



**Metropolitan Waterworks
and Sewerage System
The Republic of the Philippines**

PREPARATORY SURVEY FOR METRO MANILA SEWERAGE AND SANITATION IMPROVEMENT

FINAL REPORT

July 2009



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SURVEY AREA



EXECUTIVE SUMMARY

Background

The main objectives of this Survey are:

- To grasp the existing situation of sewerage and sanitation by identifying and analyzing the existing and proposed projects, including those assisted by international donors and international financing institutions; and
- Through discussions with relevant agencies, to confirm the actual needs of Metro Manila in relation to the improvement of sewerage and sanitation services.

The Survey covers the entire Metro Manila with about 636 km² and consists of 16 cities and one municipality. In view of the fact that the service area of MWSS covers not only Metro Manila but also parts of the Provinces of Rizal and Cavite, and considering that Metro Manila is part of the Manila Bay basin, the entire MWSS service area as well as the Manila Bay basin were also considered in this Survey.

Existing Conditions

Metro Manila has a long history of sewerage and sanitation services. The first recorded effort was from the Spanish Law on Waters in 1871 and the first sewerage system was constructed in 1904, which covered an area of about 1,800 hectares.

Metropolitan Waterworks and Sewerage System (MWSS), a Philippine government owned and controlled corporation, was established in 1971, is responsible for the provision of water, sewerage and sanitation services in Metro Manila. In line with the rapid growth of the metropolis, the needs for expansion and improvement of water, sewerage and sanitation services were urgent. Responding to slow progress of the sector, in 1997 MWSS signed a 25-year concession contract with Manila Water Company, Inc. (MWCI) and Maynilad Water Services, Inc. (MWSI) to transfer the operation of MWSS on the provision of water supply and sewerage/sanitation services in Metro Manila.

Since the privatization of sewerage service in 1997, steady improvements have been evidenced in sewerage and sanitation sector in Metro Manila. This is particularly prominent at the East Zone, whereby sewerage and sanitation coverage has reached 8% and 19% respectively in 2007 (2% and 1% respectively in 2001); while at the West Zone, provision of sewerage and sanitation services has reached 10% and 36% respectively in 2007 (16% and 4% respectively in 2001)¹.

From the pollution load assessment, the existing pollution (BOD) load from the entire MWSS service area is estimated to be about 900 tons-BOD/day. If there is no further improvement of sewerage and sanitation service (as status quo), by 2025, pollution load from MWSS service area is possible to significantly increase to over 1,000 tons-BOD/day, which would result in significant deterioration of water quality in the Manila Bay and its tributaries. However, if all the proposed projects contained in the existing business plans and master plans of both concessionaires were implemented on schedule, it would be possible to reduce the pollution load to about 600 tons-BOD/day by 2025, leading to a remarkable improvement of water quality.

¹ Cumulative figures.

Policy Framework

Until recently, sewerage and sanitation services in Metro Manila were scattered across the service area without a clear linkage to the generation of environmental and health benefits. In 2004, the Philippine Congress passed a landmark law known as the Clean Water Act, making water quality management as one of the ultimate objectives in the provision of sewerage and sanitation services. The Clean Water Act attempts to consolidate different laws and unify efforts to stop water pollution caused by rapid urbanization. It is currently the centerpiece legislation for the environmental clean up of the country's water bodies.

In December 2008, the Supreme Court issued a ruling ordering 10 concerned government agencies to clean up and rehabilitate the Manila Bay. Among the directives specifically related to sewerage and sanitation sector in Metro Manila is the directive for MWSS to install, operate and maintain adequate sewerage treatment facilities in strategic places under its jurisdiction and increase their capacities to achieve the target. The ultimate goal of the ruling is to improve the present Class SC water quality standard of the Manila Bay to Class SB that fit for swimming, skin diving and other forms of contact recreation.

The other laws that deal specifically on policies relating to sewerage and sanitation management include the National Plumbing Law, the Sanitation Code, the National Building Code (Chapter 9), the Philippine Environment Code (Chapter 3) and the Local Government Code.

Sewerage and Sanitation Master Plans, Studies and Projects

From 1969 to 1997, at least five sewerage and sanitation master plans have been prepared for Metro Manila. However, not all of them were fully implemented. Among the major constraints are the huge capital investments required for proposed conventional sewerage systems, traffic disruption during construction, unavailability of land and the apparent unwillingness of consumers to pay for the service.

The latest comprehensive master plan covering the entire MWSS service area is the MWSS Sewerage and Sanitation Master Plan prepared in 2005. It has a planning period of 2005 to 2025 with an estimated total capital cost of about Php58.8 billion for the recommended investments. Besides, both MWCI and MWSI have also prepared their individual master plans in 2005 and 2008/2009 respectively. Also, in line with the rate rebasing exercise in 2008, both concessionaires have prepared their business plans that serve as the latest plans to guide their operation up to 2012.

In term of project, from the start of the concession period in 1997, so far there are only two major sewerage and sanitation projects implemented by MWSS, MWCI and MWSI, namely the Manila Second Sewerage Project (MSSP) 1997-2005, and the Manila Third Sewerage Project (MTSP) 2005-2010. The MTSP, which to be completed in about a year's time, was conceptualized by both MWSS and MWCI for the East Zone concession area. The objectives of the MTSP include the reduction of pollution of waterways within Metro Manila and the Manila Bay, reduction of the health hazards from sewage exposure, and the gradual improvement in the sewerage services through expansion of the septage management program.

One of the major on-going soft component projects is the Global Environment Facility - Manila Third Sewerage Project (GEF-MTSP) Project, which is to complement the ongoing MTSP. The GEF-MTSP project aims to enhance cooperation among various agencies related to sewerage and sanitation management; to assist MWSS in pursuing higher investments in sewerage and sanitation by its concessionaires; and to provide technical assistance to help with project management, monitoring, evaluation and dissemination.

Also, it was mentioned by the official of the World Bank that the Bank is in the process of preparing the Manila Fourth Sewerage Project, which mainly targeting on the east concession area by MWCI.

However, considering the large amount of funds required for the purpose as well as the complexity of the sector, contributions from other international donors would also be necessary.

Sewerage Service Concessions

The concession agreements between MWSS and MWCI/MWSI mandate the concessionaires to *operate, maintain, renew and, as appropriate, decommission water and sewerage system facilities* in their respective service areas. Under the obligations on sewerage services, concessionaires required to:

- supply sewerage services to all customers in the service area who have sewerage connections, and to meet the sewerage coverage target percentages of the population in specific municipalities/cities with water connections;
- make necessary connections to a public sewer for those who request such service;
- comply with all national and local laws and standards relating to treated wastewater in the service area; and
- provide septic and sanitation cleaning services in the service area every 5-7 years.

The concession agreements specify water, sewerage and sanitation service coverage targets within the 25-year concession period. The performances of concessionaires are being evaluated every five years (i.e., 2003, 2008, 2013, and 2018) through the rate rebasing exercises. Based on the latest rate rebasing exercise, the concessionaires are mandated to provide sewerage and sanitation service targets for at least 55% of households with water connection by 2021 in East Zone and 66% in West Zone. MWCI plans to spend at least PhP23 billion on these projects up to 2022, while MWSI will spend PhP50.8 billion up to 2021, based on their present business plans.

The concessionaires expressed preference for ODA/concessional financing as funding sources for these projects. As much as possible, they would like to conclude loans directly with the bilateral agencies/MFIs through GFI's such as Land Bank.

The main issue, however, is the willingness-to-pay for sewerage services by households. Hence, efforts are being done to rationalize the sewerage rate structure to make the cost of providing sewerage services affordable to households and within their willingness-to-pay. Both concessionaires intend to reduce the sewer connection fee from up to 50% to as low as zero, while raising the environmental/sanitation fee from 10% to 20% over a period of 4 to 5 years from 2008. They have also sought for a 15-year extension of the concession period to spread out tariff increases and hence reduce their impact on households.

Conclusion

Since the privatization of sewerage service in 1997, significant improvements have been evidenced in sewerage and sanitation sector in Metro Manila. Although the above achievement can be attributed mainly to the continuous efforts and commitments from the Government of the Philippines in improving the sewerage and sanitation conditions of Metro Manila, contributions from various international agencies are also significant.

On a whole, although significant achievements in sewerage and sanitation improvement in Metro Manila have been accomplished, there is still room for further improvement in the sector. More programs and projects should be introduced not only to expedite facility development (hard components) but also soft components like enhancement of technical capabilities of various agencies related to the sector are also necessary.

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- Annex 2 MWCI Master Plan Update, 2005
- Annex 3 MWCI Business Plan, 2008
- Annex 4 MWSI Master Plan, 2008/2009
- Annex 5 MWSI Business Plan, 2008

Laws and Regulations related to Sewerage and Sanitation Management:

- Annex 6 Clean Water Act
- Annex 7 Implementing Rules and Regulations of Philippine Clean Water Act
- Annex 8 The Code on Sanitation
- Annex 9 Implementing Rules and Regulations of the Code on Sanitation
- Annex 10 Revised Water Usage and Classification
- Annex 11 Revised Effluent Regulations
- Annex 12 Drinking Water Standard

Plans, Manuals and Reports related to Sewerage and Sanitation Management:

- Annex 13 Pre-feasibility Study for Wastewater Management in Marikina Basin
- Annex 14 Sewerage Master Plan and Feasibility Study for the Marikina River Basin
- Annex 15 Wastewater Management Study by the City of Yokohama
- Annex 16 National Sewerage and Septage Management Plan (Draft)
- Annex 17 Operations Manual on the Rules and Regulations Governing Domestic Sludge and Septage
- Annex 18 Manila Third Sewerage Project Appraisal Report
- Annex 19 GEF Manila Third Sewerage Project Appraisal Report
- Annex 20 Septage Management in the Philippines - Current Practices and Lessons Learned
- Annex 21 Maynilad on the Mend

Other Related Plans and Reports:

- Annex 22 Medium-Term Philippine Development Plan 2004-2010
- Annex 23 Philippines Sanitation Sourcebook and Decision Aid
- Annex 24 Manila Bay Coastal Strategy
- Annex 25 Operational Plan for the Manila Bay Coastal Strategy

Measurement Units

(Length)

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

(Area)

mm² : square millimeter(s)
cm² : square centimeter(s)
m² : square meter(s)
km² : square kilometer(s)
ha : hectare(s)

(Weight)

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

(Time)

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

(Volume)

cm³ : cubic centimeter(s)
m³ : cubic meter(s)
l, ltr : liter(s)
mcm : million cubic meter(s)

(Speed/Velocity)

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

Abbreviations

ADB	Asian Development Bank
ADR	Appropriate discount rate
BHN	Basic human needs
BOD	Biochemical oxygen demand
CA	Concession Agreement
CAPEX	Capital expenditure
CERA	Currency exchange rate adjustment
CHED	Commission on Higher Education
CMSS	Central Manila Sewerage System
CO	Corporate Office of MWSS
CPI	Consumer price index
CST	Centralised sewage treatment
CTII	CTI Engineering International Co., Ltd.
CWA	Clean Water Act
DA	Department of Agriculture
DAO	DENR Administrative Order
DCRA	Debt and Capital Restructuring Agreement
DENR	Department of Environment and Natural Resources
DENR	Department of Environment and Natural Resources
DILG	Department of Interior and Local Government
DO	Dissolved oxygen
DOH	Department of Health
DOST	Department of Science and Technology
DPWH	Department of Public Works and Highways
DTI	Department of Trade and Industry
ECC	Environmental Compliance Certificate
EIA	Environmental Impact Assessment
EIS	Environmental Impact Assessment
EMB	Environmental Management Bureau
ESC	Environmental Sanitation Clearance
EUFS	Environmental Users Fee System
FCDA	Foreign currency differential adjustment
FPA	Fertilizer and Pesticides Authority
GEF	Global Environment Facility
GOP	The Government of the Philippines
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
IEC	Information, Education and Communication
IEPC	Industrial Efficiency and Pollution Control Program
IP	Inspection Panel
IRR	Implementing Rules and Regulations
IST	Individual septic tank

JBIC	Japan Bank for International Cooperation
JICA	Japan International Cooperation Agency
LAREC	Luzon Agricultural Research Center
LGUs	Local government units
LISCOP	Laguna de Bay Institutional Strengthening and Community Participation Project
LLDA	Laguna Lake Development Authority
LWUA	Local Water Utilities Administration
MDU	Mobile dewatering unit
METROSS	The Metro Manila Sewerage and Sanitation Projects
MGB	Mines and Geosciences Bureau
MLD	Million liter per day
MMDA	Metro Manila Development Authority
MMO	Marilao-Meycauayan-Obando Rivers
MNTT	Malabon-Navotas-Tullahan-Tenejeros
MSSP	Manila Second Sewerage Project
MTPDP	The Medium-Term Philippine Development Plan, 2004-2010
MTSP	Manila Third Sewerage Project
MWCI	Manila Water Company, Inc.
MWD	Metropolitan Water District
MWSI	Maynilad Water Services, Inc.
MWSS	Metropolitan Waterworks and Sewerage System
NAWASA	National Waterworks and Sewerage Authority
NCR	National Capital Region
NEDA	National Economic and Development Authority
NGO	Non-governmental organization
NHA	National Housing Authority
NHCS	Napindan Hydraulic Control Structure
NRW	Non-revenue water
NSO	National Statistics Office
NSSMP	National Sewerage and Septage Management Program
NWRB	National Water Resources Board
NWRB	National Water Resources Board
ODA	Official Development Assistance
PAB	Pollution Adjudication Board
PCG	Philippine Coast Guard
PCG	Philippines Coast Guard
PD	Presidential Decree
PIA	Philippine Information Agency
PNP	Philippine National Police
PROGRESS	Projects for depressed areas
PRRC	Pasig River Rehabilitation Commission
PRRP	Pasig River Rehabilitation Project

PSES	Pre-treatment Standards for Existing Sources
PSNS	Pre-treatment Standards for New Sources
PhP	Philippine Peso
RA	Republic Act
RO	Regulatory Office of MWSS
ROW	Right of way
RWDC	Rural Waterworks Development Corporation
SBR	Sequencing batch reactor
SC	Supreme court
SRA	Sugar Regulatory Administration
STAMP	Septic tank desludging program
STED	Septic tank effluent disposal
STM	Special transitory mechanism
STP	Sewage treatment plant
SpTP	Septage treatment plant
TCA	Transitional and Clarificatory Agreement
TDL	Total discharge loading
TESDA	Technical Education and Skills Development Authority
TOR	Terms of Reference
TSS	Total suspended solids
UASB	Upflow anaerobic sludge blanket
UATP	Umiray-Angat Tunnel Project
UN	United Nations
USAID	United States Agency for International Development
VAT	Value added tax
WB	The World Bank
WD	Water District
WQMA	Water Quality Management Area
WSSSMP	Water Supply, Sewerage and Sanitation Master Plan
WWTP	Wastewater treatment plant

1 BACKGROUND

1.1 Introduction

In Metro Manila, the existing sewerage systems cover only about 15% of the population and 12% of the area². The remaining population is either served by on-site facilities like septic tanks and pit latrines, while some are even without any proper sanitation system. As a result, water bodies such as storm drains, rivers, lakes, and the Manila Bay are seriously polluted by wastewater discharges.

Septic tanks can only treat sewage very minimally. Due to inappropriate design and construction, and practically no maintenance prior to the desludging program initiated by the water supply and sewerage service concessionaires in Metro Manila, the treatment efficiency of the septic tanks is estimated to be less than 10%³. With regular desludging program based on the Sanitation Code, the treatment efficiency of septic tanks may reach around 20%.

The main water bodies in Metro Manila, namely the Pasig-Marikina-San Juan River, Paranaque River and the Tullahan River, have exhibited very poor water quality exceeding Class C water quality standard. The average Biochemical Oxygen Demand (BOD) as measured in 2005 was as high as 33 mg/l⁴, which is over three-fold of Class C standard (10 mg/l). The Pasig, San Juan and Tullahan Rivers have often been described as biologically dead (meaning the anaerobic condition). Physically, especially during dry seasons, the waters are of unsightly color, reduced clarity and have obnoxious odor. These rivers cause significant pollution loads into the Manila Bay.

The Government of the Philippines (GOP) enacted and promulgated the Clean Water Act (CWA) in 2004. The CWA provides policy and regulatory framework for comprehensive water quality management in the Philippines, and sets specific development guidelines for domestic sewage management.

The provision of water supply and sewerage services in Metro Manila is under the responsibility of the Metropolitan Waterworks and Sewerage System (MWSS). In 1997, MWSS privatized the said water supply and sewerage services to two concessionaires i.e. Manila Water Company, Inc. (MWCI) for East Zone and Maynilad Water Services, Inc. (MWSI) for West Zone. The total capacity of the existing sewage treatment facilities operated by these two concessionaires is about 0.07 million m³/day, or about 3% of the 2.4 million m³/day treatment capacity that required to cater for the entire MWSS service area.

A recent judicial ruling (Supreme Court, December 2008) upheld the earlier judicial orders to several government agencies to clean up and rehabilitate the Manila Bay, which is the receiving water body of most of the wastewaters generated in Metro Manila. This has put pressures on many government agencies, including the Department of Environment and Natural Resources (DENR) and MWSS, to set forth effective programs to improve the water quality of the Manila Bay. MWSS and its two concessionaires have thus responded to the ruling by reviewing their respective investment program for sewerage and sanitation to expedite the provision of sewerage and sanitation services in Metro Manila.

² Water Supply, Sewerage and Sanitation Master Plan for Metro Manila, 2005.

³ Manila Third Sewerage Project (MTSP) Feasibility Study Report, 2004.

⁴ Data for San Juan River, National Water Quality Status Report (2001-2005), 2007.

1.1.1 Survey Objectives

The main objectives of this **Preparatory Survey for Metro Manila Sewerage and Sanitation Improvement** (hereafter referred to as “the Survey”) are:

- To grasp the existing situation of sewerage and sanitation by identifying and analyzing the existing and proposed projects, including those assisted by international donors and international financing institutions.
- Through discussions with related agencies, to confirm the actual needs of Metro Manila in relation to the improvement of sewerage and sanitation services.

1.1.2 Survey Area

The Survey covers the entire Metro Manila (hereafter referred to as the “Survey Area”). **Figure 1.1.1** shows the location of Metro Manila in the context of whole of the Philippines as a whole. The Metro Manila area is about 636 square kilometers (km²). It consists of 16 cities and one municipality (17 local government units, LGUs) as shown in **Figure 1.1.2**.

However, in view of the fact that the service area of MWSS covers not on Metro Manila but also part of the Provinces of Rizal and Cavite, with a total land area of 2,371 km², the Survey also took into consideration of the entire MWSS service area (see **Figure 1.1.2**). The pollution load assessment under Chapter 2 covers the entire MWSS service area.

Furthermore, considering that certain areas outside the Metro Manila and MWSS service area also draining into the Manila Bay, these were also investigated, but only with respect to how it affects wastewater management in the Survey Area and MWSS service area. No detailed survey was undertaken for these adjacent areas. The catchment area of the Manila Bay-Laguna de Bay Basins were also evaluated, considering that these basins are the ultimate receiving bodies of wastewater coming from the MWSS service area.

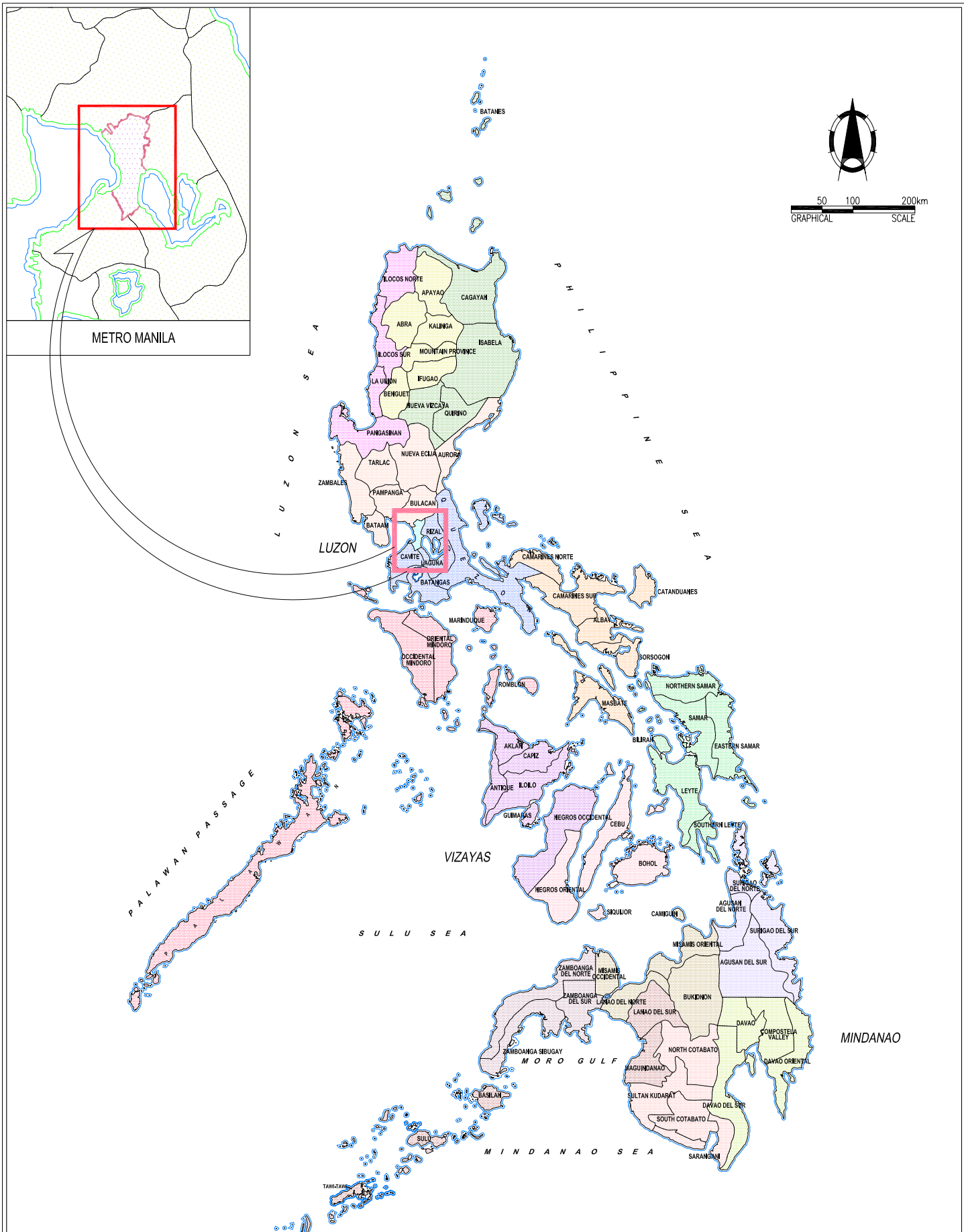
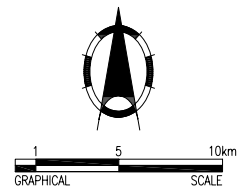
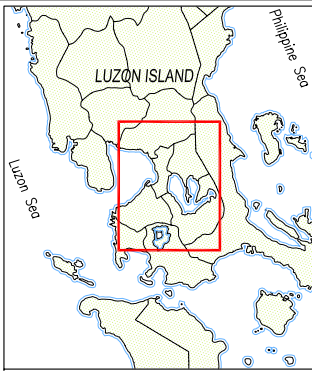
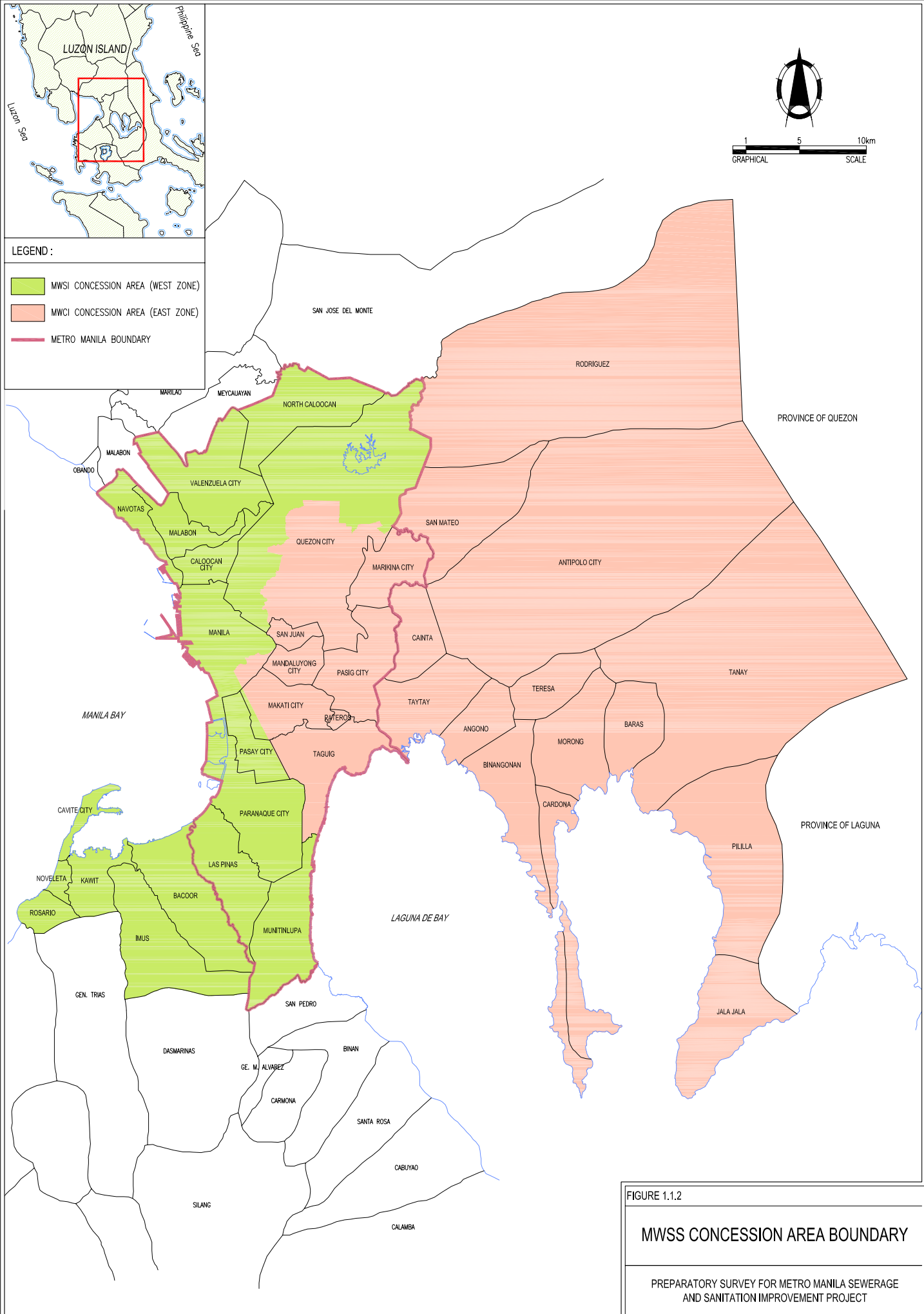


FIGURE 1.1.1

LOCATION OF METRO MANILA

PREPARATORY SURVEY FOR METRO MANILA SEWERAGE AND SANITATION IMPROVEMENT PROJECT



LEGEND :

- MWSI CONCESSION AREA (WEST ZONE)
- MWCi CONCESSION AREA (EAST ZONE)
- METRO MANILA BOUNDARY

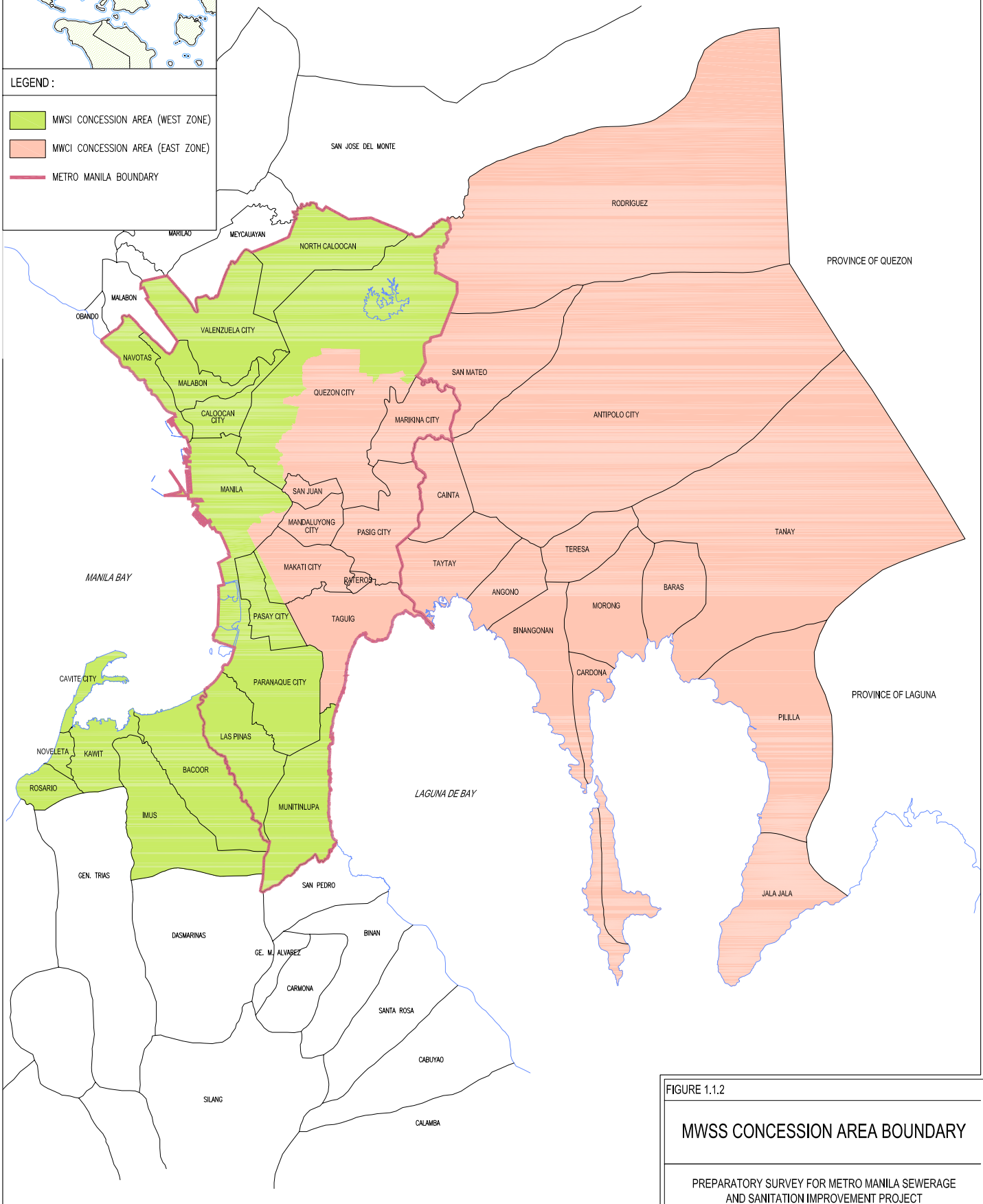


FIGURE 1.1.2

MWSS CONCESSION AREA BOUNDARY

PREPARATORY SURVEY FOR METRO MANILA SEWERAGE AND SANITATION IMPROVEMENT PROJECT

1.2 Scope of Survey

1.2.1 Sewerage and Sanitation

This Survey focuses on the sewerage and sanitation sector in Metro Manila, with consideration of the whole MWSS service area. While commercial and industrial establishments are considered in pollution load assessment (Section 2.4), this report basically addresses only domestic sources. The mechanism for servicing commercial and industrial establishments through MWSS is still not clear at this time, therefore the present Survey does not cover these establishments entirely.

In this Survey, unless otherwise specified, sanitation refers specifically to septage management, and is not used as a general term for wastewater management nor referred to on-site toilet systems. This definition is made to ensure consistency with the common use of this term by MWSS and its two concessionaires, MWCI and MWSI.

For sewerage and sanitation, the survey covered the following items:

- Historical sewerage and sanitation coverage statistics from 1997 to present;
- Existing sewerage and sanitation facilities (MWSS);
- Project implementation by MWCI and MWSI;
- Concession targets, rate rebasing, and financial capacity;
- Water quality of and pollution loading to different river systems in the Survey Area;
- Proposed investment programs and projects by MWCI and MWSI;
- Institutional framework, with related laws, codes and guidelines.

1.2.2 Other Related Sectors

As sewerage and sanitation sector has very close relationships with other sectors, the following sectors are also being considered in this Survey:

Water Quality Improvement:	This is related activities for water quality improvement, both on national and local levels.
Drainage Improvement:	This refers to flood management, in general, and storm drainage systems, in a physical sense. Storm drains systems can be used to collect wastewater, particularly in a combined sewerage system, which is being proposed by both concessionaires as one of their wastewater management strategies. Hence, drainage systems can be considered as a key component of wastewater management in the Study Area, and is therefore being reviewed in this survey.
Solid Waste Management:	This is also evaluated, albeit not in depth, in this Survey. With indiscriminate dumping or as a result of inefficient collection, garbage finds its way into the drainage systems and waterways, causing pollution loading and unaesthetic scenes. It causes water stagnation and flooding during major flood events.