn-over activities | 100 | 100 | 5,800 |
| | Contingencies | including administration and management not included above | 300 | 300 | 17,400 |
| Water and power connection fee | | | 5,000 | | |
| Food assistance | | (in kind, for 3 days) | 1,000 | 1,000 | 58,000 |
| Total | | | 215,000 | | 423,400 |

Source of Unit Cost: NHA Pasig Office

## 12.5 Cost for Assistances and Allowances

Cost for assistances and allowances is estimated at P 1,791,200.

**Table 48 Cost for Assistances and Allowances**

| Type | Number | Unit Cost P. | Total Cost P. |
|---|---|---|---|
| Transportation assistance | | | 319,000 |
| *(Transportation (trucks for materials) including fuel)* | *(58)* | *(4,000)* | *(232,000)* |
| *(Service vans for women, children, elders)* | *(58)* | *(1,500)* | *(87,000)* |
| Inconvenience allowance | 58 | 10,000 | 580,000 |
| Rental subsidy | 7 | 3,171 | 22,197 |
| Livelihood Rehabilitation Assistance (as training programs equivalent to the value) | 58 | 15,000 | 870,000 |
| Grand Total | | | 1,791,197 |

* : Average monthly rent multiplied by 3.

## 12.6 Cost for Monitoring and Evaluation

The TOR and cost estimation for internal and external monitoring and evaluation are shown in Appendix 8 and 9. The cost for internal and external monitoring and evaluation is estimated at P 9,590,700 and P. 2,683,800, respectively, these costs are included in the total Project Cost.

## 12.7 Total Cost for RAP Implementation

Based on the above estimate, the total estimated cost for the implementation of the RAP (including price escalation and taxes), is P 40.4 million.

The annual inflation rates applied for the price escalation for this Project is 6.9 % for local currency portion.

**Table 49 Cost for Resettlement**

| Type | Unit | Number | Total Cost Ph P. | Paying Institution | Remarks |
|---|---|---|---|---|---|
| Compensation | Structures | 60 | 5,290,000 | DPWH | Implemented in 2012-13. |
| | Improvements | 108 | subject for validation | | Implemented in 2012-13. |
| | Tree | 884 | 8,140,000 | | Implemented in 2012-13. |
| | Garden | 59 | subject for validation | | Implemented in 2012-13. |
| Preparation and | Households | 58 | 423,400 | DPWH | Implemented in |

| Type | Unit | Number | Total Cost Ph P. | Paying Institution | Remarks |
|---|---|---|---|---|---|
| implementation of resettlement | | | | | 2012-13. |
| Assistances and allowances | Transportation assistance per HH | 58 | 319,000 | DPWH | Implemented in 2012-13. |
| | Inconvenience allowance | 58 | 580,000 | | |
| | Rental subsidy | 7 | 22,200 | | |
| | Livelihood Rehabilitation Assistance | 58 | 870,000 | | |
| Monitoring | Internal monitoring | 1 | 9,590,700 | DPWH | Pre-relocation, Relocation, Post-relocation. Implemented from 2012 to 2017. |
| | External monitoring | 1 | 2,683,800 | DPWH | |
| Sub-Total | | | 27,919,100 | | |
| Administration cost | | | 1,395,955 | DPWH | 5 % of sub-total |
| Contingencies | | | 2,791,910 | DPWH | 10 % of sub-total |
| Price escalation (6.9 %/year) | Compensation | | 1,567,653 | DPWH | |
| | Preparation and implementation of resettlement | | 49,423 | | |
| | Assistances and allowances | | 209,083 | | |
| | Monitoring | | 3,107,987 | | Internal : P 2,410,848<br>External : P 697,139 |
| Value Added Tax | | | 3,350,292 | DPWH | 12 % of sub-total |
| Grand-Total | | | 40,391,403 | | |

# CHAPTER 13 BUDGET AND FINANCING PLAN

## 13.1 Funds for RAP Implementation

Funds for the implementation of the RAP which include compensation, relocation and livelihood assistance, and external monitoring will be included in the project budget of the DPWH.

## 13.2 Update of the Cost Estimation

Estimated resettlement costs were based on the prevailing market rates of the materials in 2011. The market rates used for assessment of compensation will remain valid during the implementation period.

In case of unforeseen delays beyond 12 months, that will be August 2012, the rates for structures and fixed assets will be reviewed and adjusted as needed.

## 13.3 Procedures for Flow of Funds

The DPWH shall be responsible in providing the necessary funds for the implementation of RAP.

The PMO-MFCP I shall implement the RAP upon approval through the DPWH IROWR Committee and shall request the necessary funds to the Central Office of DPWH.

The IROWR-PMO, in coordination with ESSO-DPWH and LIAC, shall handle the compensation and payments of the PAFs.

# CHAPTER 14 MONITORING AND EVALUATION

## 14.1 Internal Monitoring

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

The tasks of the IMA are to:

1) Regularly supervise and monitor the implementation of the RAP in coordination with the concerned LIAC. The findings will be documented in the quarterly report to be submitted to the PMO and ESSO, for eventual submission to JICA by the PMO.

2) Verify that the re-inventory baseline information of all PAFs has been carried out and that the valuation of assets lost or damaged, the provision of compensation and other entitlements, and relocation, if any, has been carried out in accordance with the LARRIP and the respective RAP Reports.

3) Ensure that the RAP are implemented as designed and planned.

4) Verify that funds for the implementation of the RAP are provided by the PMO in a timely manner and in the amount sufficient for the purpose.

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

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

## 14.2 External Monitoring and Evaluation

An External Monitoring Agent (EMA) will be commissioned by the PMO-MFCP I to undertake independent external monitoring and evaluation. The EMA for the Project will be either a qualified individual or a consultancy firm with qualified and experienced staff.[1] The Terms of Reference of the engagement of the EMA shall be prepared by the DPWH and shall be acceptable to the JICA prior to the engagement.

The tasks of the EMA shall be the following:

a. Verify results of internal monitoring;
b. Verify and assess the results of the information campaign for PAFs rights and entitlements;
c. Verify that the compensation process has been carried out with the procedures communicated with the PAFs during the consultations;
d. Assess whether resettlement objectives have been met; specifically, whether livelihoods and living standards have been restored or enhanced;

[1] According to ESSO-DPWH, previous examples of EMA contracted by DPWH are; University of the Philippines at Los Banos, private consultants such as Angel Lazaro and Associates Co., GHD Pty. Ltd., and individual consultant Mr. Joselito P. Losaria .

e. Assess efficiency, effectiveness, impact and sustainability of resettlement and RAP implementation drawing lessons as a guide to future resettlement and indigenous peoples' policy making and planning;
f. Ascertain whether the resettlement were appropriate to meet the objectives, and whether the objectives were suited to PAF conditions;
g. Suggest modification in the implementation procedures of the RAP, if necessary, to achieve the principles and objectives of the Resettlement Policy;
h. Review on how compensation rates were evaluated; and
i. Review of the handling of compliance and grievances cases.

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

## 14.3 Stages and Frequency of Monitoring

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

### 14.3.1 Inception Report

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

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

### 14.3.2 IMA Monthly Monitoring

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

### 14.3.3 IMA Final Evaluation

Final evaluation of the implementation of the LARRIP will be conducted three months after the completion of payments of compensation to PAFs. (LARRIP p. 44)

### 14.3.4 IMA Post-Resettlement Semi-Annual Monitoring and Evaluation

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

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

### 14.3.5 EMA Semi-Annual Monitoring

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

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

### 14.3.6 IMA / EMA Final Evaluation and Proposal Report

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

## 14.4 Schedule of Implementation of RAP and Monitoring

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

Proposed schedules of monitoring as of August 2011 are shown in Table 49 and Table 50.

**Table 50 Proposed Schedule Chart for Internal Monitoring**

| | | | | | | | | | | | | | Number of reports |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2012** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | |
| Inception Report | | | | | | | | | ● | | | | 1 |
| Monthly monitoring and reporting | | | | | | | | | ● | ● | ● | ● | 4 |
| **2013** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | |
| Monthly monitoring and reporting | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | 11 |
| **2014** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | |
| Final Evaluation | | ● | | | | | | | | | | | 1 |
| Semi-annual monitoring and reporting | | | | | ● | | | | | | ● | | 2 |
| **2015** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | |
| Semi-annual monitoring and reporting | | | | | ● | | | | | | ● | | 2 |
| **2016** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | |
| Semi-annual monitoring and reporting | | | | | ● | | | | | | ● | | 2 |
| **2017** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | |
| Final evaluation and proposal report | ● | | | | | | | | | | | | 1 |

**Table 51 Proposed Schedule Chart for External Monitoring**

| 2012 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inception report | | | | | | | | | ● | | | |
| Semi-annual report | | | | | | | | | ● | | | |
| 2013 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Semi-annual report | | | ● | | | | | | ● | | | |
| 2014 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Semi-annual report | | | ● | | | | | | ● | | | |
| 2015 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Semi-annual report | | | ● | | | | | | ● | | | |
| 2016 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Semi-annual report | | | ● | | | | | | ● | | | |
| 2017 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Final report | ● | | | | | | | | | | | |

## 14.5 Reporting

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

## Monitoring Indicators

**1. FOR THE IMA**

| Monitoring Indicators | Basis for Indicators / Check List | Input and Output Indicators |
|---|---|---|
| 1. Budget and timeframe | ❑ Have all land acquisition and resettlement staff been appointed and mobilized for the field and office work on schedule?<br>❑ Have capacity building and training activities been completed on schedule?<br>❑ Are resettlement implementation activities being achieved against the agreed implementation plan?<br>❑ Are funds for resettlement being allocated to resettlement agencies on time?<br>❑ Have resettlement offices received the scheduled funds?<br>❑ Have funds been disbursed according to the RAP?<br>❑ Has the social preparation phase taken place as scheduled? | A. Input Indicators<br>* Amount of funds for resettlement allocated to resettlement agencies on time, compared to the planned amount.<br><br>B. Output Indicators<br>* Number of staff appointed on schedule compared to the number planned.<br>* Number of capacity building and training activities completed on schedule compared to the number planned. |
| 2. Delivery of Compensation and Entitlements | ❑ Have all PAFs received entitlements according to numbers and categories of loss set out in the entitlement matrix?<br>❑ Have PAFs received payments for affected structures on time?<br>❑ Have all received the agreed transport costs, relocation costs, income substitution support and any resettlement allowances, according to schedule?<br>❑ Have all replacement land plots or contracts been provided? Was the land developed as specified? Are measures in train to provide land titles to PAFs?<br>❑ How many PAFs resorted to expropriation?<br>❑ How many PAF households have received land titles?<br>❑ How many PAFs have received housing as per relocation options in the RAP?<br>❑ Does house quality meet the standards agreed?<br>❑ Have relocation sites been selected and developed as per agreed standards?<br>❑ Are the PAFs occupying the new houses?<br>❑ Are assistance measures being implemented as planned for host communities?<br>❑ Is restoration proceeding for social infrastructure and services? | A. Input Indicators<br>* Number of PAFs who started the procedure of resettlement activities, compared to the total number of PAFs.<br>* Number of PAFs who finished the procedure of resettlement activities, compared to the total number of PAFs.<br>* Number of PAFs who has not started the procedure of resettlement activities, compared to the total number of PAFs.<br>* Number and type of income and livelihood restoration trainings and other activities being implemented.<br><br>B. Output Indicators<br>* Number of PAFs resorted to expropriation, among the total number of PAFs who started or finished the procedure of resettlement.<br><br>* Number of PAFs that received land title, among the total number of PAFs who started or finished the procedure of relocation.<br><br>* Number of PAFs occupying the new houses, among the total number of PAFs relocated to the relocation site. |

| Monitoring Indicators | Basis for Indicators / Check List | Input and Output Indicators |
|---|---|---|
| | ❑ Are the PAFs able to access schools, health services, cultural sites and activities at the level of accessibility prior to resettlement?<br>❑ Are income and livelihood restoration activities being implemented as set out in income restoration Plan? For example utilizing replacement land, commencement of production, numbers of PAFs trained and provided with jobs, micro-credit disbursed, number of income generating activities assisted?<br>❑ Have affected businesses received entitlements including transfer and payments for net losses resulting from lost business and stoppage of production? | * Total number of PAFs who finished income and livelihood restoration trainings per training course.<br><br>C. Outcome Indicators<br>* Number of elementary school student among the PAFs, compared to the number prior to relocation.<br><br>* Number and type of complaints received by RIC regarding the living conditions and accessibility to various services in the relocation site. |
| 3. Public Participation and Consultation | ❑ Have consultations taken place as scheduled including meetings, groups, and community activities? Have appropriate resettlement leaflets been prepared and distributed?<br>❑ How many PAFs know their entitlements? How many know if they have been received?<br>❑ Have any PAFs used the grievance redress procedures? What were the outcomes?<br>❑ Have conflicts been resolved?<br>❑ Was the social preparation phase implemented? | A. Input Indicators<br>* Number of open forums (public consultations) conducted, compared to the total number planned.<br><br>B. Output Indicators<br>* Number of attendants in open forums (public consultations) compared to the number of PAFs in the particular barangay where the forum was held.<br><br>C. Outcome Indicators<br>* Number of the grievance redress procedures filed.<br>* Number of the conflicts resolved, compared to the number of the grievance redress procedures filed |
| 4. Benefit Monitoring | ❑ What changes have occurred in patterns of occupation, production and resources use compared to the pre-project situation?<br>❑ What changes have occurred in income and expenditure patterns compared to pre-project situation? What have been the changes in cost of living compared to pre-project situation? Have PAFs' incomes kept pace with these changes?<br>❑ What changes have taken place in key social and cultural parameters relating to living standards?<br>❑ What changes have occurred for vulnerable groups? | A. Outcome Indicator<br>* Number of PAFs who answer that their income have increased after relocation, compared to the total number of PAFs relocated.<br><br>B. Impact Indicator<br>* Types and significance of unexpected positive and negative impacts on persons, families, and communities at the original habitation and relocation site. |

**2. FOR THE EMA**

| Monitoring Indicators | Basis for Indicators / Check List | Input and Output Indicators |
|---|---|---|
| 1. Basic information on PAP households | ❑ Location<br>❑ Composition and structures, ages, education and skill levels<br>❑ Gender of household head<br>❑ Ethnic group<br>❑ Access to health, education, utilities and other social services<br>❑ Housing type<br>❑ Land use and other resource ownership patterns<br>❑ Occupation and employment patterns<br>❑ Income sources and levels<br>❑ Agricultural production data (for rural households)<br>❑ Participation in neighborhood or community groups<br>❑ Access to cultural sites and events<br>❑ Value of all assets forming entitlements and resettlement entitlements | — |
| 2. Restoration of living standards | ❑ Were house compensation payments made free of depreciation, fees or transfer costs to the PAF?<br>❑ Have PAFs adopted the housing options developed?<br>❑ Have perceptions of "community" been restored ?<br>❑ Have PAFs achieved replacement of key social cultural elements? | A. Outcome Indicator<br>* Number and type of complaints received by RIC regarding the living conditions and accessibility to various services in the relocation site. |
| 3. Restoration of Livelihoods | ❑ Were compensation payments free of deduction for depreciation, fees or transfer costs to the PAF?<br>❑ Were compensation payments sufficient to replace lost assets?<br>❑ Did transfer and relocation payments cover these costs?<br>❑ Did income substitution allow for re-establishment of enterprises and production?<br>❑ Have enterprises affected received sufficient assistance to re-establish themselves?<br>❑ Have vulnerable groups been provided income-earning opportunities? Are these effective and sustainable?<br>❑ Do jobs provided restore pre-project income levels and living standards? | A. Input Indicators<br>* Number and type of income and livelihood restoration trainings and other activities being implemented.<br><br>B. Output Indicators<br>* Number of PAFs occupying the new houses, among the total number of PAFs relocated to the relocation site.<br><br>C. Outcome Indicator<br>* Number of PAFs who answer that their income have increased after relocation, compared to the total number of PAFs relocated. |
| 4. Levels of PAP Satisfaction | ❑ How much do PAFs know about resettlement procedures and entitlements? Do PAFs know their entitlements?<br>❑ Do they know if these have been met?<br>❑ How do PAFs assess the extent to which their own living standards and | A. Outcome Indicators<br>* Number of the grievance redress procedures filed.<br>* Number of the conflicts resolved, compared to the number of the grievance redress procedures filed |

| Monitoring Indicators | Basis for Indicators / Check List | Input and Output Indicators |
|---|---|---|
| | livelihood been restored?<br>❑ How much do PAFs know about grievance procedures and conflict resolution procedures? How satisfied are those who have used said mechanisms. | |
| 5. Effectiveness of Resettlement Planning | ❑ Were the PAFs and their assets correctly enumerated?<br>❑ Was the time frame and budget sufficient to meet objectives?<br>❑ Were entitlements too generous?<br>❑ Were vulnerable groups identified and assisted?<br>❑ How did resettlement implementers deal with unforeseen problems? | A. Output Indicators<br>* The difference / delay of resettlement activities compared to the original time frame.<br>* The difference of cost of resettlement activities per PAFs compared to the original budget. |
| 6. Other Impacts | ❑ Were there unintended environmental impacts?<br>❑ Were there unintended impacts on employment or incomes? | A. Impact Indicator<br>* Types and significance of unexpected positive and negative impacts on persons, families, and communities at the original habitation and relocation site. |

# Appendix

## 1. Terms of Reference for Census Survey and Socio-Economic Study

# TENDER DOCUMENTS

# FOR

# SOCIOECONOMIC SURVEY

# FOR

# PREPARATORY STUDY FOR PASIG-MARIKINA RIVER CHANNEL IMPROVEMENT PROJECT

**September 2010**

**Manila, Philippines**

**CTI ENGINEERING INTERNATIONAL CO., LTD.**

# TABLE OF CONTENTS

## 1. GENERAL

The technical specifications shall apply to SOCIOECONOMIC SURVEY FOR Pasig-Marikina River Channel Improvement Project Phase III.

## 2. SCOPE OF WORK

The services to be provided by the Contractor are summarized below.

**Table 1 Socioeconomic Survey**

| Item | contents | comment |
|---|---|---|
| Socioeconomic Survey | -Interview Survey-<br>• Approximately 200 houses in Phase II area<br>• Approximately 200 houses in Phase III area | -Survey Contents-<br>1) Population (by Job, Deforciant)<br>2) Property<br>3) Family Composition, Family Budget and Socially Vulnerable |

## 3. WORK AREAS

The Work areas are shown in Figure 1. The exact location of the project areas shall be instructed by the Engineer prior to the commencement of the Work. The Target Areas shall include, but not limited to, 14 areas listed in Table 2. When Informal Settler Families are found in the area other than the listed area, the Contractor and the Engineer shall discuss and decide whether the Families shall be included in the Census.

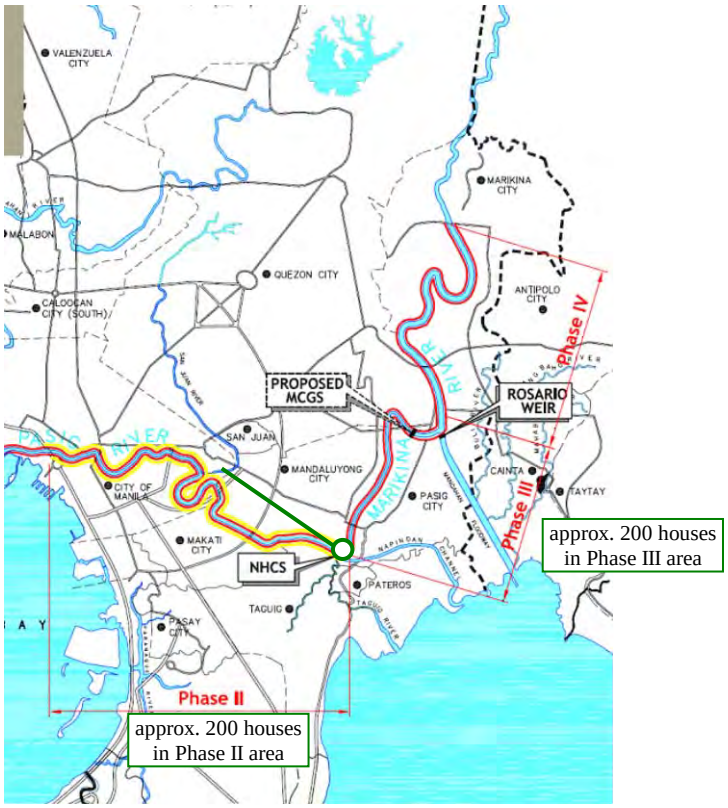



**Figure 1 Location of Socioeconomic Survey**

**Table 2 Target Areas Recognized in the Preliminary Survey 1/2**

| No./ Side | CITY | AREA | Total # of IS (fas.) | REMARKS | ACTION TAKEN by LGU/BARANGAY |
|---|---|---|---|---|---|
| III-1/L | PASIG | Upstream of Vargas Bridge | 4* | | The City Government of Pasig is now implementing on the clearing of IS families along Marikina River. The IS families will be relocated to Habitat Housing Project of Pasig. Other IS families who can not avail the housing project will avail the financial assistance of Five Thousand Pesos (P5,000.00) |
| III-2/L | PASIG | Kawilihan/Liwayway Brgy Caniogan | 20 | Samahan ng Tabing Ilog | |
| III-3/L | PASIG | Downstream of Sandoval Bridge-Kawilihan to Pasuan, Brgy Maybunga | 50 | | |
| III-4/R | PASIG | Downstream of Sandoval Bridge | 0* | 2 IS Families (as of year 2002) | |
| III-5/L | PASIG | Downstream of Rosario Bridge Brgy Rosario | 20* | | |
| III-6/R | PASIG | Brgy. Ugong North | 2 | | |
| III-7/R | Quezon | Brgy. Bagumbayan<br>Upstream of proposed MCGS (Sapang Bato and Mangahan Ext.) | 176* | | According to Barangay Captain Elmer C. Maturan M.D., the work program of the barangay in coordination with the city government is to relocate the 276 IS families to Towerville Phase 5 Bulacan. They are now waiting for the result of the verification of the Masterlist of IS families affected by NHA (National Housing Authority)/and documentation. After clearing the area the barangay is planning to plant BAMBOO's along the Marikina River as their Green Revolution Project. |
| | | ***Total*** | **272** | | |

*:Area with proposed river work.

**Table 2 Target Areas Recognized in the Preliminary Survey 2/2**

| No./ Side | Code #/ sta. No. | City | Barangay | Area | STATUS of per AREA | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | With IS | Trees | Damaged Revetment | Cavities | Encroachment of 3.5m from the river bank | |
| II-1/R | AP-6R 5+543-5+630 | Manila | Brgy | Rogon Private Property | √ | √ | √ | - | √ | Small trees<br>**With IS Pink House (5)encroached the3.5m** |
| II-2/R | AP-8R 7+518-8+230 | Manila | Brgy 898 Z100 Brgy Capt. Rodolfo Tagala Sr | Punta Sta Ana | - | √ | √ | - | - | With drainage pipes<br>The PRRC cleared the IS families affected in 10 m easement and were relocated to PRRC Resettlement Site in Montalban Rial/and Cardinal Sin Condominiom(the remaining 150 IS fas. affected along punta sta ana are still for relocation) |
| | 8+230-8+500 | | | Marcelo Private Property | - | √ | √ | √ | √ | Obstruction of structures/trees within the 3.5m |
| | AP-9R 8+510-8+850 | Manila | Brgy. | Marcelo Private Property | - | √ | √ | √ | √ | With drainage pipes<br>With obstruction within the 3.5 m |
| II-3/R | 8+850-9+150 | | | Punta Sta Ana | √ | - | √ | - | √ | With on going relocation activities by PRRC<br>With IS fas. In sta.9+150 |
| II-4/R | 9+150-9+341 | | | Phimco Private Property | √ | - | √ | √ | √ | With drainage pipes<br>Obstruction within the 3.5m of fence and structures<br>IS number unknown |
| II-5/R | AP-10R 9+430-9+722 | Manila | Brgy. | Punta Sta Ana | √ | √ | √ | - | √ | With drainage pipes<br>Trees for trimming<br>Encroachment of IS within 3.5m<br>IS number unknown |

| **No./ Side** | Code #/ sta. No. | City | Barangay | Area | STATUS of per AREA | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | With IS | Trees | Damaged Revetment | Cavities | Encroachment of 3.5m from the river bank | |
| II-6/L | BP-1L 10+364-10+824 | Manila | Brgy 888 Z98 | Pablo Ocampo | - | - | √ | √ | √ | -Obstruction of an extended kiosk to the river and encroachment within the 3.5m from the river bank |
| | | | Brgy Capt. Abraham Setosta Jr | Oil Company | - | - | √ | - | √ | - Encroachment within the 3.5m from the river bank |
| | | | | IS fas.affected | √ | - | √ | - | √ | -The ten (10) IS affected were already relocated by DPWH through PRRC and the remaining six (6(20?)) IS are still for relocation,<br>-obstruction of extended walls with 2nd floor as day care school and encroachment within the 3.5m<br>-obstruction of extended walls/post<br>-obstruction of extended walls<br>- Encroachment within the 3.5m from the river bank |
| II-7/L | BP-9L 276 15+965-16+562 | Manila | Brgy. West Rembo | Talipapa | √ | - | √ | √ | √ | With drainage pipes<br>With obstruction within the 3.5 m<br>IS number unknown (11?) |

## 4. SOCIOECONOMIC SURVEY

The Contractor shall conduct the Socioeconomic Survey in accordance with direction, instruction and order by the Engineer and DPWH. The primary purpose of the Work is to investigate the impacts on the surrounding environment. Concretely, the Work clarifies the present status of the various economical, physical and human related components surrounding the Project areas with interview survey.

## 5. SURVEY ITEMS

The contractor shall conduct the interview survey on affected social elements in line with Study process and strategies by the Engineer for the following topics. Other standard items which may be related to relocation, compensation and damage caused by the Project can be added.

(1) Coordination with concerned groups, organizations and institutions

The contractor shall advise and assist the Engineer at the any coordination that is necessary to conduct the census. The assistance shall include formulation of the Local Inter-Agency Committee and taking minutes of formal discussions and meetings regarding the Socioeconomic Survey.

(2) Agreement of the cut-off date

The contractor shall consult with the Engineer and related institutions to achieve the agreement on the survey schedule and the cut-off date to eliminate further inflow of the population on the target areas.

(3) Population Census

The population in the target areas shall be counted with the interview survey. All of the houses and people located/residing in/working in the target areas are the targets of this interview. The main items to be surveyed are as follows.

(a) Number of houses (including informal shanties and fences), barges and other obstructive structures to be affected

(b) Number of landowners and property lots to be affected

(c) Number of formal and informal settler families to be relocated (including residents, renters and businesses)

(d) Number of workers to be affected by the removal of businesses in the target areas

(4) Properties Census

The properties such as lands (real estates), structures and personal belongings owned by the every affected persons and businesses shall be investigated by the interview survey. The main items to be surveyed are as follows.

(a) Area, length, and types of use of the lands for immediate acquisition (to be

determined upon additional information from JICA Engineer)

(b) Types and numbers of assets to be relocated or to be damaged (including houses, pigs and housedogs)

(c) Types and amount of loss of expected income to be affected (may be determined from the income data)

(5) Family Composition, Family Budget and Social Vulnerable

Family composition, family budget and social vulnerable shall be investigated by the interview survey. The main items to be surveyed are as follows.

(a) Family composition, age, sex and the term (length) of residence

(b) Amount and types of family income

(c) Types and amount of household expenditure, including current expenditure for basic services (water, electricity, cooking fuel, telephone, education)

(d) Number of working family member, types of jobs, location of jobs(by LGUs and Barangays); time, measures and cost of commuting to the job site

(e) Number of socially vulnerable who requires special care for the relocation and compensation (i.e. persons with physical and mental disabilities, persons who need assistance to walk, persons who need special medical care (hospitals), persons who are seriously ill, persons who has difficulties in communication (language), migrants from other countries)

(f) Preference for the possible relocation sites and the reasons for the selection. (including the most desired basic services and facilities at the relocation site)

## 6. WORK RESULTS

The Contractor shall submit the following reports in English to the Engineer at the designated time. The Engineer will examine them for approval to the next step.

(1) Project Description Report (PDR) (3 copies with soft copy)

The Contractor shall prepare the three (3) copies of Project Description Report and submit them to the Engineer within one (1) week after the signing of the Contract. The PDR shall contain the following descriptions.

- Methodology of the study
- Staffing and study schedule
- Interview Sheet
- Others, if any

(2) Interim Report (3 copies with soft copy)

The Contractor shall prepare the three (3) copies of Interim Report and submit it to the Engineer by the end of October, 2010. The Inception Report shall contain the following descriptions.

- Methodology of the study
- Staffing and study schedule
- Interim Summary of the Interview Results
- Table of Contents of Assumed Final Report for Socioeconomic Survey
- Others, if any

(3) Draft Final Report (3 copies with soft copy)

The Contractor shall prepare the three (3) copies of Draft Final Report and submit it to Engineer by 20th day of November, 2010. The Draft Final Report shall contain all the results of the Work. The Engineer will review the report and make comments.

(4) Final Report (5 copies with soft copy)

The Contractor shall finalize the Draft Final Report referring to the comments by the Engineer and submit the five (5) copies of the report to the Engineer by the end of November, 2010.

**7. EQUIPMENT, MATERIAL AND LABOR**

All equipment, transportation vehicles, site office, per diem/allowance, materials and labor required for all the above-mentioned works shall be provided by the Contractor, as defined in the contract. Those costs shall be included in the cost estimate. The contract is concluded on lump sum basis.

**8. OTHER ISSUES**

The scope of the Work may be changed if necessary after the discussions of the stakeholder meeting or discussion with DPWH and in progress of the Study. The change of the scope will be settled with mutual agreement between the Engineer and the Contractor. The additional payment will not be made for such changes, amendments and modifications of the work item and the entire cost of this work shall be deemed to be included in initial contract price as such changes, amendments and modifications are a part of a series of the Work.

In this connection, the personnel of the Contractor will work together with the Engineer every working day through the course of the survey. Hence, working record prepared by the Engineer and signed by the personnel of the Contractor may be a verification / evidence in line with Bill of Quantities in the Contract.

Throughout the Work, the Contractor shall always communicate with Officers of DPWH as well as the Engineer.

Any other issues related to the conduct of the Work not mentioned above shall be settled with mutual agreement between the Engineer and the Contractor.

## 9. WORK PERIOD

The Work shall be completed at the end of November.

**Table 3.2 Work Period**

| Year | 2010 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Description | September | | | October | | | November | | |
| Survey in the field | | | | | | | | | |
| Report | | | | | | | | | |

# Appendix

## 2. Survey Format Sheet

**2010 OCCUPANCY VERIFICATION FOR PASIG-MARIKINA RIVER CHANNEL IMPROVEMENT PROJECT (PHASE III)**
**TAGGING AND HOUSEHOLD LISTING**

**City:** 1) Manila 2) Mandaluyong 3) Makati 4) Pasig 5) Quezon **Barangay:** **Zone:**

| Tag No. | Location of Structure | Type of Structure | Type of Housing Materials | Use of Structure | Age of Structure | Floor Area (Sq.m) | No. of HHs | Name of Household Head (Last Name/ First Name/ Middle Name) | Tenurial Status | Occupancy Status of Owner | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| - | a | b | c | d | e | f | g ( ) | - | h | i | |
| | | | | | | | HH-1 | | | | |
| | | | | | | | HH-2 | | | | |
| | | | | | | | HH-3 | | | | |
| | | | | | | | HH-4 | | | | |
| | | | | | | | HH-5 | | | | |

**a Location of Structure**

**1)** Pasig River (Left Bank)
**2)** Pasig River (Right Bank)
**3)** Marikina River (Left Bank)
**4)** Marikina River (Right Bank)

**b Type of Structure**

**1)** Single-detached
**2)** Duplex
**3)** Extended Housing
**4)** Rowhouse/Apartment
**5)** Others (Specify: _____)

**c Type of Housing Materials**

**1)** Salvaged (plastic, tin, cardboard, etc.)
**2)** Light (nipa, cogon, bamboo, wood)
**3)** Strong (hollow blocks, G. I. Sheets, wood)
**4)** Mixed (lights and strong)

**d Uses of Structure**

**1)** Residential
**1.1)** Purely Residential
**1.2)** Resi-Commercial
**1.3)** Resi-Industrial
**1.4)** Resi-Institutional
**2)** Non-Residential
**2.1)** Commercial
**2.2)** Industrial
**2.3)** Institutional
**2.4)** Others (bodega, Abandoned House, Toilet, etc.)

**h Tenurial Status**

**1)** Owner
**2)** Co-Owner
**3)** Renter
**4)** Sharer
**5)** Caretaker
**6)** AHO (Absent House-Owner)
**7)** **ODC** (Out During Census)
**7.1)** Owner
**7.2)** Co-Owner
**7.3)** Renter
**7.4)** Sharer
**7.5)** Caretaker
**8)** Refused to be interviewed
**8.1)** Owner
**8.2)** Co-owner
**8.3)** Renter
**8.4)** Sharer
**8.5)** Caretaker
**0)** NA

**i Status of Occupancy of Residential Owners**

**1)** Residing
**2)** Not Residing
**3)** NA

**SOCIAL-ECONOMIC SURVEY**
**FOR THE PASIG-MARIKINA RIVER CHANNEL IMPROVEMENT PROJECT (PHASE III)**

| | |
|---|---|
| **Tag. No. & HH No.** | **Tag. No. 2010 - HH. No.** |
| **Zone** | |
| **Barangay** | |
| **City** | 1) Manila 2) Mandaluyong 3) Makati 4) Pasig |

| **CALL RECORD** | |
|---|---|
| **DATE** | |
| **TIME STARTED** | |
| **TIME FINISHED** | |
| REMARKS | |

**CERTIFICATION**

**I hereby certify that all data entered hereto are true and correct to the best of my knowledge.**

_____
Signature over Printed name of Interviewee - Date

**I hereby certify that all data set forth wereobtained/reviewed by me personally in accordance with the instructions give.**

_____
Signature over Printed name of Field Interviewer - Date

_____
Signature over Printed Name of Reviewer/Supervisor - Date

| **(A) THE RESPONDENT** | |
|---|---|
| **(A-1) Name of Respondent** | |
| **(A-2) Relation to HH Head** | 1) Child 2) Parent 3) Sibling 4) Other Relative 5) Non-Relative |

| **(B) HOUSEHOLD** | | | | | | |
|---|---|---|---|---|---|---|
| **(B-1) Household Size** | | | | | | |
| **(B-2) Member** | | | | | | |
| Relation to HH Head | Last Name/ First / Middle | Age | Gender | Civil Status | Highest Educ. | Schooling Status (for 6-21 Yrs.) |
| **a** | | | **b** | **c** | **d** | **e** |
| 1. Household Head | | | | | | |
| 2. Spouse | | | | | | |
| 3. | | | | | | |
| 4. | | | | | | |
| 5. | | | | | | |
| 6. | | | | | | |
| 7. | | | | | | |
| 8. | | | | | | |
| 9. | | | | | | |
| 10 | | | | | | |

**a:** 1) Child, 2) Parent, 3) Sibling, 4) Other Relative, 5) Non-Relative **b:** 1) Male 2) Female **c:** 1) Single 2) Married 3) Live-in 4) Widowed 5) Separated **e:** 1) Yes 2) No

**d:** 1) None 2) Pre-School 3) Elem. Undergrad. 4) Elem. Graduate 5) HS Undergrad. 6) HS Graduate 7) Vocational/Tech'l 8) Coll. Undergrad 9) Coll. Graduate 10) Post Graduate

| **(B-3) Length of Residence** | **(B-4) Place of Origin** | **(B-5) Ownership of Other Real Property** |
|---|---|---|
| _____ Year (s) | 1) Within LGU<br>2) Outside LGU but Within Metro Manila<br>3) Outside Metro Manila (Specify: ) | 1) Yes<br>2) No |

**(B-6) Reason for Establishing Residence in the Area**

1) Economic Reason
   - 1.1) Proximity to Livelihood
   - 1.2) Rent Free / Affordable Rental Rate

2) Social Reason
   - 2.1) Family Ties
   - 2.2) Near School
   - 2.3) Got Married

3) Others
   - 3.1) Awardee
   - 3.2) Acquired Right
   - 3.3) Emergency Reasons (Demolition, Calamity, etc.)
   - 3.4) No Other Place to Go

**(B-7) Location of Other Real Property Owned**

1) Not Applicable 3) Outside LGU but Within MM
2) Within LGU 4) Outside Metro Manila
(4.1 Luzon 4.2 Visayas 4.3 Mindanao)

**(C) INCOME & EXPENDITURE**

| | | |
|---|---|---|
| **(C-1) Amount and Type of Family Income** | Amount (P per Month) Type ( ) | |
| **(C-2) Fuel for Lighting** | 1) Electricity 2) Kerosene (Gas) 3) Rechargeable Battery 4) LPG 5) Oil 6) Other | P per Month |
| **(C-3) Fuel for Cooking** | 1) Electricity 2) Kerosene (Gas) 3) LPG 4) Charcoal 5) Wood 6) Other | P per Month |
| **(C-4) Drinking Water** | 1) Community Water System 2) Deep Well 3) Shallow Well 4) MWSS 5) Other | P per Month |
| **(C-5) Food** | | P per Month |
| **(C-6) Communication (Telephone)** | | P per Month |
| **(C-7) Education Cost** | | P per Month |
| **(C-8) Transportaion Cost** | | P per Month |

| | |
|---|---|
| **(D) PROPERTIES TO BE AFFECTED** | |
| **(D-1) Structures to be Affected** | 1) Residential House (How many? ) 2) Shanty ( ) 3) Fence ( ) 4) Barge ( ) 5) Other: |
| **(D-2) Use of land** | 1) Use for ( ) 2) Area ( ) 3) How many years did you used ( ) |
| **(D-3) Pigs, Chicken, and Dogs** | 1) Pig (How many: ) 2) Chicken ( ) 3) Dog ( ) |

**(E) EMPLOYED HOUSEHOLD MEMBER**

| Name | a) Occupation | b) Place of Work | c) Income (Daily/Monthly) | d) Mode of Payment | e) Type of Employment | f) Status | g) Commuting to the Job Site | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Time | Measure | Cost |
| 1) | | | | | | | Hr | | Pesos |
| 2) | | | | | | | | | |
| 3) | | | | | | | | | |

**(F) BUSINESS**

**(F-1) Do you have a business in the area?** 1) Yes 2) No

**(F-2) Type of Business**

1) Trading 2) Manufacturing 3) Personal Services 4) Home/Small-Scale Industry 5) Transport 6) Service Contracting 7) Agri-business 8) Others ( )

**(F-3) No. of Workers Employed** Workers

**(F-4) Number of Years in Business** Years

**(F-5) Present Total Capitalization:** 1) Less than P2,000, 2) P2,000 - P5,000 3) 5,001 - P10,000 4) P10,001 - P15,000 5)P15,001 - P20,000 6) More than P20,000

**(G) SKILLS, BUSINESS INTERESTS & TRAINING NEEDS**

| Name of HH Member | Skills Possessed | Skills Preference | Business Preference | Training Need/Interest |
|---|---|---|---|---|
| 1) | | | | |
| 2) | | | | |
| 3) | | | | |

***(E) Employed Household Member***

***b) Place of Work:***

1) Residence/House 2) Neighborhood 3) Within LGU 4) Outside MM 5) No definite area 6) Abroad 7) NA

***c) Mode of Payment:***

1) Daily 2) Weekly 3) Bi-monthly 4) Monthly 5) Pakyaw/piecemeal 6) Commission 7) NA

***e) Type of Employment:***

1) Government Employee 2) Private Employed 3) Employer in Own Business 4) Self-employed Without Employee 5) Employee in Family Business

***f) Status of Employment:***

1) Permanent 2) Temporary /Casual 3) Contractual 4) Seasonal 5) Others ( ) 6) NA

| **(H) SOCIAL VULNERABLE** | | | |
|---|---|---|---|
| **(H-1) Person with Physical and Mental Disabilities** | 1) No | 2) Yes (Name: | Relation to HH Head: ) |
| **(H-2) Person who need assistance to walk** | 1) No | 2) Yes (Name: | Relation to HH Head: ) |
| **(H-3) Person who need special medical care** | 1) No | 2) Yes (Name: | Relation to HH Head: ) |
| **(H-4) Person who are seriously ill** | 1) No | 2) Yes (Name: | Relation to HH Head: ) |
| **(H-5) Person who has difficulties in communication (language)** | 1) No | 2) Yes (Name: | Relation to HH Head: ) |
| **(H-6) Migrant fro other countries** | 1) No | 2) Yes (Name: | Relation to HH Head: ) |

| **(I) RELOCATION SITE** | |
|---|---|
| **(I-1) Preference for Possible Relocation Site** | |
| **(I-2) Reason for Selection Above** | |
| **(I-3) Most Desired Basic Services/Facilities in Relocation Site** | 1) Health Center 2) Private Clinic 3) Government Hospital 4) Police Outpost 5) Livelihood Center 6) Market<br>7) School [ 7-1) Pre-School 7-2) Elementary 7-3) High School ] 8) Barangay Center<br>9) Other ( ) |

**(J) Do you know the Project (Pasig-Marikina River Channel Improvement Project by DPWH)**

1) Yes 2) No 3) Other ( )

# Appendix

# 3. Master List of PAFs

3-1. Master List of Project Affected Households, Project Affected Persons, and Structures to be Resettled

| ID | CITY | BARANGAY | NAME | Tenurial Status | Type of Housing Materials | Household Size |
|---|---|---|---|---|---|---|
| 1. | Manila | 900 | Almaden, Joel Llaneta | Owner | Strong | 2 |
| 2. | Manila | 900 | Jamolin Alejandra Joves | Owner | Strong | 5 |
| 3. | Manila | 900 | Tan, Remegio Orias | Owner | Mixed | 5 |
| 4. | Manila | 900 | Pacaña, Bisilisa | Owner | Strong | 4 |
| 5. | Manila | 900 | Ignacio Tampol | Owner | Strong | 1 |
| 6. | Manila | 900 | Rommel M Manao | Owner | Mixed | 1 |
| 7. | Manila | 900 | Baylon Cherlisita Abejuela | Owner | Mixed | 4 |
| 8. | Manila | 900 | Boco George Fajilan | Owner | Mixed | 4 |
| 9. | Manila | 900 | Dalimo Marlon Hindap | Renter | | 5 |
| 10. | Manila | 900 | Encinas Adelinda Jamon | Renter | | 5 |
| 11. | Manila | 900 | Lomentigar Sonia Bernaldez | Owner | Mixed | 3 |
| 12. | Manila | 900 | Viray Ligaya F | Co-Owner | | 2 |
| 13. | Manila | 900 | Alma Boco | Owner | Light | 4 |
| 14. | Manila | 900 | Sherelyn M Bartolome | Owner | Mixed | 10 |
| 15. | Manila | 900 | Delcano Gerarda Igno | Renter | | 2 |
| 16. | Manila | 900 | Florentina Manao | Owner | Mixed | 1 |
| 17. | Manila | 900 | Dennis Manao | Owner | Mixed | 4 |
| 18. | Manila | 900 | Barrios, Perlita Cayupan | Owner | Mixed | 9 |
| 19. | Manila | 900 | Romualdo Culibao Reyes | Owner | Mixed | 1 |
| 20. | Manila | 900 | Nora Garcia Tampol | Owner | Strong | 1 |
| 21. | Manila | 900 | Domingo,Edgardo | Co-Owner | | 4 |
| 22. | Manila | 900 | Lozano Josephine | Co-Owner | | 3 |
| 23. | Manila | 900 | Victoria Amador | Owner | Light | 3 |
| 24. | Manila | 900 | Budaño Arastacia Abella | Sharer | | 4 |
| 25. | Manila | 900 | Mallari Amado Teradez | Owner | Strong | 3 |
| 26. | Manila | 900 | Mangaong Vilma Ramos | Owner | Strong | 6 |
| 27. | Manila | 896 | Sumang Benjamin Modera | Owner | Mixed | 1 |
| 28. | Manila | 896 | Molino Eddie Gadon | Owner | Mixed | 1 |
| 29. | Manila | 896 | Lulu Alvin Bagacay | Owner | Strong | 3 |
| 30. | Manila | 896 | Pascual Gesmundo Moreno | Owner | Mixed | 2 |
| 31. | Manila | 896 | Florendo Bibiano Parena | Owner | Mixed | 1 |
| 32. | Manila | 896 | Laguinday Rolando Ramos | Owner | Mixed | 1 |
| 33. | Manila | 896 | Boco, Rolando | Owner | Mixed | 1 |
| 34. | Manila | 896 | Santiago,Rolando | Owner | Mixed | 7 |
| 35. | Manila | 896 | Catapang,Roberto | Owner | Mixed | 1 |
| 36. | Manila | 896 | Garcia, Ruben | Owner | Mixed | 6 |
| 37. | Manila | 896 | Nocum, Efren | Owner | Mixed | 1 |
| 38. | Manila | 896 | Resurreccion,Felipe | Owner | Strong | 2 |
| 39. | Manila | 896 | Julius Mendez Edradan | Owner | Mixed | 1 |
| 40. | Manila | 897 | Jackie Hans Visto Firrman | Owner | Mixed | 5 |
| 41. | Manila | 897 | Ravalo Miyong | Owner | Strong | 9 |
| 42. | Manila | 897 | Labio Doroteo | Co-Owner | | 5 |
| 43. | Manila | 897 | Garcia Lualhati Nocom | Owner | Mixed | 5 |
| 44. | Manila | 897 | Sumayang,Richard Altajara | Owner | Salvaged | 7 |
| 45. | Manila | 897 | Dela Cruz Leandro Perez | Owner | Mixed | 1 |
| 46. | Manila | 897 | Florbeth Matic | Owner | Mixed | 3 |
| 47. | Manila | 894 | Pacana, Christian | Owner | Mixed | 1 |
| 48. | Manila | 894 | Tampol, Irvin | Owner | Mixed | 1 |
| | | | 48 Household | | 4 Structures | 161 Pop. |
| 1. | Makati | West Rembo | Justin Calimlim | Owner | Strong | 2 |
| 2. | Makati | West Rembo | Gorospe Maria Rendon | Renter | | 2 |
| 3. | Makati | West Rembo | Rendon, Mario | Renter | | 4 |
| 4. | Makati | West Rembo | Reynold Salazar | Owner | Strong | 6 |

| ID | CITY | BARANGAY | NAME | Tenurial Status | Type of Housing Materials | Household Size |
|---|---|---|---|---|---|---|
| 5. | Makati | West Rembo | Consuelo Leorito De la Reyna | Owner | Mixed | 6 |
| 6. | Makati | West Rembo | Ganea Wendy Buin | Renter | | 4 |
| 7. | Makati | West Rembo | Isidro Angelito Geronimo | Renter | | 7 |
| 8. | Makati | West Rembo | Joy Calimlim | Owner | Light | 2 |
| 9. | Makati | West Rembo | Justin Calimlim | Sharer | | 8 |
| 10. | Makati | West Rembo | Rendon, Jose | Co-Owner | | 2 |
| | | | 10 Household | | 4 Structures | 43 Pop. |
| 1. | Manila | 900 | Incomo Loreta Sorio | Absent | Strong | 0 |
| 2. | Manila | 900 | Molino JeiJei Cordova | Absent | Strong | 0 |
| 3. | Manila | 900 | Jocuya Merlita Mazano | Absent | Strong | 0 |
| 4. | Manila | 900 | Bernabella Manao | Absent | Mixed | 0 |
| 5. | Manila | 900 | Tampol, Nino | Absent | Strong | 0 |
| 6. | Manila | 900 | Laguinday Armando Ramos | Absent | Mixed | 0 |
| 7. | Manila | 900 | Ligaya Lagunday Conguez | Absent | Strong | 0 |
| 8. | Manila | 896 | Baltazar,Edwin | Absent | Strong | 0 |
| 9. | Manila | 896 | Alba, Emma | Absent | Mixed | 0 |
| 10. | Manila | 896 | Espinosa, Jun | Absent | Mixed | 0 |
| 11. | Manila | 896 | Malaya,Federigan | Absent | Strong | 0 |
| 12. | Manila | 896 | Walo, Perfecta | Absent | Strong | 0 |
| 13. | Manila | 897 | Regis Remedios Arnesia | Absent | Light | 0 |
| 14. | Manila | 897 | Sanga Ronaldo Rosales | Absent | Mixed | 0 |
| 15. | Manila | 897 | Padillion Samuel | Absent | Mixed | 0 |
| 16. | Makati | West Rembo | Amis Michael jao | Absent | Mixed | 0 |
| | | | Absentee House Owners | | 16 Structures | |

3-2 Master List of Owners of Improvements, Crops and Trees to be Affected

| LGU | Barangay | No. | Owner's Name | Total Cultivated Area m2 | Garden / Field with crops | Number of Trees | Deepwell | Chicken pen | Dog house | Kitchen | Shed |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Pasig | Maybunga | 1 | Alfonso Supang | 174 | Yes | 44 | | 3 | | | 0 |
| Pasig | Maybunga | 2 | Eddie Moro | 52 | Yes | 1 | | | | | |
| Pasig | Maybunga | 3 | Mercedes Dalina | 73 | | 4 | | | | | |
| Pasig | Maybunga | 4 | Menchi Eguid | 86.6 | Yes | 7 | | | | | |
| Pasig | Maybunga | 5 | Consuelo Penaflor | 45 | | 13 | | | | | |
| Pasig | Maybunga | 6 | Rolly Bron | 60.5 | | 2 | | | | | 1 |
| Pasig | Maybunga | 7 | Doray Saturnino | 68 | Yes | 8 | | | | 1 | |
| Pasig | Maybunga | 8 | Rodel Aranila | 30 | Yes | 6 | | | | | |
| Pasig | Maybunga | 9 | Crisol Paterter | 30 | Yes | 2 | | 3 | 1 | 1 | |
| Pasig | Maybunga | 10 | Carlito Puruganan | 87 | | 5 | | 1 | | 1 | 1 |
| Pasig | Maybunga | 11 | Jun Lincuazon | 63 | | 7 | | | | 1 | |
| Pasig | Maybunga | 12 | Cristita Haranta/Rosemarie Watiwal | 48 | | 2 | | | | | |
| Pasig | Maybunga | 13 | Ernesto Peralta | 116.6 | Yes | 4 | | 3 | | 1 | |
| Pasig | Maybunga | 14 | Jocylin Argonia | 96.6 | | 7 | | 3 | | | |
| Pasig | Maybunga | 15 | Larry Damagan | 176 | | 13 | | 5 | | | 1 |
| Pasig | Maybunga | 16 | Teresita Canales | 120 | Yes | 17 | | | | | 1 |
| Pasig | Maybunga | 17 | Aida Estrella | 294.6 | Yes | 17 | | | 1 | | 1 |
| Pasig | Maybunga | 18 | Angelita Tangonan | 198 | Yes | 17 | | | | | |
| Pasig | Maybunga | 19 | Felino (Pigsa) Cruz | 115 | | 1 | 1 | 1 | | | 2 |
| Pasig | Maybunga | 20 | Siano Cruz | 201 | | 17 | | | | | |
| Pasig | Maybunga | 21 | Johnny Luar | 668 | Yes | 15 | | | | | |
| Pasig | Maybunga | 22 | Jose Reyes/Raquel Reyes (wife) | 409 | Yes | 139 | | | 1 | | |
| Pasig | Maybunga | 23 | Ata Embien | 104 | Yes | 14 | | | | | 1 |
| Pasig | Maybunga | 24 | Dionisio Galvez | 101 | Yes | 6 | | | | | |
| Pasig | Maybunga | 25 | Francisco Fernandez | 190 | | 20 | | | | | |
| Pasig | Maybunga | 26 | Severino Galvez | 130 | Yes | 12 | | 1 | | | |
| Pasig | Maybunga | 27 | Mario Noren | 125 | Yes | 10 | | | | | |
| Pasig | Maybunga | 28 | Jose Ramos | 117 | Yes | 15 | | | | | 2 |
| Pasig | Maybunga | 29 | Roberto Rivera | 130 | | 6 | | | | | |
| Pasig | Maybunga | 30 | Bernard Delos Santos | 165 | Yes | 10 | | | | | 1 |
| Pasig | Maybunga | 31 | Jerry Supiter | 96 | Yes | 9 | | 1 | | | |
| Pasig | Maybunga | 32 | Gloria Dauag | 80 | Yes | 4 | | | | | |
| Pasig | Maybunga | 33 | Daday Cielo | 66 | Yes | 6 | | | | | |
| Pasig | Maybunga | 34 | Agustin Castro/Joaquin Naragay | 182 | | 20 | | | | | |
| Pasig | Maybunga | 35 | Maria Perbillo | 144 | | 19 | | | 1 | | |
| Pasig | Maybunga | 36 | Ana Tagalini | 68 | | 12 | | 5 | | | |
| Pasig | Maybunga | 37 | Marcelina Tornea | 103 | Yes | 7 | | | | | |
| Pasig | Maybunga | 38 | Ruby Sarita | 106 | | 7 | | | | | |

| LGU | Barangay | No. | Owner's Name | Total Cultivated Area m2 | Garden / Field with crops | Number of Trees | Deepwell | Chicken pen | Dog house | Kitchen | Shed |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Pasig | Maybunga | 39 | Marino Trajano | 93 | Yes | 8 | | | | | |
| Pasig | Maybunga | 40 | Inocencio Taganili | 179 | Yes | 11 | | | | | |
| Pasig | Maybunga | 41 | Ramil Dolyas | 125 | | 7 | | | | | |
| Pasig | Maybunga | 42 | Lito Magno | 120 | Yes | 5 | | | | | |
| Pasig | Maybunga | 43 | (Absent Owner) | 120 | | 3 | | | | | |
| Pasig | Maybunga | 44 | (Absent Owner) | 120 | | 3 | | | | | |
| Pasig | Maybunga | 45 | Celestino Santos | 200 | | 3 | | 1 | | | 1 |
| Pasig | Maybunga | 46 | Corazon Labrador | 170 | Yes | 0 | | | | | |
| Pasig | Maybunga | 47 | (Absent Owner) | 150 | Yes | 1 | | | | | |
| Pasig | Maybunga | 48 | (Absent Owner) | 150 | | 1 | | | | | |
| Pasig | Maybunga | 49 | (Absent Owner) | 90 | | 4 | | | | | |
| Pasig | Maybunga | 50 | (Absent Owner) | 90 | | 2 | | | | | |
| Pasig | Maybunga | 51 | (Absent Owner) | 150 | Yes | 2 | | | 1 | | |
| Pasig | Maybunga | 52 | (Absent Owner) | 90 | Yes | 6 | | | | | |
| | | | Maybunga Total | | 29 | 581 | 1 | 27 | 5 | 5 | 12 |
| Pasig | Ugong | 1 | Ranelo Ravena | 411 | Yes | 17 | 1 | | | | |
| Pasig | Ugong | 2 | Jerry Jauriqui | 214 | Yes | 2 | | | | | |
| Pasig | Ugong | 3 | Barangay Ugong | 276 | Yes | 28 | | | | | |
| Pasig | Ugong | 4 | Ernesto Santos | 432 | Yes | 18 | 1 | | | | 1 |
| Pasig | Ugong | 5 | Juanito Victorino | 239 | Yes | 17 | 1 | | | | 1 |
| Pasig | Ugong | 6 | Nelson Pangan | 142 | | 31 | | | | | |
| Pasig | Ugong | 7 | Augusto Maganon | 86 | Yes | 10 | | | | | |
| Pasig | Ugong | 8 | Mariano Bernardo | 111 | Yes | 1 | | | | | |
| Pasig | Ugong | 9 | Roger Reyes/Leticia Belarde/Emelia Belarde | 108 | Yes | 16 | | | | | |
| Pasig | Ugong | 10 | Regina Bernardo/Rodolfo Dimla | 126 | Yes | 17 | | | | | |
| Pasig | Ugong | 11 | Arnold Maano | 77 | Yes | 1 | | | | | |
| Pasig | Ugong | 12 | Oli Case | 112 | Yes | 8 | | 3 | | | |
| Pasig | Ugong | 13 | Delsa Guwana | 95 | | 28 | | | | | |
| Pasig | Ugong | 14 | Anita Ramos | 18 | | 8 | | | | | |
| Pasig | Ugong | 15 | Julito Ga | 59 | Yes | 16 | | | | | |
| Pasig | Ugong | 16 | Michael Celso | 45 | Yes | 8 | | | | | |
| Pasig | Ugong | 17 | Buddy Delmonte | 99 | Yes | 8 | | | | | |
| Pasig | Ugong | 18 | Arturo Jade | 192 | Yes | 8 | | | 1 | | |
| Pasig | Ugong | 19 | Disederio Rondo | 30 | Yes | 0 | | | 2 | | |
| Pasig | Ugong | 20 | German Sarmiento | 48 | Yes | 8 | | | 1 | | |
| Pasig | Ugong | 21 | Reynaldo Punong Bayan | 276 | Yes | 1 | | | | | |
| Pasig | Ugong | 22 | Onofre Cenanis | 268 | Yes | 33 | | 2 | | | 1 |
| | | | Ugong Total | | 19 | 284 | 3 | 5 | 4 | 0 | 3 |