



METROPOLITAN WATERWORKS AND SEWERAGE SYSTEM

MWSS Water Supply and Wastewater Programs

*National Academy of Science and Technology
RTD on “Infrastructure, Information and Innovation for National Development,
Competitiveness and Resiliency “
2 April 2014*

Rebecca R. de Vera
Project Management Officer - A



Outline

- **Metropolitan Waterworks and Sewerage System (MWSS)**
- **Water supply projects**
- **Wastewater projects**
- **Video on sewage and septage treatment process**



MWSS Mandate per RA 6234

Water Supply

- *treatment, supply and distribution*



Sewerage

- *sewage collection, treatment and disposal*



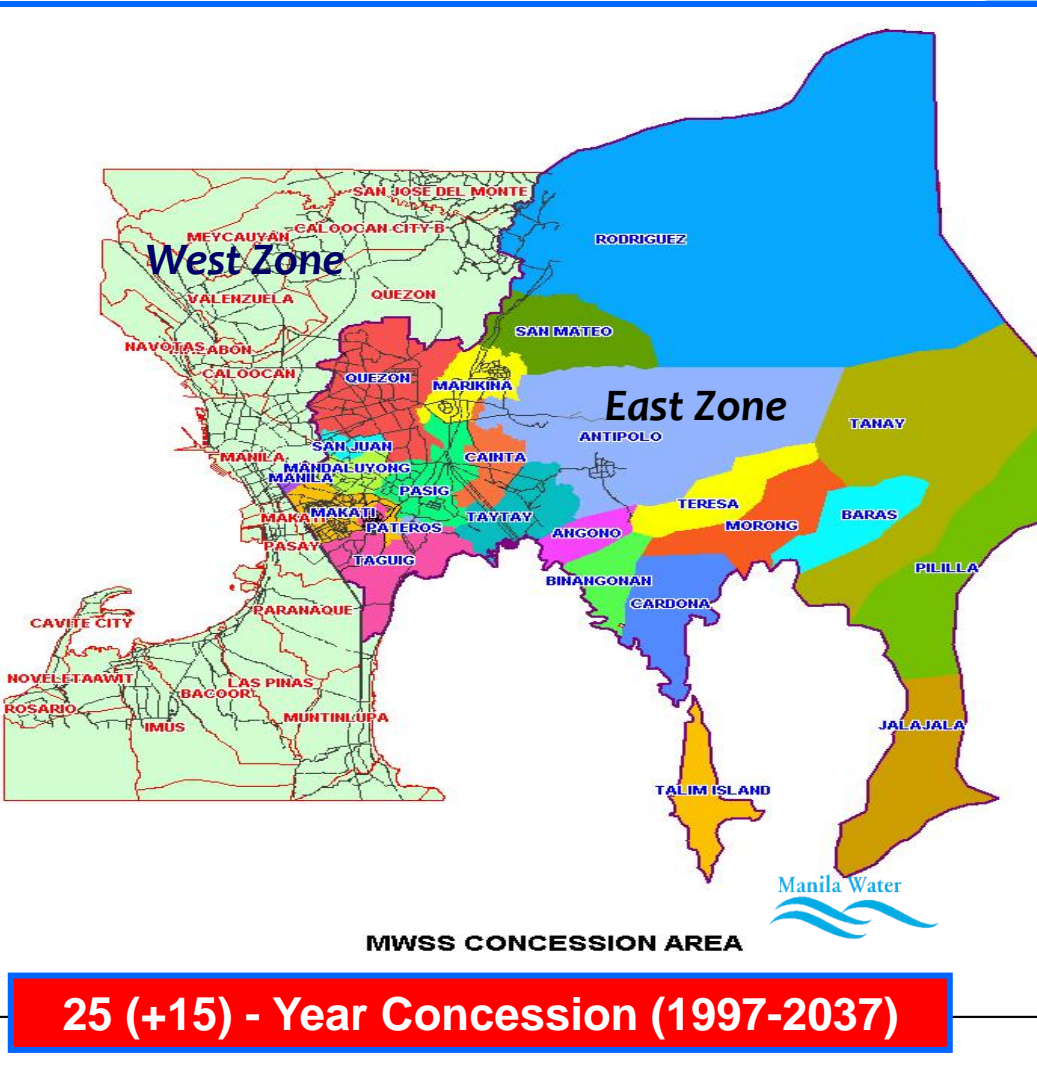
Sanitation

- *regular emptying of septic tanks and provision of appropriate treatment and disposal facilities*





MWSS Privatization in 1997



As of December 2013		
	West Zone Maynilad	East Zone Manila Water
Service Area	17 cities/ Municipalities	23 cities/ Municipalities
Total Population	9.6 M	6.3M
% Water Supply Coverage	90%	92%
% Sewer Coverage	11%	12%

mld – million liters per day



WATER SUPPLY PROJECTS



Existing Raw Water Source

Umiray River



Sierra Madre Mountain

Angat River



97% of Domestic Water
(4000mld)



IPO DAM

UMIRAY-ANGAT
TRANSBASIN TUNNEL

ANGAT DAM

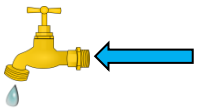
3 - TUNNELS

Bicti Basins



LA MESA TREATMENT PLANT

MAYNILAD
West zone



NOVALICHES- LA MESA
PORTAL

6 - AQUEDUCTS

AQ-6

AQ-5

AQ-4

AQ-3

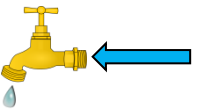
AQ-2

AQ-1



LA MESA
RESERVOIR

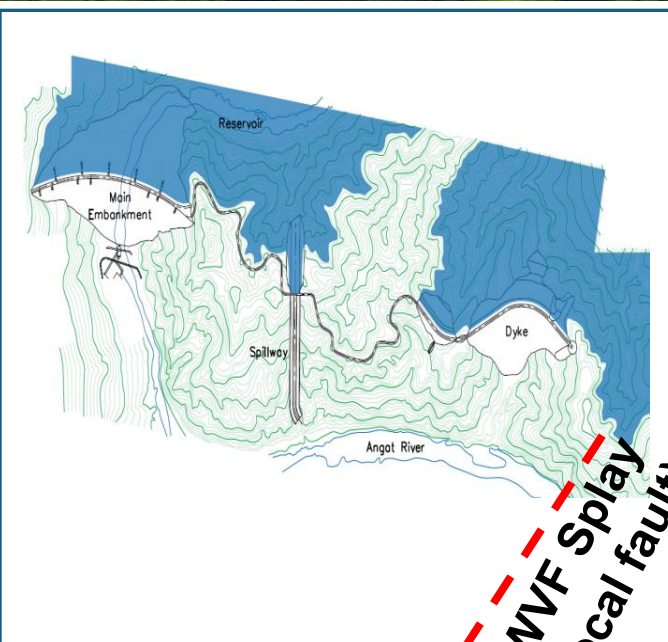
MANILA WATER
East zone



BALARA TREATMENT PLANT



Angat Dam & Dyke Strengthening Project



Background

PHIVOLCS announced that the West Valley Fault (WVF) is potentially active and that a **splay/local fault runs 200 meters east of the main Angat Dyke**;

Phase 1: Safety study, conceptual design of remediation works and preparation of bid documents

Phase 2: Detailed design and civil works

Location

Norzagaray, Bulacan

Benefit

Disaster risk reduction

Funding

Phase 1: PhP 31 Million (PSALM)

Source & Cost

Phase 2: PhP 5.70 B (National Government)

Status

- Phase 1: completed on May 2012.
- Phase 2:
On-going discussion with Korea Water Resources Corporation (K-water) regarding their obligation for mandatory rehabilitation of Angat Dam.



Angat Water Transmission Improvement Project (AWTIP)

ANGAT DAM

IPO DAM

**Proposed
TUNNEL NO. 4**

Bicti basin

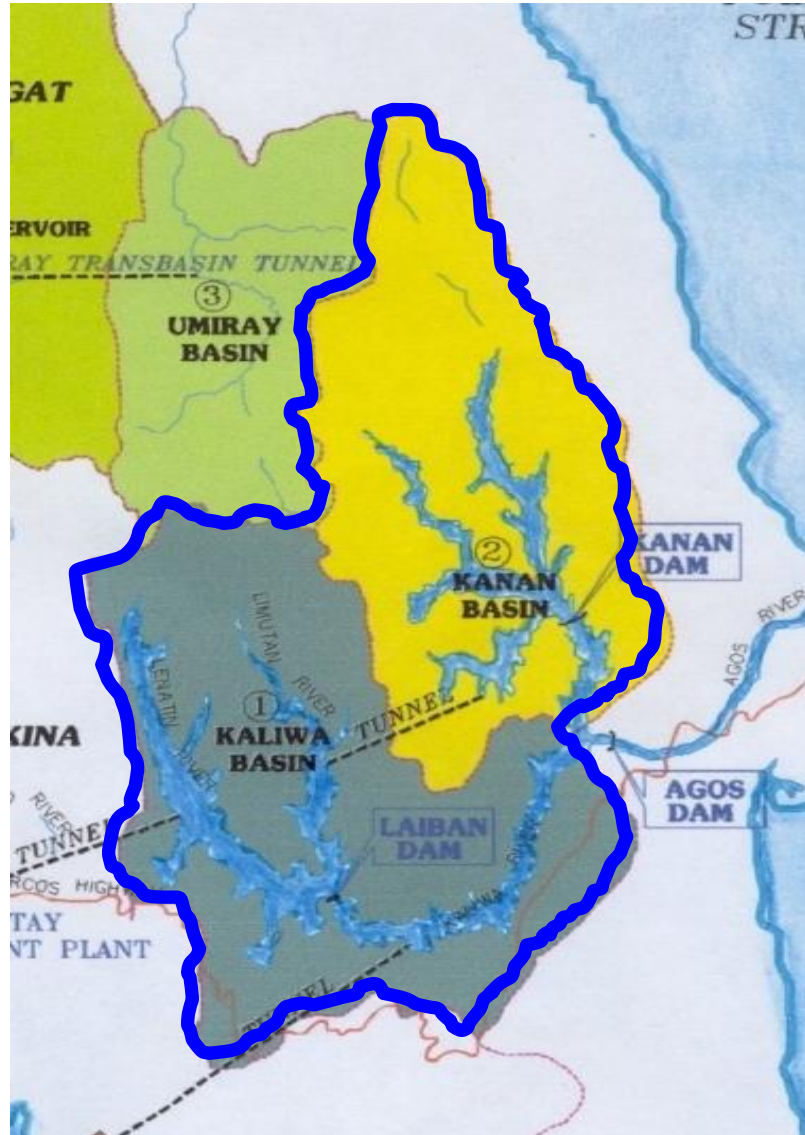
LA MESA
RESERVOIR

NOVALICHES
PORTAL
JUNCTION

Description	New tunnel No. 4 to facilitate the rehabilitation of the transmission system
Location	San Jose Del Monte and Norzagaray, Bulacan
Benefits	Reliable conveyance of raw water from Ipo to La Mesa Dams
Funding	ADB
Project Cost	PhP 5.8 Billion
Status	<ul style="list-style-type: none">• Loan negotiation with ADB in progress;• Approved by NEDA



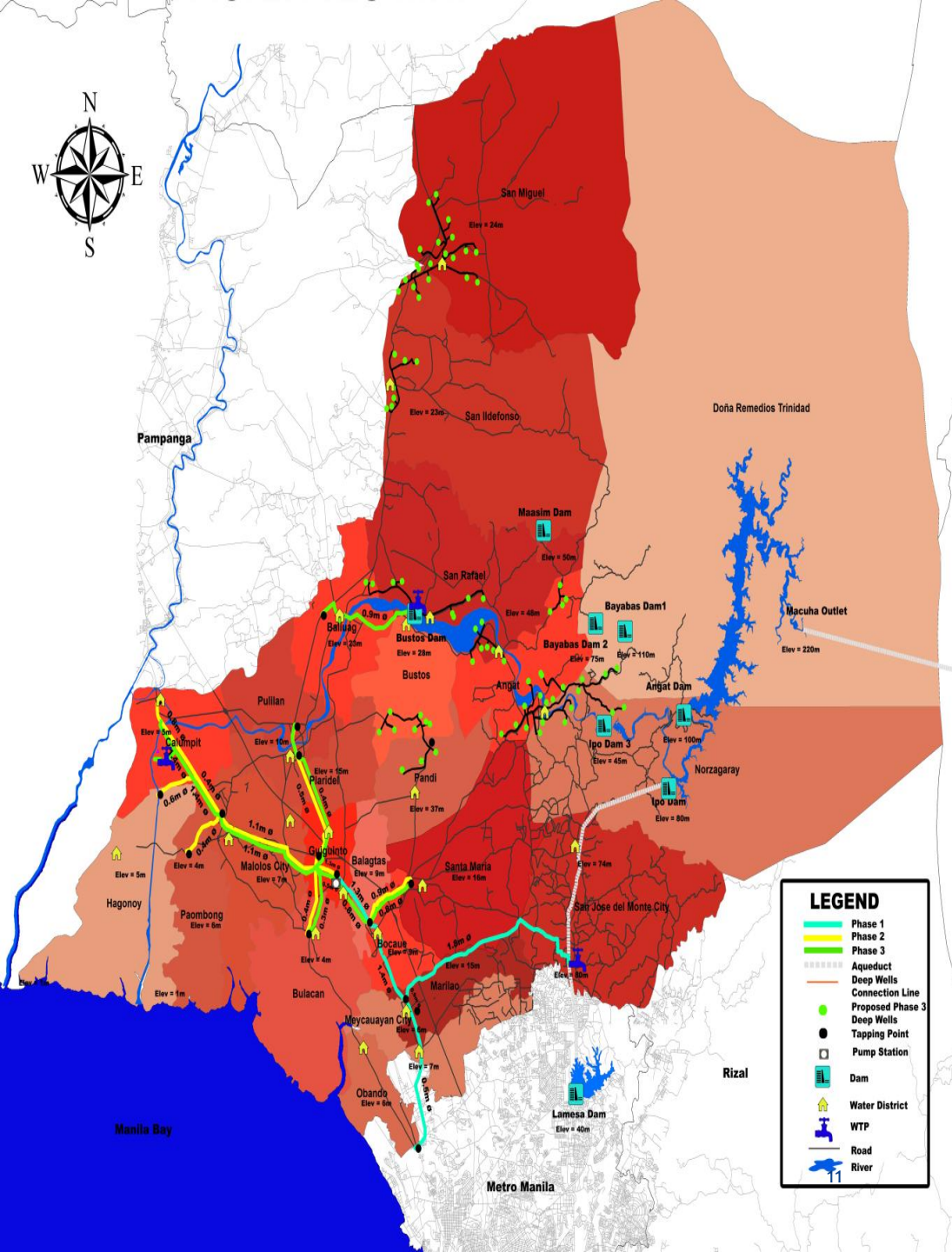
New Centennial Water Source Project (NCWSP) – Kaliwa Dam Project



Description	Construction of a new water source to meet the increasing water demand
Location	Kaliwa River (Tanay, Rizal & General, Nakar, Quezon)
Funding Source	<u>Public-Private Partnership (PPP)</u>
Cost	PhP 19 Billion
Status	Endorsed by NEDA-ICC Technical Board; for NEDA Board approval



MWSS



LEGEND

- Phase 1
- Phase 2
- Phase 3
- Aqueduct
- Deep Wells
- Connection Line
- Proposed Phase 3
- Deep Wells
- Tapping Point
- Pump Station
- Dam
- Water District
- WTP
- Road
- River

The Bulacan Bulk Water Supply Project

Legal basis: Approval of the President for the inclusion of Bulacan in the MWSS Service Area for purposes of supplying bulk water. In 1993

Project cost: 24B

Implementation: PPP

Cooperation period: 30 years

BULACAN BULK WATER SUPPLY STAGE 1



Stage-1

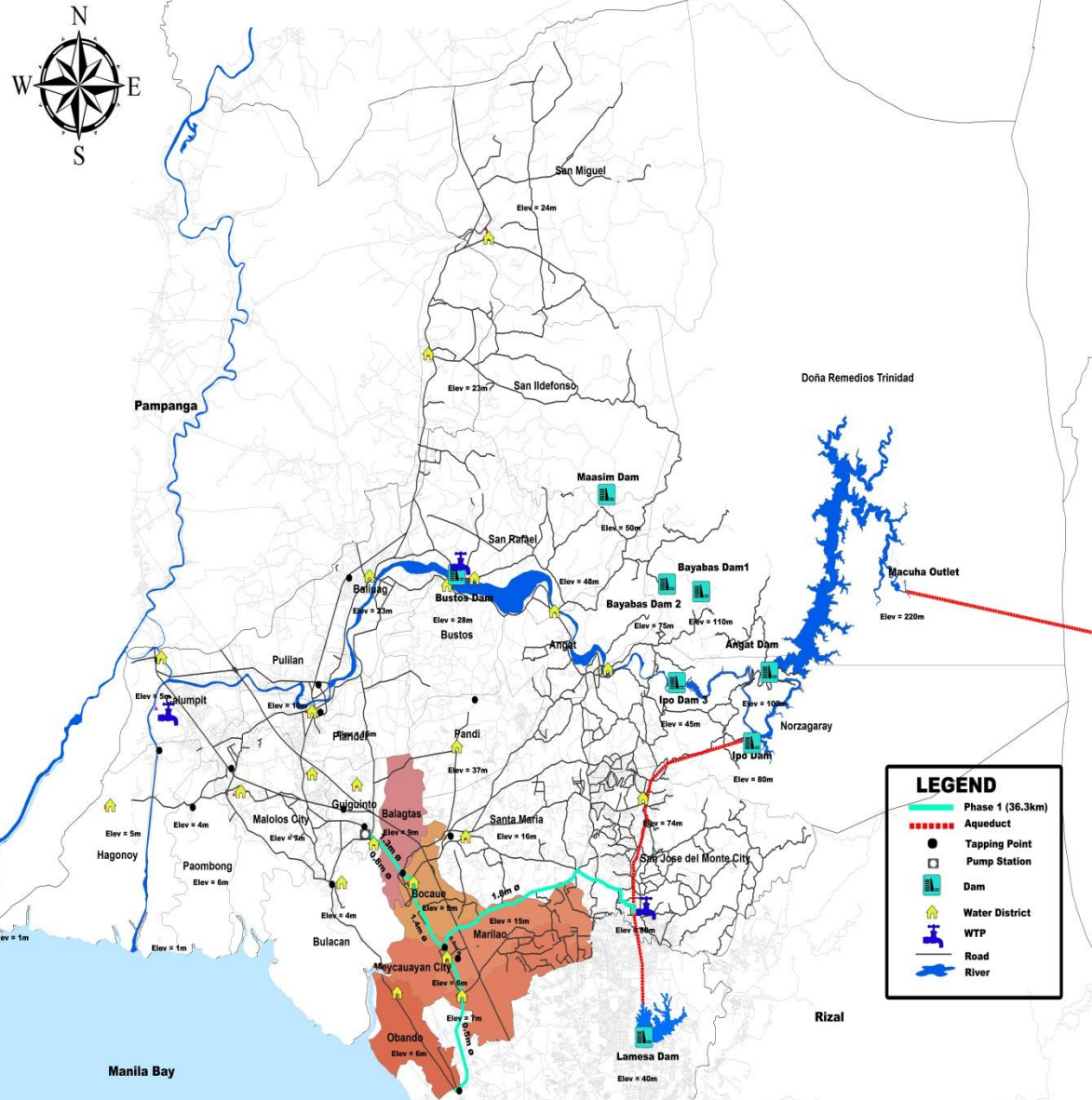
Scope: Provision of initial 100 MLD treated bulk supply to:

1. Balagtas
2. Bocaue
3. Marilao
4. Meycauyan
5. Obando
6. San Jose del Monte

Raw Water Source: Angat Dam through existing AQ

Construction Period: 2014-2015

Commissioning: Q1 of 2016





Stage-2

BULACAN BULK WATER SUPPLY STAGE 2

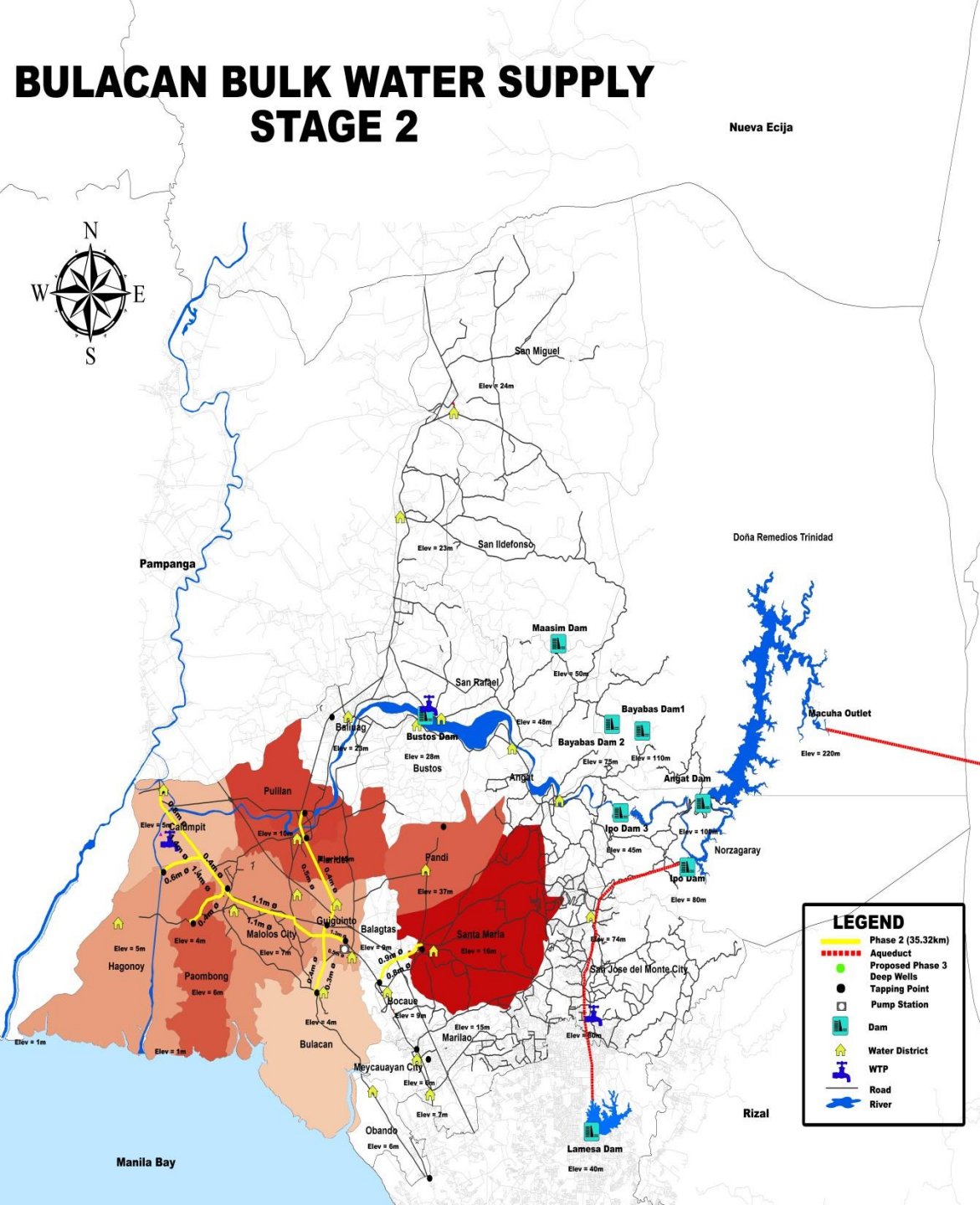
Scope: Provision of initial
375 MLD treated bulk supply
to:

1. Bulakan
2. Calumpit
3. Guiguinto
4. Hagonoy
5. Malolos City
6. Paombong
7. Plaridel
8. Pulilan
9. Sta. Maria

Raw Water Source: Angat
Dam through existing AQ

Construction Period:
2015-2016

Commissioning:
Q1 of 2017



BULACAN BULK WATER SUPPLY STAGE 3

Stage-3a



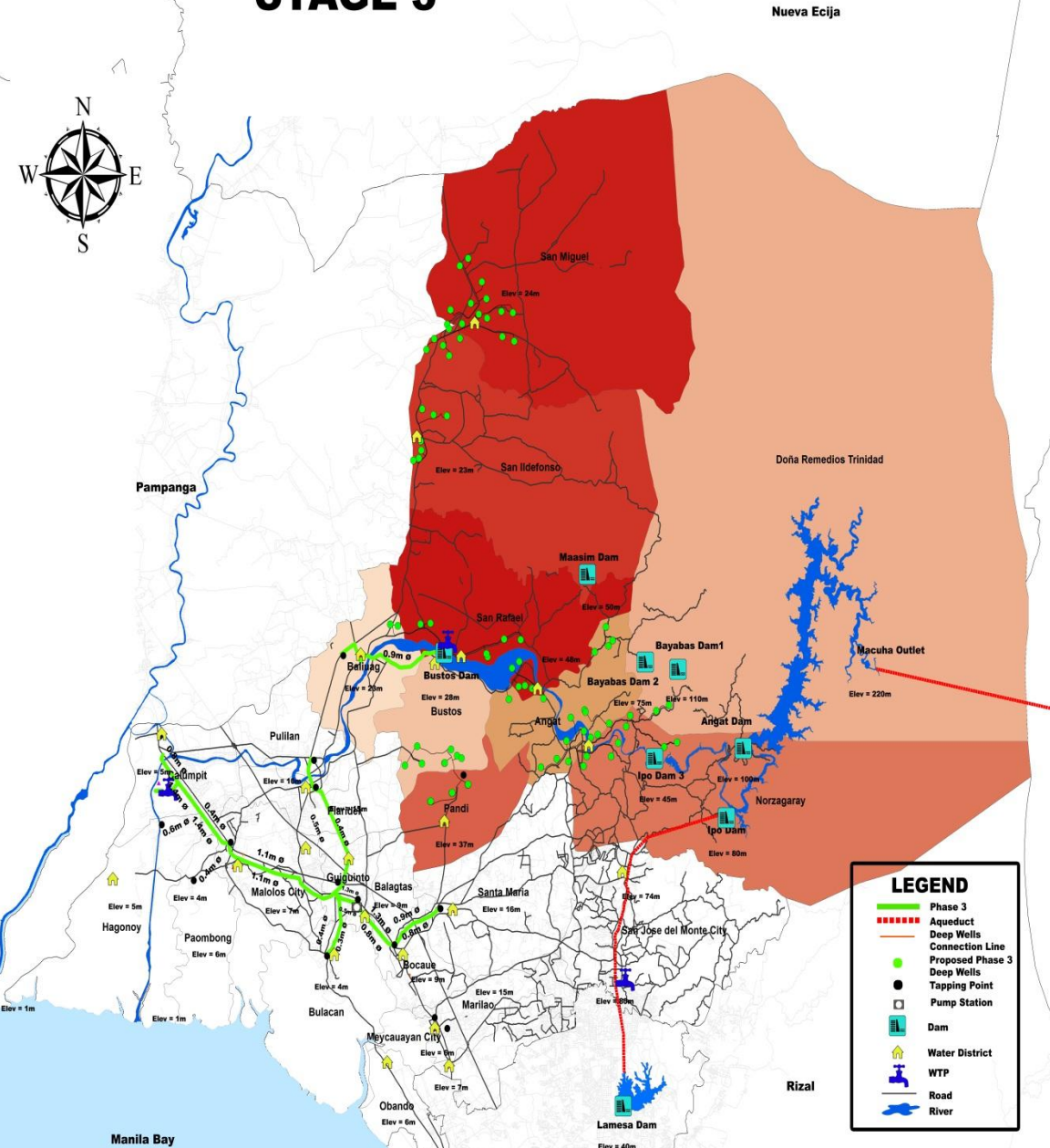
Scope: Provision of approx. 237 MLD initial treated bulk supply to:

1. Angat*
2. Baliwag
3. Bustos
4. DRT*
5. Norzagaray*
6. Pandi*
7. San Ildefonso*
8. San Miguel*
9. San Rafael*

Potential Sources: Bustos Infiltration Gallery, Ipo Dam 3, Bayabas Dam, Maasim Dam, Pampanga River, & Deep wells*

Construction Period:
2018 – 2020

Commissioning: 2021



BULACAN BULK WATER SUPPLY STAGE 3



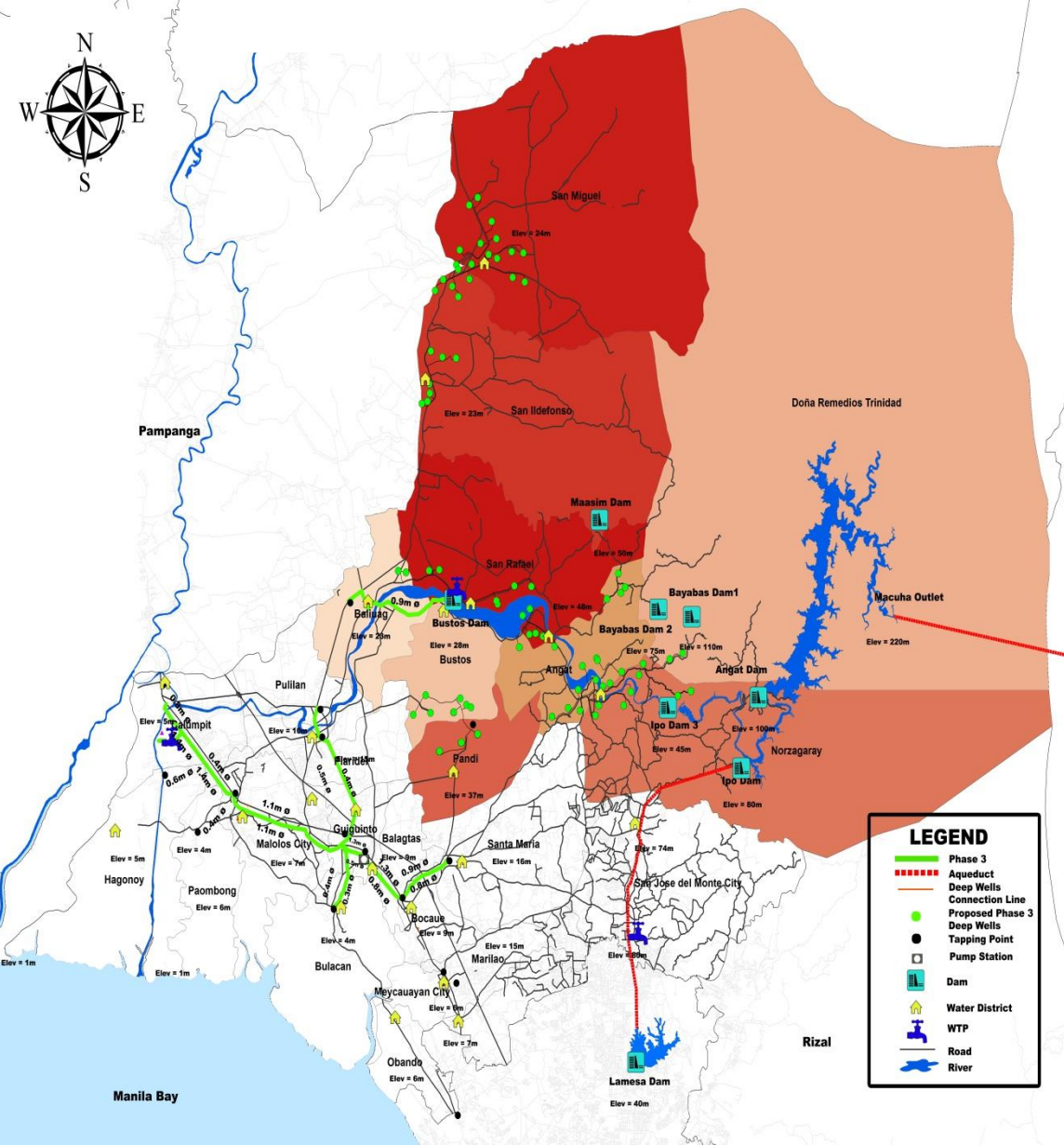
Stage-3b

Scope: Provision of approx. 518 MLD additional treated bulk supply to the areas under Stage 1 and Stage 2.

Potential Sources: Bustos Infiltration Gallery, Ipo Dam 3, Bayabas Dam, Maasim Dam, Pampanga River, & Deep wells

Construction Period:
2023 – 2025

Commissioning: 2026



BULACAN BULK WATER SUPPLY STAGE 3



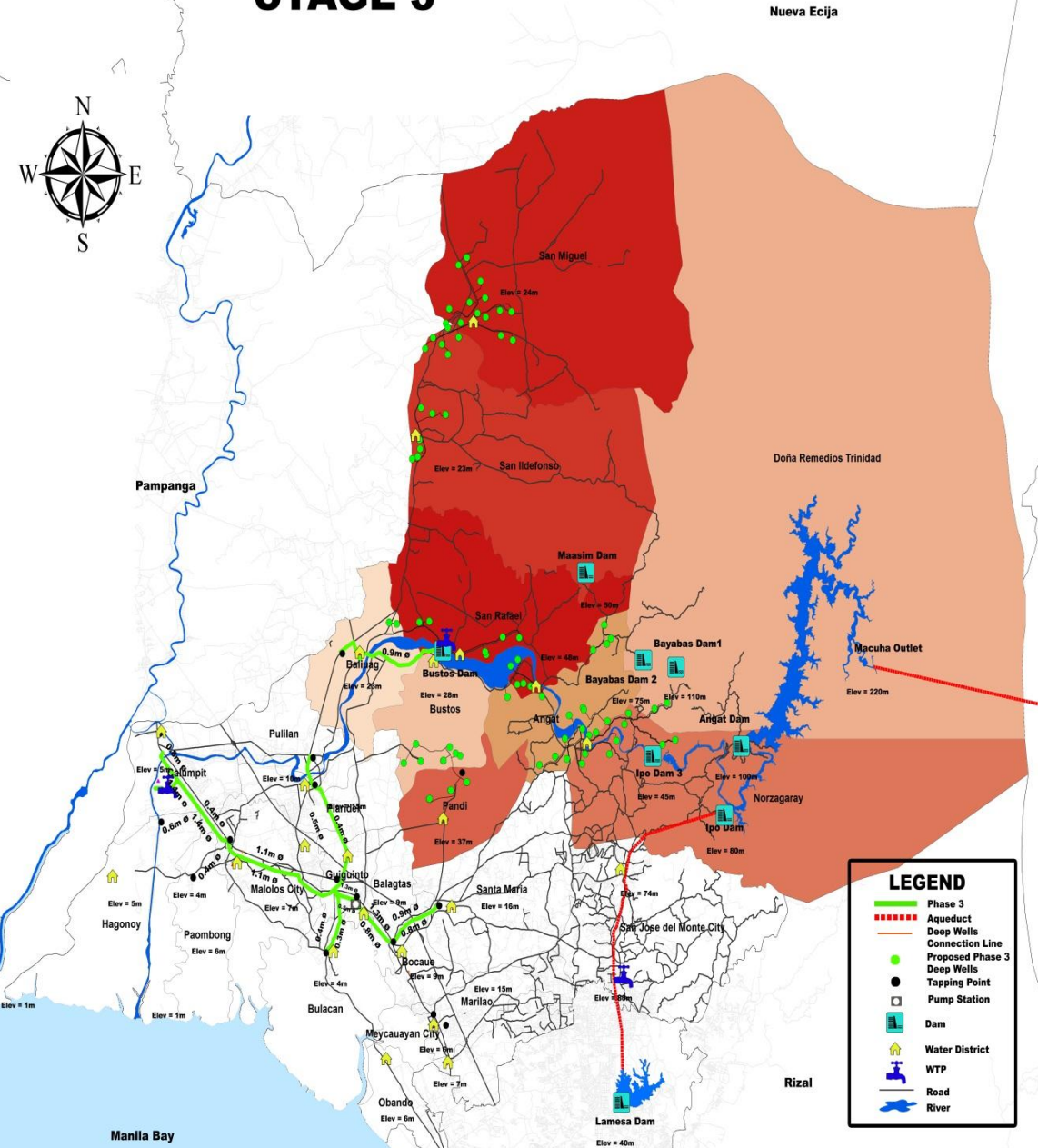
Stage-3c

Scope: Provision of approx. 264 MLD additional treated bulk supply to the areas under Stage-3a.

Potential Sources: Bustos Infiltration Gallery, Ipo Dam 3, Bayabas Dam, Maasim Dam, Pampanga River, & Deep wells*

Construction Period:
2028 – 2030

Commissioning: 2031





WASTEWATER PROGRAM (Sewerage and Sanitation)



Domestic Wastewater / Sewage Generation

Wastewater Generation at HOME



Toilet

Others

Yellow Water

Brown Water

Gray Water

Black Water

SEWAGE



Drivers for Sewerage and Sanitation Programs

- Clean Water Act-2004
- Supreme Court decision to clean-up Manila Bay
- Compliance with the Concession Agreement





Drivers for Sewerage and Sanitation Programs

DAO – 35: Effluent Standards

Parameter	Values (for class C)
Biological oxygen demand (BOD)	50mg/L
Chemical oxygen demand (COD)	100mg/L
Total suspended solids (TSS)	70mg/L
Oil and grease	5mg/L
Color	150NTU
Total coliform	10,000 MPN/100mL



Sewerage and Sanitation Services



SEWERAGE Wastewater Treatment Plant

- ◆ network of pipes leading to a wastewater or sewage treatment plants (STP)
- ◆ treatment of sewage STPS prior to disposal to receiving bodies of water



SANITATION Septic Tank Desludging

- ◆ Provide regular cleaning of septic tank
- ◆ Vacuum tankers are used to collect the septage
- ◆ Septage are treated at STP
- ◆ Biosolids are used as soil conditioner



Sewerage Services

Manila Water

- 37 Sewage Treatment Plants
 - Magallanes WwTP (Makati), UP WwTP (Quezon City), Olandes WwTP (Marikina), Pineda WwTP (Pasig), 31 Package WwTPs
- 260 km of sewer network
- 12% Sewerage Coverage (as of Dec 2013)

Maynilad

- 11 Sewage Treatment Plants
 - Manila Central Sewerage System, Dagat-dagatan, Alabang, Makati Isolated System
 - QC Communal Systems, San Juan catchment STPs
- 480 km of sewer network
- 11% Sewerage Coverage (as of Dec 2013)





Sanitation Services



Manila Water

- ◆ 2 Septage Treatment Plants
 - South SpTP (Taguig City)
 - North SpTP (San Mateo, Rizal)
- ◆ Total Capacity: 1,400 cmd
- ◆ 91 vacuum desludging tankers

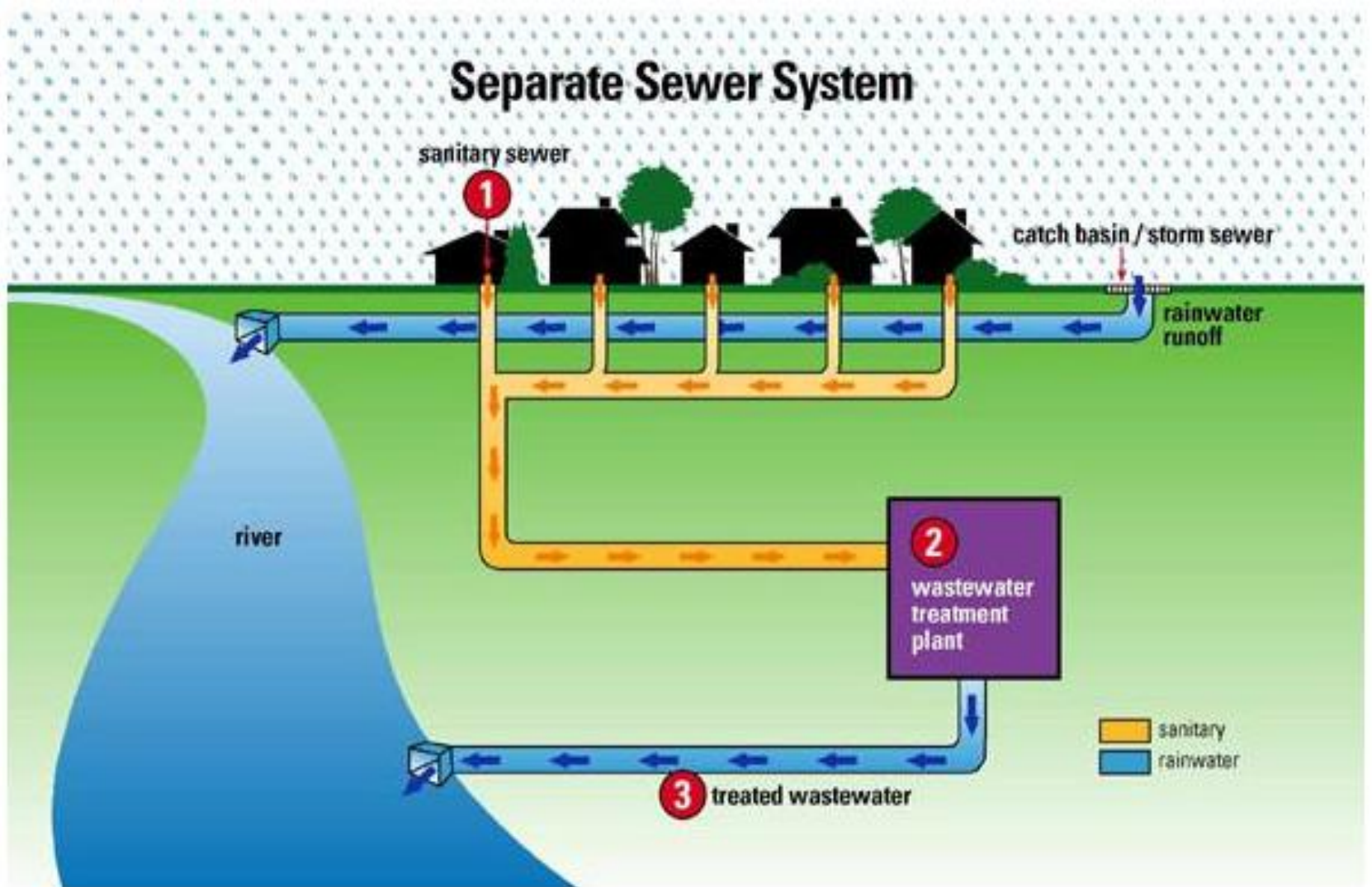


Maynilad

- ◆ 2 Septage Treatment Planst
 - Dagat-dagatan SpTP (Tondo)
 - Project 7 SpTP (Quezon City)
- ◆ Total Capacity: 700 cmd
- ◆ 25 vacuum desludging tankers
- ◆ 7 mobile dewatering units



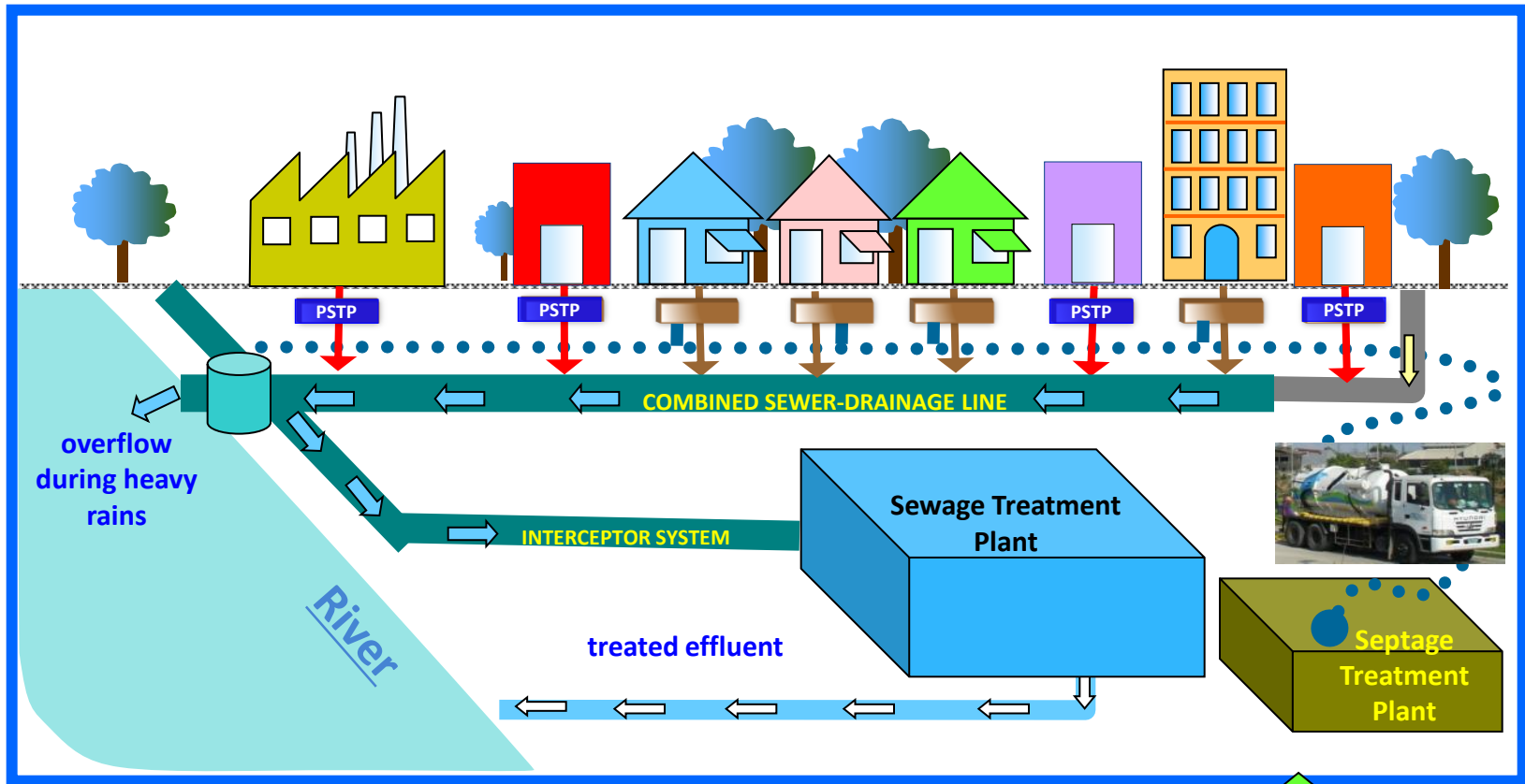
Separate Sewer System



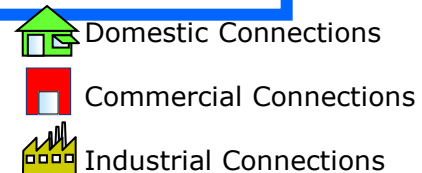


Strategies

Combined Sewer System and Septage Management

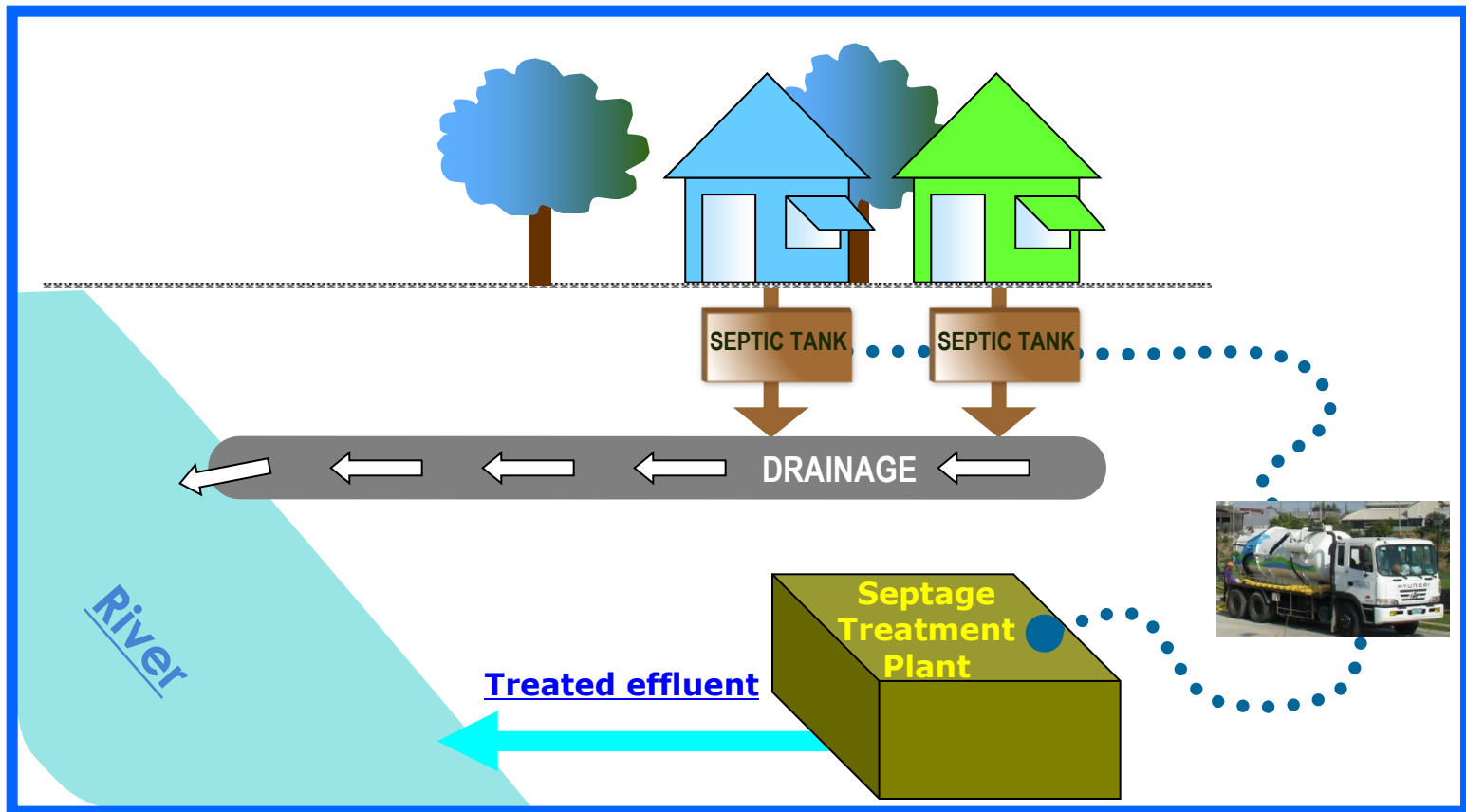


- Commercial and Industrial connections should have pre-treatment for their wastewater





Septage Management





The River Basin Approach

RIVER SYSTEMS (EAST ZONE)

- **Marikina-San Juan-Pasig Rivers**
- **Laguna Lake**





The Goal

Sewerage and Sanitation 100%

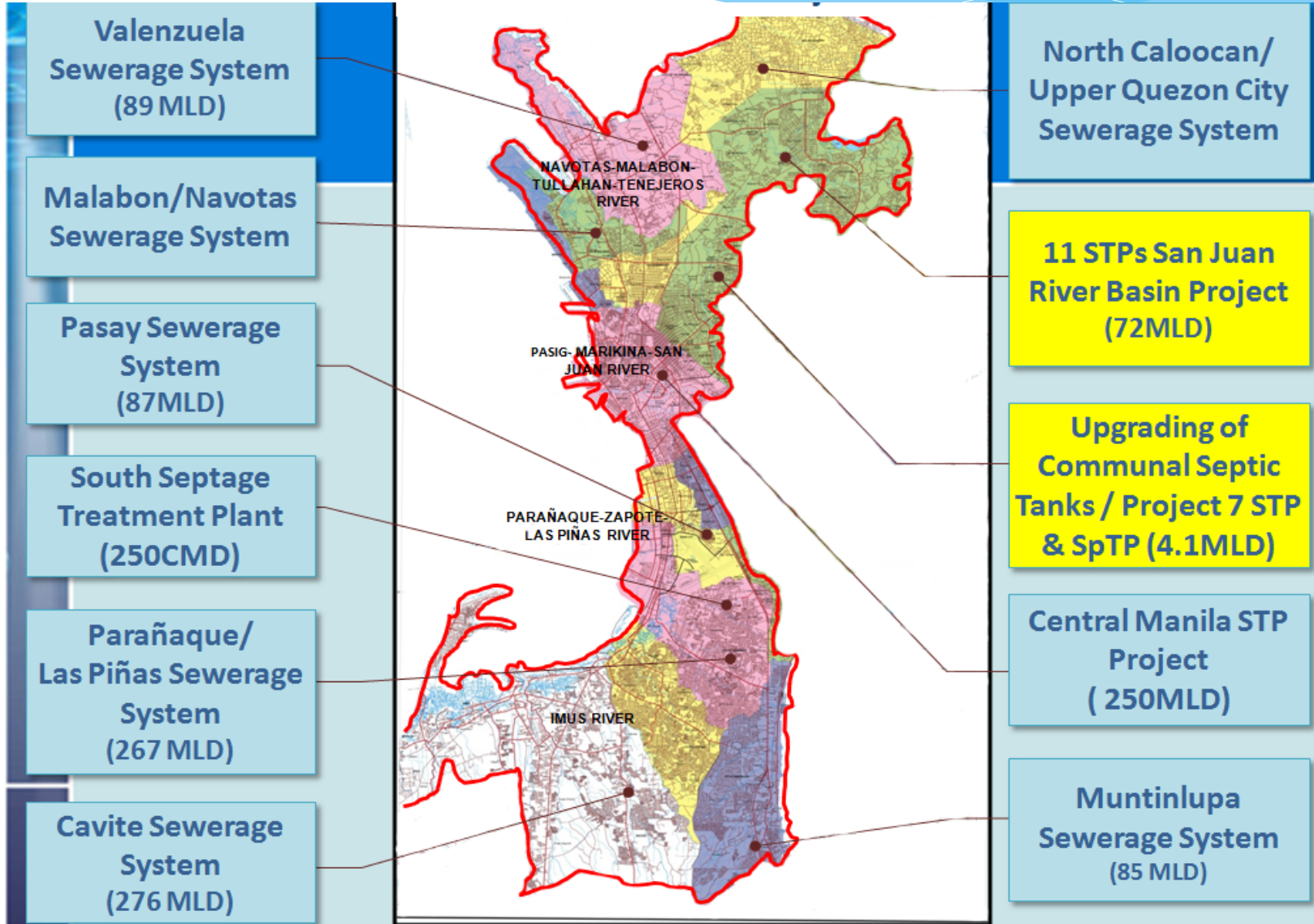
2037

Sewerage Roadmap

Period	MWCI	MWSI
	Percentage	Percentage
As of 2012	12%	9%
2013-2017	33%	27%
2018-2022	50%	58%
2023-2027	61%	73%
2028-2037	100%	100%

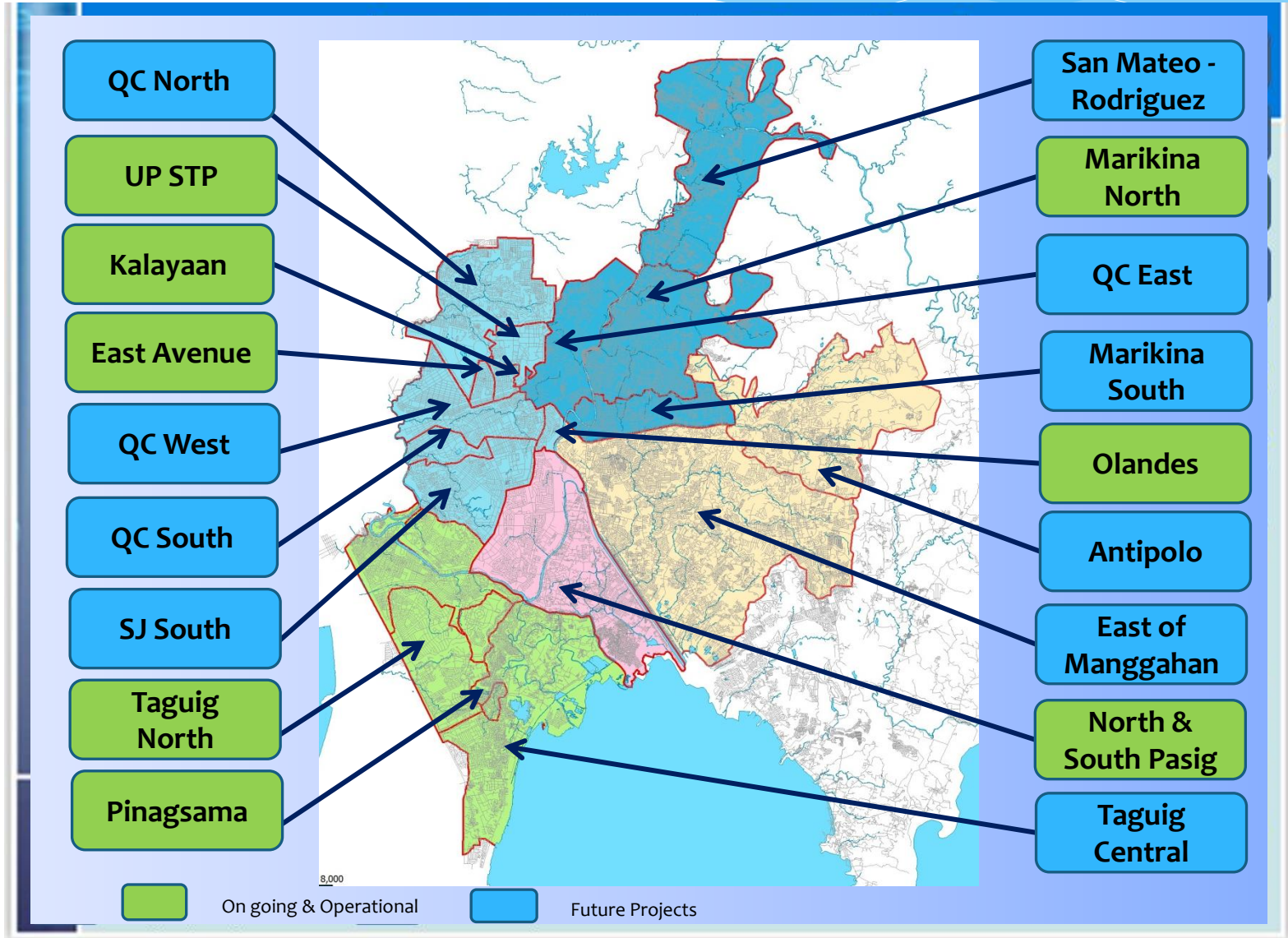


Sewerage Master Plan - Maynilad





Sewerage Master Plan – Manila Water





Maynilad's Sewerage Projects 2013-2037 (1/2)

Period	Projects	Coverage (%)
2013-2017	Valenzuela Sewerage System-1 st Stage	27%
	Pasay Sewerage System-1 st Stage	
	Muntinlupa Sewerage System-1 st Stage	
	Paranaque-Las Pinas Sewerage System-1 st Stage	
	Cavite City Sewerage System – 1 st stage	
	Upgrading & Expansion of Manila Central Sewerage System	
	South Septage Treatment Plant	
2018-2022	North Caloocan Sewerage System-1 st Stage	58%
	Quezon City Sewerage System-1 st Stage	
	Malabon- Navotas	



Maynilad's Sewerage Projects 2013-2037 (2/2)

Period	Projects	Coverage (%)
2022-2027	Valenzuela Sewerage System-2 nd Stage	78%
	Pasay Sewerage System-2 nd Stage	
	Paranaque-Las Pinas Sewerage System-2 nd Stage	
	Cavite Sewerage – 2 nd stage	
2028-2037	Expansion of Manila Central Sewerage System	100%
	Quezon City Sewerage	
	Paranaque-Las Pinas Sewerage System-3 rd and 4 th Stage	
	Cavite City Sewerage System a. Bacoor Expansion b. Imus Expansion	



Manila Water's Sewerage Projects 2013-2037 (1/2)

Period	Projects	Coverage (%)
2013-2017	Marikina North Sewerage System	33%
	Taguig North Sewerage System	
	Quezon City West Sewerage System	
	Rodriguez-San Mateo Sewerage System	
	Pasig North and South Sewerage System	
2018-2022	Makati-Manila Sewerage System	50%
	Taguig Central Sewerage System	

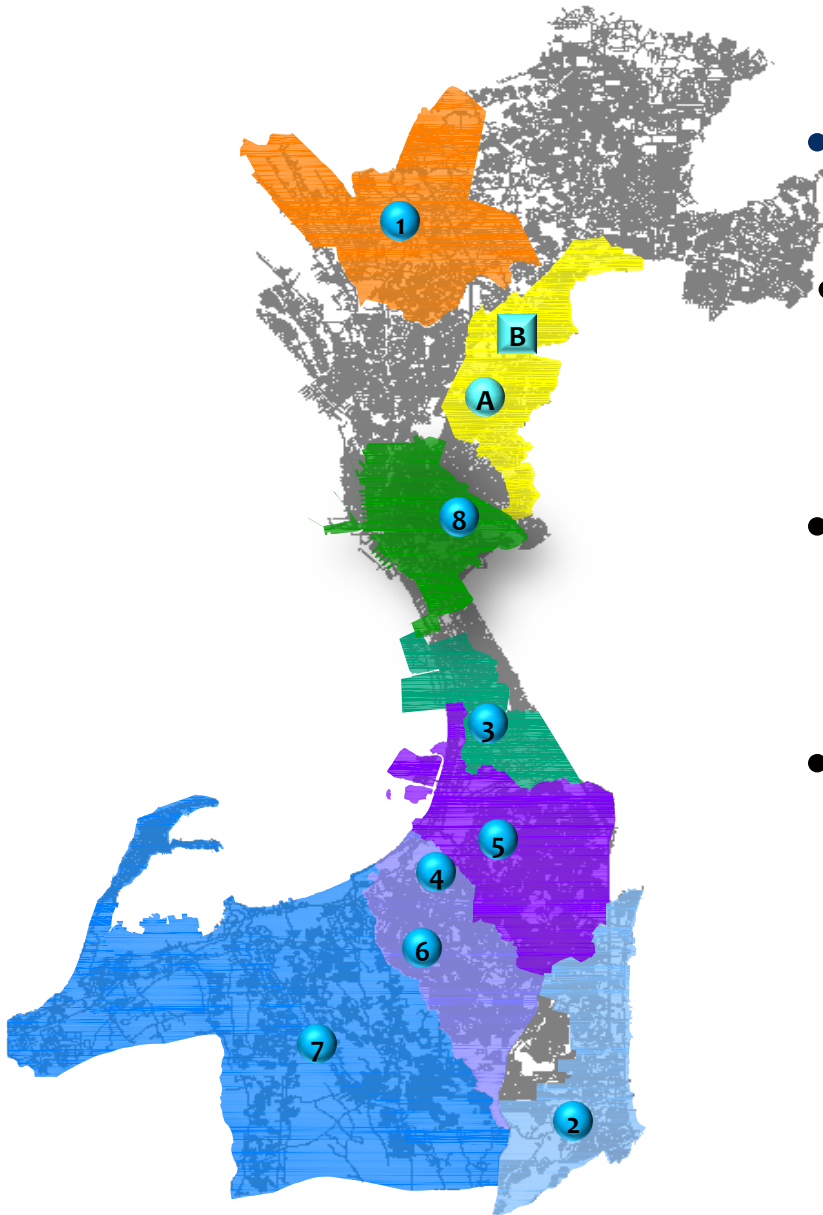


Manila Water's Sewerage Projects 2013-2037 (2/2)

Period	Projects	Coverage (%)
2023-2027	San Juan South Sewerage System	61%
	Sewer Line Extensions	
2028-2037	San Juan South Sewerage System	100%
	Marikina South Sewerage System	
	Quezon City East Sewerage System	
	Mandaluyong West Sewerage System	
	Quezon City North & South Sewerage System	
	Antipolo Sewerage System	
	East of Manggahan Sewerage System	



Maynilad Ongoing Projects



- **Construction Stage**
 - A,B : San Juan River Basin Project
- **Detailed Design Stage**
 - 1.Valenzuela Sewerage System
 2. Muntinlupa Sewerage System
- **Tendering Stage**
 3. Pasay Sewerage System
 - 4, 5.South Sewage and Septage Facility
- **Completed Feasibility Studies/
Lot acquisition on-going**
 6. Paranaque -Las Pinas Sewerage System
 7. Cavite Sewerage System
 8. Central Manila Sewerage System



Manila Water On-going Projects



Marikina North 100 MLD STP

(Ongoing Construction)
Population 470,704



Taguig North (LNMB) 75 MLD STP

(Ongoing Construction)
Population 245,677



North & South Pasig 100MLD expandable to 165 MLD STP

(Ongoing Construction)
Population : 630,885



QC West

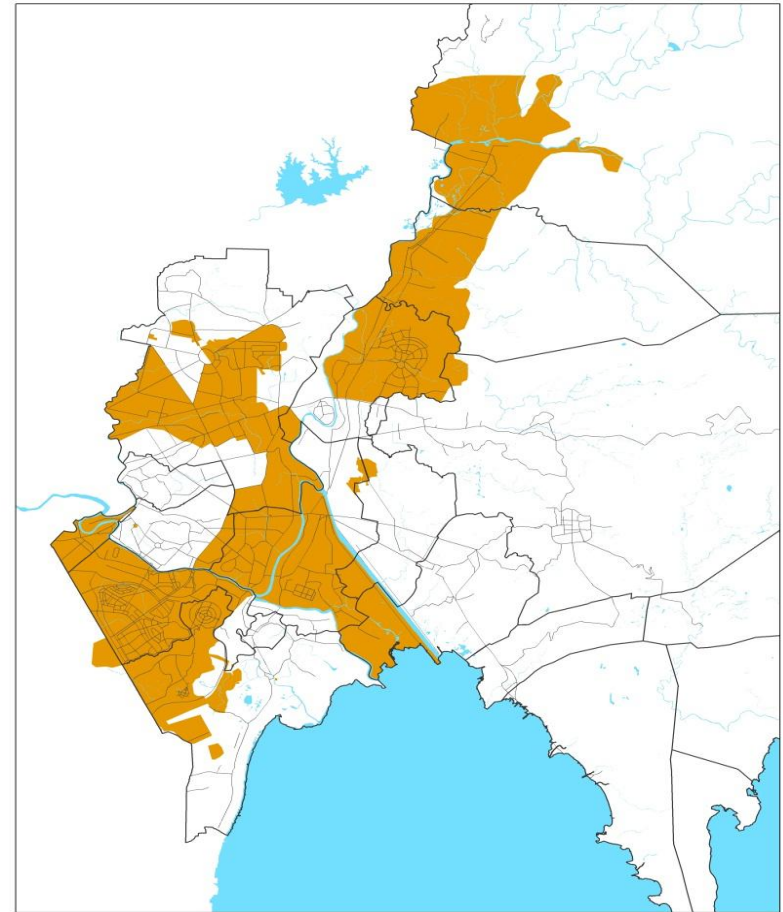
55 MLD STP

(Ongoing Reference Design)
Population : 198,777



San Mateo/ Rodriguez 60 MLD STP

(Ongoing Reference design)
Population : 637,858



***Subject to Rate Rebasing 2013 exercises, which will still be agreed upon with MWSS**



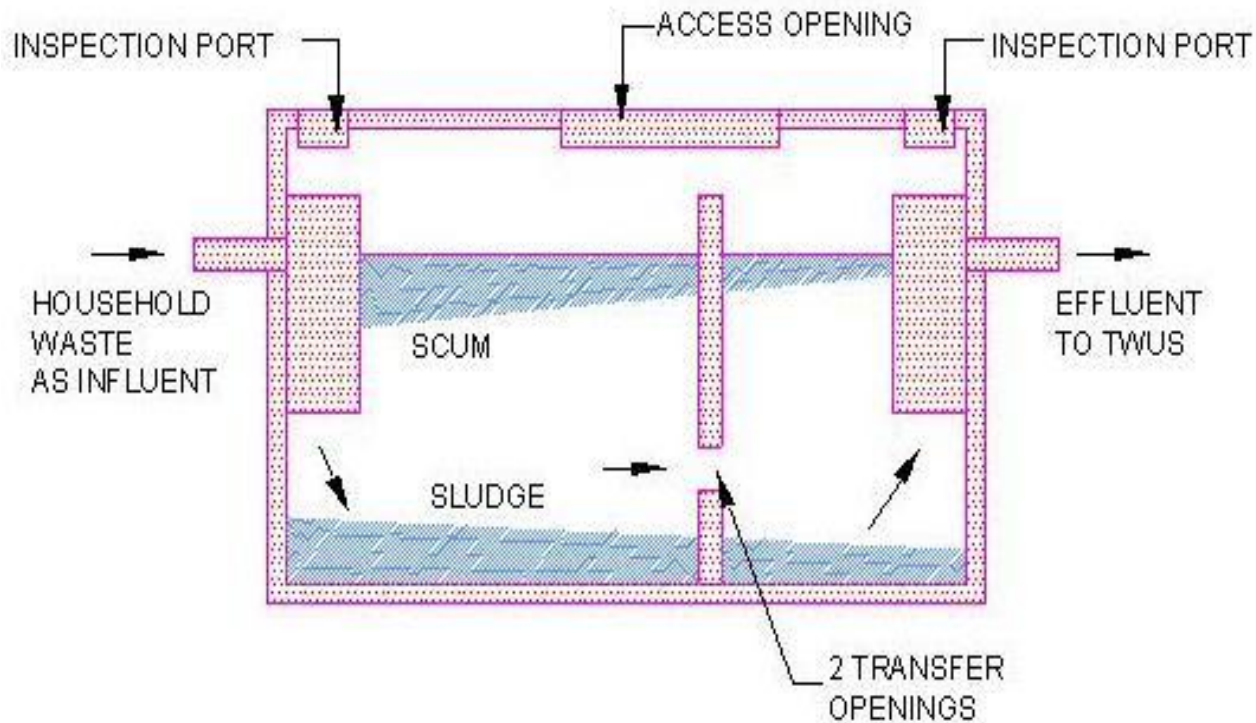
SANITATION SERVICES: Desludging of septic tanks





Septic Tank

Septic Tank Design



Typical Design Parameters

- ✓ Two chamber
- ✓ 5 cu.meter volume
- ✓ Lined bottom
- ✓ with access manhole
- ✓ desludging period:
5 to 7 years



Challenges

- Tariff increases due to large investment
- Commitment of other agencies for:
 - provision of adequate housing and toilets to the urban poor
 - relocation of unauthorized structures on the river banks
 - solid waste management
 - maintenance of street drainage





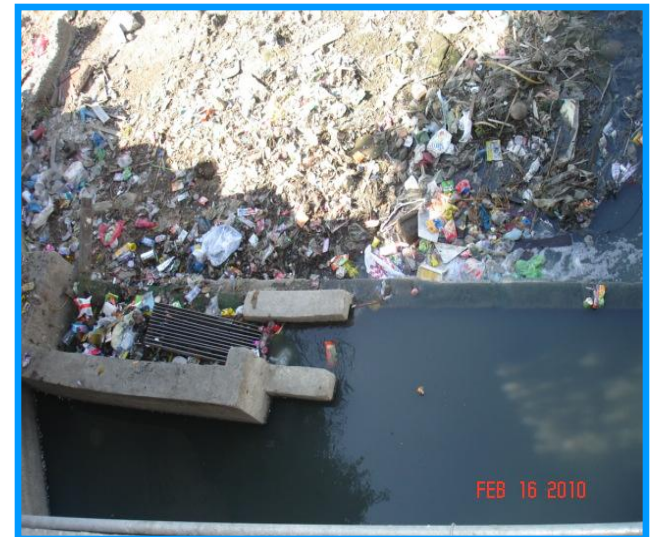
Challenges

➤ Land

- Large tracts of land required for STPs and network
- CWA: LGUs to allocate land for STPs

➤ Addressing the other sources of pollution entering the waterways

- Non-point sources: agricultural runoff, urban runoff, land erosion
- Landfill leachate, industrial and commercial sources





Call for Action from the Community

- Construct properly designed septic tanks
- Participate in desludging program
- Practice proper solid waste disposal
- Report illegal disposal of wastewater
- Support the construction of wastewater or sewage treatment plants
- Connect houses to existing sewer lines



Video on Sewage and Septage Treatment

Veterans Village Sewage and Septage Treatment Plant

Sewage – wastewater collected from houses through pipes

Septage – wastewater collected from septic tanks by trucks



Treatment Processes

- Preliminary treatment: removal of solids and oil + grease
- Primary treatment: chemical treatment and dewatering
- Secondary treatment: takes place in SBR basins
- Tertiary treatment: by filtration using sand and activated carbon
- Disinfection: addition of chlorine



Preliminary Treatment

Preliminary treatment : removal of solids and oil + grease

- bar screen – removes solids, garbage
- grit remover – removes sand, metal chips
- oil and grease separator – collects oil and scum





Primary Treatment

Primary treatment:

- addition of chemicals to form flocs
- dewatering press to produce dewatered sludge cakes



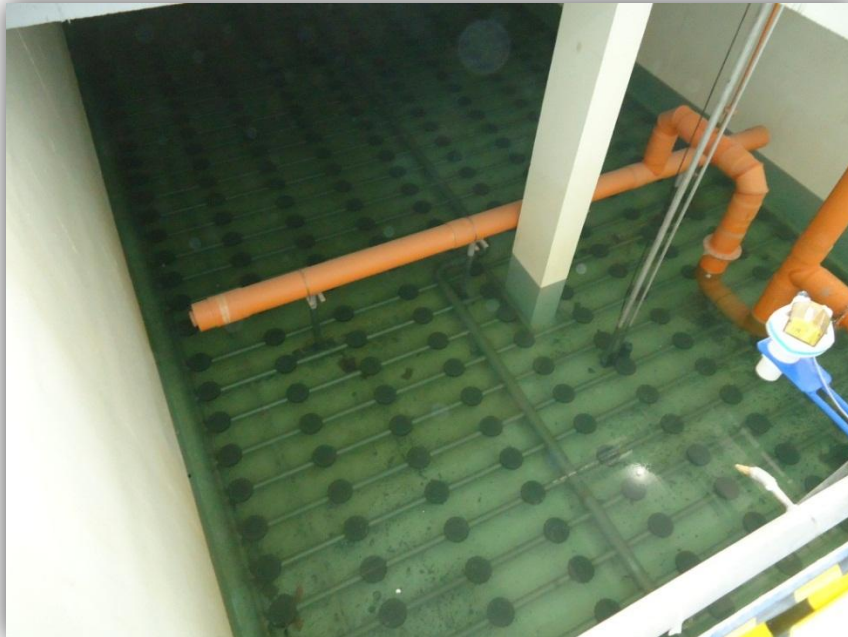


Secondary Treatment

Secondary treatment: takes place in SBR basins

Cycles:

- **Fill** : basin is filled with sewage
- **React**: supply air to grow microorganism
- **Settle**: to separate the clear water
- **Decant**: clear water flows out of the SBR basin





Tertiary Treatment

Tertiary treatment: filtration using sand and activated carbon

Disinfection: add chlorine to remove pathogens

Water reuse: for toilet flushing, cleaning of vehicles and watering the garden
(within the treatment plant)



The background features a central white oval with a blue gradient, surrounded by blue curved lines. Small white squares are scattered across the blue areas.

Thank you