



BUSINESS PLAN

*For the 6th Rate Rebasing Period
(2023-2027)*

FINAL VERSION March 23, 2023



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GLOSSARY OF TERMS

Term	Definition
2018 ABP	2018 Approved Business Plan
ACC	Automated Customer Communication
ACP	Asbestos Cement Pipes
ADR	Appropriate Discount Rate
AIS	Anti-Illegal System
ALM	Application Lifecycle Management
API	Application Programming Interface
ASV	Ayala Southvale Village
AWC	All Works Contract
AWTIP	Angat Water Transmission Improvement Project
AWTIP AQ7	Angat Water Transmission Improvement Project – Additional Financing for Aqueduct 7
BA	Business Area
BAF	Biological Aerated Filter
BNAQ	Bigte-Novaliches Aqueducts
BOCS	Business Operations Central Services
BOD	Biochemical Oxygen Demand
C2P	Contracts to Payment
CA	Concession Agreement
CAMANA	Caloocan-Malabon-Navotas
CAPEX	Capital Expenditures
CAS	Conventional Activated Sludge
CCM	Central Control Monitoring
CCP	Customer Communication Portal
CCTV	Closed-Circuit television
CMD	Cubic Meter per Day
CMMS	Computerized Maintenance Management System
CMS	Cubic Meter per Second
CNRW	Central NRW
CPF	Common Purpose Facilities
CPI	Consumer Price Index
CRM	Customer Relations Management
CRMS	Customer Relations Management Systems
CSIS	Customer Service Information System

Term	Definition
CST	Communal Septic Tank
CX	Customer Experience
CXRO	Customer Experience and Retails Operations
DAF	Dissolved Air Flotation
DAO	DENR Administrative Order
DAO 2021-19	DENR Administrative Order no. 2021-19
DCS	Datalogging Communication System
DENR	Department of Environment and Natural Resources
DL	Dataloggers
DM	District Meters
DMA	District Metered Areas
EAM	Enterprise Assets Management
ECav	East Cavite BA
ECQ	Enhanced Community Quarantine
ELA	Enterprise Licensing Agreement
EMF	Electromagnetic Flow Meters
EMF FB	Electromagnetic Full-bore Type
ETS	Electronic Total Station
FM	Flowmeters
GD	Guarantee Deposit
GHD	Gutteridge Haskins and Davey
GIP	Galvanized Iron Pipes
GIS	Geographic Information System
GNSS	Global Navigation Satellite System
GP	Gauging points
HAS	Hectares
HOA	Homeowners Association
HS	Hydraulic Systems
IAPAD	Industrial Automation and Plant Automation Design
IBS	Interceptor Box Systems
ICN	Industrial Control Network
IFAS	Integrated Fixed Film and Activated Sludge
IMM	Integrated Meter Management
IMS	Integrated Management System
IOT	Internet Of Things
IP	Infnetnet Protocol
IRR	Implementing Rules and Regulations

Term	Definition
ISMP	Integrated Sludge Management Program
ISMS	Integrated Sludge Management System
IT	Information Technology
IT-JD7	Tethered Leak Detection Equipment
ITS	Information Technology Services Division
JBIC Loan	Japan Bank of International Cooperation loan
Kaliwa Dam	New Centennial Water Source
Kaliwa Dam Project	New Centennial Water Source - Kaliwa Dam Project
KAR	Key Accounts Relations
KMS	Kilometers
KPI	Key Performance Indicator
LGU	Local Government Units
LLO	Low Level Outlet
LMS	Learning Management System
LMTP	La Mesa Treatment Plants
LPBA	Liters per Business Activity
LPCD	Liters per Capita per Day
M2C	Meter to Cash
MBBR	Moving Bed Bioreactor
MCM	Million Cubic Meters
MDD	Maximum Daily Demand
ML	Million Liters
MLD	Million Liters per Day
MLE	Modified-Ludzack Ettinger
MLP	Muntinlupa-Las Pinas BA
MMR	Massive Meter Replacement
MN	Manganese
MNL	Manila BA
MSC	Maintenance Service Charge
MSSP	Manila Second Sewerage Project
MTP	Modular Water Treatment Plants
MVAL	Malabon-Valenzuela BA
MWSS RO	Regulatory Office
NAC	Network Access Control
NCAL	North Caloocan Business Area
NDR	Network Detection and Response
NQC	North Quezon City BA

Term	Definition
NRW	Non-Revenue Water
NSCAL	Navotas-South Caloocan BA
NSSC	New Sewer Service Connections
NVAL	Novaliches-Valenzuela Business Area
NWSC	New Water Service Connection
OCP	Opening Cash Position
OI	Organic Intelligence, Inc.
OPEX	Operating Expenses
PDS	Primary Distribution System
PMP	Pressure Monitoring Points
PNSDW	Philippine National Standards for Drinking Water
PPM	Paranaque-Pasay/Makati BA
PPR	Partial Pipe Replacement
PRV	Pressure Regulating Valves
PS	Pumping Station
PSA	Philippine Statistics Authority
PSI	Pound per Square Inch
PSIC	Philippine Standard Industrial Classification
PWTP	Putatan WTP
R	Rate Rebasing Adjustment
R&B	Read-and-Bill System
R&M	Repairs and Maintenance
RO	Reverse Osmosis
ROW	Right-of-Way
SBR	Sequencing Batch Reactor
SCADA	Supervisory Control and Data Acquisition
SDS	Secondary Distribution System
SLI	Service Level Improvement
SO	Service Obligation
SOA	Statement of Account
SQC	South Quezon City BA
SSpTP	Sewage and Septage Treatment Plant
STF	Sludge Treatment Facility
TDS	Tertiary Distribution System
TDS	Total Dissolved Solids
TLS	Terrestrial Laser Scanner
TPR	Total Pipe Replacement

Term	Definition
TSPP	Tondo Sewage Pumping Plant
UAV	Unmanned Aerial Vehicle
UF	Ultrafiltration
UP DITCI	UP Diliman Integrated Technical Consultancy, Inc.
US	Ultrasonic
VTU	Vacuum Truck Units
WCav	West Cavite BA
WMS	Workflow Management System
WRF	Water Reclamation Facility
WSC	Water Service Connection
WTP	Water Treatment Plant
ZAMS	Zone Accounts Management System

Chapter 1 Service Obligations Performance and Targets for 2021

Despite the challenges faced by Maynilad over the past five years, it has held steady and has been able to expand its water and wastewater services in the West Zone.

The table below summarizes the Company's performance in relation to its Service Obligation (SO) targets. The full SO compliance report is included as Annex 1.1: SO Compliance Report 2017 to 2021 of this Business Plan.

SERVICE OBLIGATIONS	Actual					Total / Avg
	2017	2018	2019	2020	2021	
5.1 General Obligations Regarding the Provision of Water Services						
5.1.1 Water Supply; New Connections						
W1. New Water Service Connections	52,707	52,404	48,968	28,391	34,224	216,694
W1B. Water Coverage	93.4%	93.9%	94.2%	94.3%	94.5%	94.5%
5.1.2 Continuity of Supply (24 hours at min. 7 psi)	91.1%	90.0%	45.7%	86.0%	86.3%	86.3%
5.1.3 Obligation to Make Connections to a Water Main						
C3. Response to Request for New Connections (5 days)	100%	100%	100%	93%	99%	98%
Response to Request for New Connections (if at 2 days)				85%	96%	
C4. Installation of New Water Service Connections (7 days)	100%	100%	95%	93%	98%	97%
Installation of New Water Service Connections (if at 3 days)				79%	94%	
5.1.4 Drinking Water Quality Standards	100% Compliant					100%
5.2 General Obligations Regarding the Provision of Sewerage Services						
5.2.1 Supply of Sewerage Service						
S1. New Sewer Service Connections (Separate System)	3,796	4,441	3,625	2,758	4,326	18,946
Domestic NSSC	3,796	4,441	3,407	2,717	4,303	18,664
Commercial NSSC	-	-	218	41	23	282
S1B-A. Sewerage Coverage (Separate and Combined System)	16%	20%	21%	21%	22%	22%
5.2.3 Wastewater Standards	Passed wastewater effluent standards set by the DOH					100%
5.2.4 Septic and Sanitation Cleaning						
S2 Number of Accounts Offered	156,966	157,255	281,430	244,121	342,801	1,182,573
Number of Account Offered but waived	58,673	62,251	114,347	102,010	213,552	550,833
Number of Accounts served	98,293	95,004	167,083	142,111	129,249	631,740
Number of septic tanks emptied	78,389	82,353	147,988	93,824	53,738	456,292
S2 Sanitation Service Coverage (cumulative from 2022)	11%	22%	42%	58%	84%	84%
5.4 Other Customer Service Standards						
C1. Response to Customer Service-Related Complaints (10 days)	100%	100%	100%	96%	96%	98%
C2. Response to Customer Billing-Related Complaints (10 days)	100%	100%	100%	86%	93%	96%
C5. Response to Disruptive Mains (24 hours)	99%	99%	99%	99%	100%	99%
New Service Obligation under the Revised CA						
NRW average - Total		39.5%	39.0%	41.3%	44.9%	44.9%
- DMA	32.3%	29.8%	26.4%	26.1%	31.8%	31.8%

Table 1.1: SO Performance from 2017 to 2021

I. SO Compliance as of EO 2021

A. Water Service

To expand its service coverage, Maynilad added a total of **216,694** (97% or **209,506** of which are domestic connections) new billed water service

connections (“**WSC**”) during the period 2017 to 2021 (the “**Subject Period**”), thus, translating to a customer population of around 1.5 million people.

The accomplishments of Maynilad with respect to water service as of 31 December 2021 are the following:

1. Reached water service coverage of **94.5%**, on a constrained population served over the total projected population;
2. Provided (i) 24/7 water supply to **97.5%** of the population served; and (ii) water supply at a minimum pressure of 7 psi to **86.3%** of the population served;
3. Complied with drinking water quality standards;

The samples taken from Maynilad’s water treatment plants (“**WTP**”) and distribution systems passed the requirements under the Philippine National Standards for Drinking Water (“**PNSDW**”) of the Department of Health.

4. Installed an additional 40 fire hydrants in key points of its service area as part of its obligation to supply water for public purposes;

The locations of the fire hydrants are in compliance with the MWSS’ requirement of installing a fire hydrant for every 250-meter radius for commercial areas, and 300-meter radius for residential areas.

5. Deployed water tankers to augment the water supply of customers during emergencies and extended water service interruptions.

B. Sewerage and Sanitation

In addition to supplying potable water, Maynilad also provided wastewater services to its customers.

In 2016, around **6.5%** of the existing customers were connected to a sewerage system that conveys and treats wastewater before it is discharged to the receiving bodies of water. By the end of 2021, Maynilad had **76,884** billed sewer service connections compared to **66,021** in 2016.

A total of **18,381** new domestic sewer service connections were installed in the separate sewer system for the Subject Period.

The increase in (i) billed sewer service connections and (ii) combined sewer accounts increased Maynilad's sewer coverage to **21.6%** as of December 2021, from **12.8%** in 2012.

Customers located in non-sewered areas also received wastewater services from Maynilad. During the Subject Period, the Company offered desludging services to **1,240,285** customers and desludged **456,302** septic tanks, which is equivalent to **672,775** customers. This increased the sanitation service coverage in the West Zone to **84%** of the water-served population, **4 percentage points** above the cumulative target of **81%** beginning in 2017.

C. Customer Service

1. Response to Customer Complaints

During the Subject Period, Maynilad received:

- (a) **207,498** customer service-related complaints and resolved **205,236** complaints within 10 days, representing a resolution rate of **99%**.

Customer service-related complaints refer to complaints regarding water quality, water availability and pressure, meter assembly concerns, no meter or stolen meter, and street hazards that were received through the Customer Service Information System ("**CSIS**"). Reported leaks that have affected the customers' water supply and pressure also fall under water availability complaints.

- (b) **221,222** customer billing-related complaints and resolved **213,122** complaints within 10 days, representing a resolution rate of **96%**.

Customer billing-related complaints refer to complaints that resulted in the correction and/or issuance of revised statements of account ("**SOA**"). Complaints regarding repair, replacement or recalibration of water meters also fall under this complaint category.

At least 48 hours prior to a scheduled water interruption, Maynilad released advisories to affected customers through Maynilad's call center, business areas, social media and, whenever necessary, the mainstream media. Maynilad also provided water tanker services to customers affected by the scheduled water service interruptions when a particular service

improvement project was not completed within six to eight hours of the expected time of completion.

2. Response to Disruptive Mains

Maynilad repaired, within 24 hours, mainline disruptive breakages which primarily involved asbestos cement pipes (“ACP”), whether due to deteriorated pipes or accidents caused by third parties.

3. Sewer Maintenance

During the Subject Period, Maynilad undertook regular sewer maintenance activities of a total of **1,866** kilometers (“kms”) of sewer lines to prevent sewage flooding and to minimize sewer-related complaints.

II. Proposed Service Obligations Targets for 2026

The business plan for the Sixth Rate Rebasing period (2023-2027) (“**New Business Plan**”) is driven by SO targets, particularly for the review year 2026, that will allow Maynilad to meet the demands of its current and future customers.

SERVICE OBLIGATIONS	New Business Plan Targets						New Business Plan Targets			
	2022	2023	2024	2025	2026	2027	2031	2036	2041	2046
5.1 General Obligations Regarding the Provision of Water Services										
5.1.1 Water Supply; New Connections										
W1. New Water Service Connections	20,316	14,805	19,503	22,633	12,386	22,196	99,617	90,082	30,565	13,940
W1B. Water Coverage	94.7%	94.8%	94.8%	95.0%	95.1%	95.5%	96.8%	98.6%	98.6%	98.6%
5.1.2 Continuity of Supply (24 hours at min. 7 psi)	80.2%	88.3%	89.9%	90.9%	94.1%	95.1%	100.0%	100.0%	100.0%	100.0%
5.1.3 Obligation to Make Connections to a Water Main										
C3. Response to Request for New Connections (5 days)	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
C4. Installation of New Water Service Connections (7 days)	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
5.1.4 Drinking Water Quality Standards	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
5.1.7 Reduction of Non Revenue Water										
NRW average - Total	44%	42%	39%	34%	29%	25%	20%	20%	20%	20%
- DMA	30%	29%	26%	23%	20%	20%	20%	20%	20%	20%
5.2 General Obligations Regarding the Provision of Sewerage Services										
5.2.1 Supply of Sewerage Service										
S1.1 New Sewer Service Connections (Separate System)	2,000	2,000	2,000	2,000	2,000	2,000	10,000	10,000	8,000	-
S1.2 New Sewer Service Connections (Combined System)	39,632	39,961	9,562	18,901	206,608	16,704	330,503	355,615	113,991	178,434
S1B-A. Sewerage Coverage (Separate and Combined System) - accounts-based	18%	21%	21%	22%	33%	34%	49%	64%	69%	76%
S1B-A. Sewerage Coverage (Separate and Combined System) - population-based	23%	27%	27%	29%	42%	43%	58%	76%	81%	88%
5.2.3 Wastewater Standards	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
5.2.4 Septic and Sanitation Cleaning										
S2 Number of Accounts Offered (including combined)	183,255	183,255	331,956	338,426	335,191	271,901	1,368,507	1,235,220	1,189,392	1,096,270
Number of Account Offered but waived (including combined)	100,790	100,790	165,978	169,213	167,596	108,760	547,403	494,088	475,757	438,508
Number of Accounts served (including combined)	82,465	82,465	165,978	169,213	167,595	163,141	821,104	741,132	713,635	657,762
Number of septic tanks emptied	68,515	68,709	146,540	150,026	148,283	143,316	722,225	653,460	628,220	573,340
S2 Sanitation Service Coverage (5 year rolling) - accounts-based	61%	60%	62%	66%	67%	69%	51%	36%	31%	24%
S2 Sanitation Service Coverage (5 year rolling) - population-based	81%	81%	83%	87%	82%	84%	62%	45%	39%	30%
5.4 Other Customer Service Standards										
C1. Response to Customer Service-Related Complaints (10 days)	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
C2. Response to Customer Billing-Related Complaints (10 days)	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
C5. Response to Disruptive Mains (24 hours)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

* 2026 targets are to be used for performance grading in the next Rate Rebasing Exercise in 2027 / The 2027 targets are shown to indicate targets for the end of the 6th Rate Rebasing Period

Table 1.2: SO Targets

The achievement of these targets is hinged on (i) the completion of the development of long-term water source to address the growth in population and developments being undertaken by the LGUs served by Maynilad; (ii) the timely grant of permits for ongoing and new capital expenditures (“**CAPEX**”) projects; and (iii) and timely implementation of Maynilad’s new tariff by January 2023. Maynilad was able to implement only one tranche of its Rebased Tariff for the Fifth Rate Rebasing Period in October 2018.

A. Water Service Coverage

Water service coverage is computed based on the estimated population served with water per city or municipality over the total population in the West Zone. The population per city or municipality is derived from the total domestic accounts of Maynilad multiplied by the estimated average number of persons per account.

By 2026, water coverage in the West Zone is projected at 95.1%, serving approximately 10.5 million people. For this New Business Plan, Maynilad assumed that certain privately served communities will remain private and will operate their own waterworks. As such, Maynilad will only be able to serve at most 98.6% of the people in its service area, translating to 11.8 million people by 2046.

The methodology for calculating water service coverage is discussed in Annex 1.2: Guidelines in Reporting Service Obligations on Water, Sewer and Sanitation. In previous Rate Rebasing exercises, both person per connection factor (from the Water Demand Study) and person per household factor (from PSA) were used to compute the water service coverage. The new guideline streamlines this to use only one factor. The water service coverage map is in Annex 1.4: Water Service Coverage.

The tables below show the water service coverage as well as the population served with water for the next Rate Rebasing Periods, all the way to 2046.

MAYNILAD SERVED AREAS	WATER SERVICE COVERAGE				
	2022	2023	2024	2025	2026
NCR					
Caloocan	100.0%	100.0%	100.0%	100.0%	100.0%
Las Piñas	100.0%	100.0%	100.0%	100.0%	100.0%
Makati	100.0%	100.0%	100.0%	100.0%	100.0%
Malabon	100.0%	100.0%	100.0%	100.0%	100.0%
Manila	100.0%	100.0%	100.0%	100.0%	100.0%
Muntinlupa	99.0%	98.8%	98.8%	98.1%	98.2%
Navotas	97.8%	98.0%	98.6%	98.9%	99.1%
Parañaque	100.0%	100.0%	100.0%	100.0%	100.0%
Pasay City	100.0%	100.0%	100.0%	100.0%	100.0%
Quezon City	100.0%	100.0%	100.0%	100.0%	100.0%
Valenzuela	100.0%	100.0%	100.0%	100.0%	100.0%
Subtotal	99.9%	99.9%	99.9%	99.9%	99.9%
Cavite Province					
Bacoor	64.3%	66.0%	67.6%	67.6%	69.0%
Cavite City	100.0%	100.0%	100.0%	100.0%	100.0%
Imus	55.3%	55.0%	54.7%	57.9%	57.7%
Kawit	100.0%	100.0%	100.0%	100.0%	100.0%
Noveleta	69.5%	71.1%	73.0%	89.6%	91.6%
Rosario	51.7%	52.5%	53.1%	57.4%	58.3%
Subtotal	65.2%	65.8%	66.4%	68.3%	68.8%
Total	94.7%	94.8%	94.8%	95.0%	95.1%

Table 1.3.a: Water Service Coverage per City/ Municipality for 2022-2026

MAYNILAD SERVED AREAS	WATER SERVICE COVERAGE			
	2031	2036	2041	2046
NCR				
Caloocan	100.0%	100.0%	100.0%	100.0%
Las Piñas	100.0%	100.0%	100.0%	100.0%
Makati	100.0%	100.0%	100.0%	100.0%
Malabon	100.0%	100.0%	100.0%	100.0%
Manila	100.0%	100.0%	100.0%	100.0%
Muntinlupa	98.2%	98.2%	98.2%	98.2%
Navotas	99.7%	100.0%	100.0%	100.0%
Parañaque	100.0%	100.0%	100.0%	100.0%
Pasay City	100.0%	100.0%	100.0%	100.0%
Quezon City	100.0%	100.0%	100.0%	100.0%
Valenzuela	100.0%	100.0%	100.0%	100.0%
Subtotal	99.9%	99.9%	99.9%	99.9%
Cavite Province				
Bacoor	77.9%	93.4%	93.4%	93.4%
Cavite City	100.0%	100.0%	100.0%	100.0%
Imus	73.8%	86.4%	86.4%	86.4%
Kawit	100.0%	100.0%	100.0%	100.0%
Noveleta	100.0%	100.0%	100.0%	100.0%
Rosario	88.9%	100.0%	100.0%	100.0%
Subtotal	80.6%	92.4%	92.4%	92.4%
Total	96.8%	98.6%	98.6%	98.6%

Table 1.3.b: Water Service Coverage per City/ Municipality for 2031-2046

MAYNILAD SERVED AREAS	WATER SERVED POPULATION				
	2022	2023	2024	2025	2026
NCR					
Caloocan	1,703,701	1,721,581	1,738,297	1,753,773	1,763,097
Las Piñas	617,683	622,519	627,142	631,533	633,933
Makati	48,566	48,561	48,812	49,345	49,686
Malabon	386,013	388,350	390,643	392,884	393,980
Manila	1,674,763	1,688,814	1,702,003	1,714,198	1,720,938
Muntinlupa	554,866	560,434	566,864	569,177	573,206
Navotas	244,361	246,029	248,447	250,323	251,375
Parañaque	713,471	726,082	737,572	747,865	754,853
Pasay City	444,593	446,286	448,064	449,916	450,597
Quezon City	1,993,264	2,006,381	2,018,958	2,030,950	2,036,950
Valenzuela	729,458	735,603	741,442	746,948	750,040
Subtotal	9,110,739	9,190,640	9,268,243	9,336,911	9,378,657
Cavite Province					
Bacoor	441,977	460,179	477,136	483,169	498,093
Cavite City	99,447	98,850	98,476	98,323	98,245
Imus	298,281	306,574	313,835	341,028	346,896
Kawit	109,139	109,694	110,320	111,020	111,632
Noveleta	35,344	36,555	37,916	47,004	48,437
Rosario	58,431	59,841	60,990	66,350	67,913
Subtotal	1,042,620	1,071,692	1,098,673	1,146,894	1,171,215
Total	10,153,359	10,262,332	10,366,916	10,483,805	10,549,872

Table 1.4.a: Population Served with Water per City/ Municipality for 2022-2026

MAYNILAD SERVED AREAS	WATER SERVED POPULATION			
	2031	2036	2041	2046
NCR				
Caloocan	1,806,526	1,835,922	1,850,466	1,850,517
Las Piñas	648,080	658,625	663,843	663,861
Makati	51,033	51,863	52,274	52,274
Malabon	402,166	408,710	411,947	411,959
Manila	1,759,687	1,788,320	1,802,487	1,802,537
Muntinlupa	588,421	597,992	602,779	602,795
Navotas	257,728	262,599	264,679	264,686
Parañaque	778,104	790,765	797,030	797,052
Pasay City	459,082	466,552	470,248	470,261
Quezon City	2,079,777	2,113,619	2,130,363	2,130,422
Valenzuela	767,167	779,650	785,826	785,848
Subtotal	9,597,769	9,754,616	9,831,944	9,832,214
Cavite Province				
Bacoor	597,777	757,180	792,377	822,140
Cavite City	102,741	108,577	113,613	117,880
Imus	479,706	593,300	621,158	644,490
Kawit	117,842	124,535	130,311	135,205
Noveleta	56,095	59,281	62,031	64,361
Rosario	109,527	130,151	136,188	141,303
Subtotal	1,463,687	1,773,025	1,855,676	1,925,379
Total	11,061,457	11,527,641	11,687,620	11,757,592

Table 1.4.b: Population Served with Water per City/ Municipality for 2031-2046

B. Wastewater Service Coverage

Aside from providing water services to people in the West Zone, Maynilad is also mandated to provide wastewater services consisting of sewerage and sanitation services.

In 2021, a new methodology for computing sewer and sanitation coverage was agreed upon between the MWSS Regulatory Office (“**MWSS RO**”) and the Concessionaires, with the aim of coming up with a wastewater coverage. This is based on the best practices and reporting methodology among Asian countries. The new wastewater coverage methodology is detailed in Annex 1.2: Guidelines in Reporting Service Obligations on Water, Sewer and Sanitation.

In previous Rate Rebasing Periods, the sewer coverage was computed as a percentage of water-served population connected to the separate and combined sewerage system. However, beginning 2022, the sewer coverage will be computed based on the percentage of equivalent domestic sewer connections under the separate, hybrid, and combined systems relative to the water domestic connections.

Moreover, in accordance with the tripartite agreement, accounts with privately served sewage treatment plants (“**STP**”) will be added in the sewer coverage as long as Maynilad has provided other wastewater services that is equivalent to the estimated cost of desludging accounts similar without STPs.

Similarly, sanitation coverage is computed based on the number of domestic water connections that are offered desludging service relative to the total number of Maynilad’s water domestic connections. The new guidelines also specified that only unsewered accounts can be included in the determination of the sanitation coverage. In addition, sanitation coverage will be computed on a rolling five-year period.

The new sewer and sanitation coverage computations will now be added to arrive at the wastewater coverage. Applying the new method to the 2021 numbers will result in a sewer coverage of 15% and a sanitation coverage of 62% for a total wastewater coverage of 77%. Maynilad is aiming for a wastewater coverage of 100% in 2026, with sewer coverage of 33% and sanitation coverage of 67%.

Annexes 1.12 and 1.13 show the sewer and sanitation coverage, respectively, per separate system and per combined system. The annexes also show the coverage based on the connection approach and based on the population approach.

Detailed plans for achieving its wastewater coverage targets are discussed in Chapter 4: Plans for Wastewater.

Wastewater Coverage	2026	2031	2036	2041	2046
Sewer coverage	33%	49%	64%	69%	76%
Sanitation coverage	67%	51%	36%	31%	24%
Total Coverage	100%	100%	100%	100%	100%

Table 1.5: Wastewater Coverage from 2026 to 2046

1. Sewer Coverage

To achieve its sewer coverage target of 33% in 2026, Maynilad will (i) complete the construction and start the operation of the water reclamation facilities (“**WRF**”) in Tunasan, Cupang, Valenzuela, Las Piñas and its conveyance package 1 and 2 and CAMANA WRF and its conveyance package 1, 2 and 3 (ii) implement flow enhancement projects; and (iii) connect 10,000 new sewer service accounts.

Once completed, these projects will cover a total area of over 8,900 hectares (“**has.**”) and will serve an additional 2,000,000 population in the West Zone, increasing Maynilad’s total treatment capacity to 1,083 MLD.

The tables below show the sewer coverage per city/municipality, while the sewer service coverage map is in Annex 1.5: Sewer Service Coverage.

MAYNILAD SERVED AREAS	SEWER COVERAGE				
	2022	2023	2024	2025	2026
NCR					
Caloocan	0%	0%	0%	0%	33%
Las Piñas	0%	0%	0%	0%	60%
Makati	41%	65%	64%	64%	63%
Malabon	1%	0%	0%	0%	9%
Manila	40%	43%	44%	45%	49%
Muntinlupa	35%	21%	30%	30%	30%
Navotas	5%	4%	4%	4%	10%
Parañaque	17%	25%	25%	39%	38%
Pasay City	30%	45%	45%	44%	44%
Quezon City	27%	31%	31%	31%	34%
Valenzuela	7%	39%	38%	38%	38%
Subtotal	20%	24%	24%	25%	37%
Cavite Province					
Bacoor	0%	0%	0%	0%	0%
Cavite City	0%	0%	0%	0%	0%
Imus	0%	0%	0%	0%	0%
Kawit	0%	0%	0%	0%	0%
Noveleta	0%	0%	0%	0%	0%
Rosario	0%	0%	0%	0%	0%
Subtotal	0%	0%	0%	0%	0%
Total	18%	21%	21%	22%	33%

Table 1.5a: Sewer Coverage per City/ Municipality 2022 to 2026 – accounts-based

MAYNILAD SERVED AREAS	SEWER COVERAGE			
	2031	2036	2041	2046
NCR				
Caloocan	35%	35%	60%	82%
Las Piñas	96%	99%	99%	99%
Makati	61%	60%	60%	60%
Malabon	99%	99%	99%	99%
Manila	55%	57%	59%	59%
Muntinlupa	79%	83%	82%	82%
Navotas	100%	100%	100%	100%
Parañaque	67%	64%	64%	64%
Pasay City	45%	45%	45%	45%
Quezon City	31%	82%	82%	84%
Valenzuela	44%	44%	44%	44%
Subtotal	53%	64%	70%	74%
Cavite Province				
Bacoor	0%	62%	62%	63%
Cavite City	95%	100%	100%	100%
Imus	22%	33%	41%	98%
Kawit	97%	100%	100%	100%
Noveleta	27%	100%	100%	100%
Rosario	0%	100%	100%	100%
Subtotal	23%	60%	63%	85%
Total	49%	64%	69%	76%

Table 1.5b: Sewer Coverage per City/ Municipality 2031 to 2046 – accounts-based

MAYNILAD SERVED AREAS	SEWER COVERAGE				
	2022	2023	2024	2025	2026
NCR					
Caloocan	0%	0%	0%	0%	41%
Las Piñas	0%	0%	0%	0%	76%
Makati	80%	82%	81%	80%	80%
Malabon	1%	1%	1%	1%	11%
Manila	61%	59%	60%	61%	66%
Muntinlupa	25%	25%	35%	34%	34%
Navotas	5%	5%	5%	5%	13%
Parañaque	26%	33%	33%	51%	50%
Pasay City	49%	59%	58%	58%	58%
Quezon City	37%	38%	38%	38%	42%
Valenzuela	9%	43%	43%	42%	42%
Subtotal	25%	30%	31%	32%	48%
Cavite Province					
Bacoor	0%	0%	0%	0%	0%
Cavite City	0%	0%	0%	0%	0%
Imus	0%	0%	0%	0%	0%
Kawit	0%	0%	0%	0%	0%
Noveleta	0%	0%	0%	0%	0%
Rosario	0%	0%	0%	0%	0%
Subtotal	0%	0%	0%	0%	0%
Total	23%	27%	27%	29%	42%

Table 1.5c: Sewer Coverage per City/ Municipality 2022-2026 – population-based, 2016 factors

MAYNILAD SERVED AREAS	SEWER COVERAGE			
	2031	2036	2041	2046
NCR				
Caloocan	43%	43%	74%	100%
Las Piñas	100%	100%	100%	100%
Makati	78%	77%	76%	76%
Malabon	100%	100%	100%	100%
Manila	74%	78%	80%	80%
Muntinlupa	91%	95%	95%	95%
Navotas	100%	100%	100%	100%
Parañaque	87%	84%	83%	83%
Pasay City	58%	58%	58%	58%
Quezon City	38%	100%	100%	100%
Valenzuela	49%	49%	49%	49%
Subtotal	63%	77%	84%	89%
Cavite Province				
Bacoor	0%	70%	70%	72%
Cavite City	100%	100%	100%	100%
Imus	24%	37%	45%	100%
Kawit	100%	100%	100%	100%
Noveleta	27%	99%	99%	99%
Rosario	0%	98%	98%	98%
Subtotal	24%	66%	69%	88%
Total	58%	76%	81%	88%

Table 1.5d: Sewer Coverage per City/ Municipality 2031 to 2046 – population-based, 2016 factors

2. Sanitation Service Coverage

The Company has an obligation to provide desludging services to its customers that are not connected to the sewer lines. To calculate the sanitation coverage, accounts that have been offered desludging services but refused to, or waived their right to, avail of the septic tank desludging are still included in the computation because acceptance of the desludging service is not within the Company's control.

Sanitation Targets	2022	2023	2024	2025	2026
No. of Accounts Offered	183,255	183,255	331,956	338,426	335,191
No. of Accounts Served	82,465	82,465	165,978	169,213	167,595

Table 1.6: Sanitation Targets 2022 to 2026

For the Sixth Rate Rebasing Period, Maynilad estimates that only 45% of its customers who are offered desludging services in 2022 and 2023 will accept or avail of the service because of the pandemic. The reluctance of customers to avail of sanitation services due to health and safety reasons was evident since 2020 and still continues to affect desludging operations. But as lockdowns and community quarantines decrease, and as the restrictions begin to ease, the Company anticipates an increase of the acceptance rate to 50% from 2024 to 2026.

The Company also expects the acceptance rate to increase with the passage and full implementation by the LGUs of a septage management ordinance that will require, among other things, the LGU's constituents to avail of the sewerage and sanitation services of the Concessionaires, with corresponding penalties for non-compliance. As such, from 2027 onwards, Maynilad assumed a higher acceptance rate of 60%.

Map of the septic tanks desludged as of end of 2021 is available in Annex 1.7 – Septic Tanks Desludged.

MAYNILAD SERVED AREAS	SANITATION SERVICE COVERAGE				
	2022	2023	2024	2025	2026
NCR					
Caloocan	64%	44.0%	44.0%	54.0%	67.0%
Las Piñas	61%	59.0%	55.0%	54.0%	40.0%
Makati	58%	122.0%	117.0%	115.0%	80.0%
Malabon	44%	28.0%	45.0%	68.0%	91.0%
Manila	63%	75.0%	70.0%	71.0%	51.0%
Muntinlupa	45%	32.0%	50.0%	67.0%	70.0%
Navotas	61%	54.0%	62.0%	76.0%	90.0%
Parañaque	56%	81.0%	80.0%	76.0%	62.0%
Pasay City	63%	81.0%	92.0%	89.0%	56.0%
Quezon City	55%	63.0%	53.0%	60.0%	66.0%
Valenzuela	84%	85.0%	93.0%	65.0%	62.0%
Subtotal	61%	62%	62%	65%	63%
Cavite Province					
Bacoor	50%	49.0%	66.0%	85.0%	100.0%
Cavite City	31%	26.0%	49.0%	77.0%	100.0%
Imus	56%	38.0%	64.0%	76.0%	100.0%
Kawit	69%	47.0%	73.0%	73.0%	100.0%
Noveleta	106%	101.0%	90.0%	98.0%	100.0%
Rosario	20%	18.0%	53.0%	78.0%	100.0%
Subtotal	52%	43%	65%	80%	100%
Total	61%	60%	62%	66%	67%

Table 1.7.a: Sanitation Targets 2022 to 2026 – accounts-based

MAYNILAD SERVED AREAS	SANITATION SERVICE COVERAGE			
	2031	2036	2041	2046
NCR				
Caloocan	65.0%	65.0%	40.0%	18.0%
Las Piñas	4.0%	1.0%	1.0%	1.0%
Makati	39.0%	40.0%	40.0%	40.0%
Malabon	1.0%	1.0%	1.0%	1.0%
Manila	45.0%	43.0%	41.0%	41.0%
Muntinlupa	21.0%	17.0%	18.0%	18.0%
Navotas	0.0%	0.0%	0.0%	0.0%
Parañaque	33.0%	36.0%	36.0%	36.0%
Pasay City	55.0%	55.0%	55.0%	55.0%
Quezon City	69.0%	18.0%	18.0%	16.0%
Valenzuela	56.0%	56.0%	56.0%	56.0%
Subtotal	47%	36%	30%	26%
Cavite Province				
Bacoor	100.0%	38.0%	38.0%	37.0%
Cavite City	5.0%	0.0%	0.0%	0.0%
Imus	78.0%	67.0%	59.0%	2.0%
Kawit	3.0%	0.0%	0.0%	0.0%
Noveleta	73.0%	0.0%	0.0%	0.0%
Rosario	100.0%	0.0%	0.0%	0.0%
Subtotal	77%	40%	37%	15%
Total	51%	36%	31%	24%

Table 1.7.b: Sanitation Targets 2031 to 2046 – accounts based

MAYNILAD SERVED AREAS	SANITATION SERVICE COVERAGE				
	2022	2023	2024	2025	2026
NCR					
Caloocan	77%	61%	61%	72%	83%
Las Piñas	88%	71%	57%	69%	51%
Makati	93%	135%	132%	115%	101%
Malabon	48%	38%	64%	85%	113%
Manila	96%	106%	109%	101%	69%
Muntinlupa	47%	39%	55%	80%	81%
Navotas	61%	70%	86%	94%	109%
Parañaque	104%	116%	102%	106%	81%
Pasay City	106%	107%	116%	110%	73%
Quezon City	92%	95%	87%	80%	81%
Valenzuela	101%	94%	101%	85%	69%
Subtotal	82%	85%	85%	86%	78%
Cavite Province					
Bacoor	51%	54%	65%	97%	113%
Cavite City	46%	25%	57%	93%	119%
Imus	56%	39%	62%	85%	112%
Kawit	75%	54%	87%	84%	115%
Noveleta	90%	86%	77%	90%	99%
Rosario	19%	14%	44%	75%	98%
Subtotal	53%	46%	65%	90%	112%
Total	81%	81%	83%	87%	82%

Table 1.7.c: Sanitation Targets 2022 to 2026 – population-based, 2016 factors

MAYNILAD SERVED AREAS	SANITATION SERVICE COVERAGE			
	2031	2036	2041	2046
NCR				
Caloocan	81%	81%	50%	22%
Las Piñas	5%	1%	1%	1%
Makati	49%	50%	51%	51%
Malabon	1%	1%	1%	1%
Manila	62%	58%	55%	55%
Muntinlupa	24%	20%	20%	20%
Navotas	0%	0%	0%	0%
Parañaque	44%	48%	48%	48%
Pasay City	73%	73%	73%	73%
Quezon City	85%	22%	22%	20%
Valenzuela	63%	63%	63%	63%
Subtotal	59%	45%	38%	32%
Cavite Province				
Bacoor	113%	43%	43%	42%
Cavite City	6%	0%	0%	0%
Imus	87%	75%	66%	2%
Kawit	3%	0%	0%	0%
Noveleta	72%	0%	0%	0%
Rosario	98%	0%	0%	0%
Subtotal	86%	43%	41%	18%
Total	62%	45%	39%	30%

Table 1.7.b: Sanitation Targets 2031 to 2046 – population-based, 2016 factors

C. Continuity of Supply

As of December 2021, Maynilad was able to deliver water continuously for 24 hours at a minimum pressure of 7 psi, to 86% of its customers. By the end of 2026, this is expected to increase to 94%. The maps on water supply continuity and availability are available in Annexes 1.8 to 1.11.

To enable Maynilad to provide 100% of its customers with 24 hours water supply at a minimum pressure of 7 psi, Maynilad needs to augment its water supply by (i) reducing its Non-Revenue Water (“NRW”), and (ii) constructing additional WTPs, namely, the 150 MLD Poblacion WTP and the 300 MLD Teresa WTP including its conveyance line. The construction of the 150 MLD Poblacion WTP is already under way, while that of the 300 MLD Teresa WTP is expected to begin in the next Rate Rebasing period.

Aside from the additional WTPs, Maynilad also plans to construct more water reservoirs that can be used to store water and release the same during peak demand in order to maintain the required pressure.

Detailed plans to ensure continuity of supply are discussed in Chapter 3: Plans for Water.

Maynilad Business Area	Continuity of Supply, min. 7 psi				
	2022	2023	2024	2025	2026
North Caloocan	56%	64%	64%	64%	83%
Malabon/Valenzuela	76%	83%	88%	92%	92%
North Quezon City	98%	99%	100%	100%	100%
South Quezon City	94%	94%	96%	97%	97%
Navotas/South Caloocan	97%	97%	98%	99%	99%
Manila	83%	93%	95%	97%	97%
Paranaque - Pasay - Makati	62%	76%	76%	76%	85%
Muntinlupa - Las Pinas	82%	92%	95%	96%	96%
East Cavite	71%	96%	98%	98%	98%
West Cavite	88%	99%	99%	100%	100%
Maynilad Overall	80.2%	88.3%	89.9%	90.9%	94.1%

Table 1.8.a: Continuity of Supply at min 7psi per BA

Maynilad Business Area	Continuity of Supply, min. 7 psi			
	2031	2036	2041	2046
North Caloocan	100%	100%	100%	100%
Malabon/Valenzuela	100%	100%	100%	100%
North Quezon City	100%	100%	100%	100%
South Quezon City	100%	100%	100%	100%
Navotas/South Caloocan	100%	100%	100%	100%
Manila	100%	100%	100%	100%
Paranaque - Pasay - Makati	100%	100%	100%	100%
Muntinlupa - Las Pinas	100%	100%	100%	100%
East Cavite	99%	100%	100%	100%
West Cavite	100%	100%	100%	100%
Maynilad Overall	100%	100%	100%	100%

Table 1.8.b: Continuity of Supply at min 7psi per BA

D. Reduction of Non-Revenue Water (“NRW”)

In the RCA, the reduction of NRW was added as an SO of the Concessionaires. In 2021, Maynilad had a total NRW of 45% and a DMA NRW of 32%.

The Company aims to reduce the Total NRW to 29.4% by 2026, and to 20% by 2030. The 20% level of NRW will be maintained until the end of the concession. The DMA NRW will be reduced to 20.1% by 2026, and will also be maintained at 20% moving forward.

Detailed plans for NRW reduction are discussed in Chapter 3: Plans for Water.

Chapter 2 Water Demand and Supply

I. Demand

The forecast water demand for the West Zone is based on the results of the 2021 Water Demand Study (the “**2021 Water Demand Study**”) undertaken by the UP Diliman Integrated Technical Consultancy, Inc. (“**UP DITCI**”). UP DITCI is comprised of the same group of experts under the UP National Engineering Center, who undertook a similar water demand study in 2011 and 2016. The presentation on the Water Demand Study results is available in Annex 1.3 – 2021 Water Demand Study Results.

The total water demand is the sum of the domestic and non-domestic demand.

A. Sectoral Domestic Demand

Domestic demand is the volume of water that residential and semi-business customers consume. Residential customers are those who use water for personal and household needs only. Semi-business customers are those who use water while operating small enterprises out of their homes. These small enterprises include sari-sari stores, repair shops, and small backyard/ cottage industries.

For Maynilad’s domestic demand projection, both the sectoral and spatial demand projections were used. The sectoral demand analysis estimates future water demand based on the population projection and consumption per capita, while the spatial demand analysis uses the area development and land-use plans of the local government units (“**LGU**”) to forecast future water demand.

1. Population in the West Zone

The population values that were used in the 2021 Water Demand Analysis were based on the initial results of the 2020 Census-based Philippines Statistics Authority (“**PSA**”). Because the water demand study used the initial results of the 2020 census, there is a 0.16% difference in the results shown in Table 2.1 when compared against the data released by the PSA on 23 March 2022.

The population is broken down per LGU using the Ratio Method that was also used in the 2016 Maynilad Water Demand Study. For the projections of the population through future years, the growth rate

provided in the 2015 Census-based Population Projection that was released by the PSA in 2019 was used, while the 2020 population figures were used as base numbers.

To compute the population per LGU, the ratio method is used to decompose the total projected population of a province into its component LGUs. The data sets of the last four censuses (2007, 2010, 2015, and 2020) are compiled.

In between these censuses, the annual (compounded) rate of change in the ratio is computed per LGU. This resulted in three sets of annual growth rates - each for the periods 2007-2010, 2010-2015, and 2015-2020.

LGUs are classified into four categories according to the behavior observed in the three sets of annual growth rates. These are summarized, as follows:

Category	Remarks
I	Shows consistent increasing or decreasing ratios
II	The direction (sign) of the last two growth rates is the same, but the first is different
III	The direction (sign) of the first two growth rates is the same, but the last is different
IV	The direction (sign) of the first and last growth rates is the same, but the second is different

The initial rate of change in the ratio of an LGU's population is computed with respect to the provincial total based on the LGU category. This is based on the following:

Category	Remarks
I	Geometric mean of the three rates
II	Geometric mean of the last two rates
III	Geometric mean of the first two rates
IV	Half of the last growth rate

The computed initial rate of change in the ratio is assumed to stabilize (zero change) after an assumed number of years in a linear manner. In the case of Maynilad, the stabilization was assumed after 10 years.

The projected ratio is calculated using the previous years' ratio multiplied by the projected change of rate (plus 1).

The projected ratio is then multiplied by the projected population of the province to get the projected population of the LGU.

Table 2.1 shows the population projection from 2021 to 2046 per LGU within the West Zone covered area. Certain barangays in the cities of Manila, Quezon City, and Parañaque are under the East Zone.

City / Municipality in the West Zone	2020 Census (initial release in 2021)	Population Projection in the West Zone covered area					
		2021	2026	2031	2036	2041	2046
OVERALL MAYNILAD	10,484,689	10,605,996	11,093,489	11,425,979	11,685,529	11,851,932	11,927,660
METRO MANILA	8,945,837	9,036,146	9,391,427	9,609,330	9,765,690	9,843,056	9,843,328
Caloocan	1,664,272	1,684,602	1,763,097	1,806,526	1,835,922	1,850,466	1,850,517
Las Pinas	607,274	612,607	633,933	648,080	658,625	663,843	663,861
Makati	49,182	48,788	49,686	51,033	51,863	52,274	52,275
Malabon	381,138	383,613	393,980	402,166	408,710	411,947	411,959
Manila	1,644,238	1,659,878	1,720,938	1,759,687	1,788,320	1,802,487	1,802,537
Muntinlupa	544,324	552,542	583,798	599,314	609,066	613,891	613,908
Navotas	247,944	248,934	253,553	258,394	262,599	264,679	264,686
Paranaque	685,014	699,766	754,853	778,104	790,765	797,030	797,052
Pasay	441,369	442,959	450,597	459,082	466,552	470,248	470,261
Quezon City	1,964,947	1,979,483	2,036,950	2,079,777	2,113,619	2,130,363	2,130,422
Valenzuela	716,135	722,973	750,040	767,167	779,650	785,826	785,848
CAVITE PROVINCE	1,538,853	1,569,850	1,702,062	1,816,650	1,919,838	2,008,875	2,084,332
Bacoor	668,520	678,421	721,554	766,921	810,483	848,071	879,926
Cavite City	101,264	100,255	98,245	102,741	108,577	113,613	117,880
Imus	499,705	519,975	601,286	649,895	686,810	718,662	745,656
Kawit	108,165	108,635	111,632	117,842	124,535	130,311	135,205
Noveleta	49,742	50,305	52,897	56,095	59,281	62,031	64,361
Rosario	111,456	112,259	116,448	123,156	130,151	136,188	141,303

Table 2.1: Population Projection from 2021 to 2046

(a) Liters per Capita per Day ("LPCD")

LPCD refers to the amount of water, in liters, that is consumed by one person per day. In this study, if there is a group of persons such as a household or an LGU, the LPCD is computed as the combined number of liters consumed by all persons in that group, divided by the number of persons in that same group.

The survey conducted by Organic Intelligence, Inc. ("OI"), a marketing consultancy firm that was engaged by Maynilad specifically for the

2021 Water Demand Study, was used as the basis for the computation of the LPCD. The results of the survey provided data on the number of persons covered per household within the West Zone from 2016 to 2021. Meanwhile, data on the monthly water consumption of the surveyed household for these years were provided by Maynilad.

Considering the differences in the water consumption pattern of households between months in a year, the LPCDs computed per LGU were de-seasonalized. Further, actual data show that domestic consumption during the pandemic is higher than recent annual figures. To account for the effect of the Covid-19 pandemic on the domestic water demand, UP DITCI incorporated a Covid-19 Pandemic Impact Index which is based on the effect of the change in LPCD brought about by the pandemic situation. The impact of the pandemic on the LPCD is then assumed to return to normal, i.e., average LPCD between 2016 and 2018, and will remain unchanged throughout the remaining forecast period. The LPCD in 2021 has not significantly changed from the 2016 per capita, thus, supporting Maynilad's demand assumption of no change in LPCD for the forecast period.

	WATER DEMAND STUDIES		
	2011 LPCD	2016 LPCD	2021 LPCD
Metro Manila			
Caloocan	123.62	129.20	126.63
Las Piñas	112.13	119.38	129.60
Makati	151.08	179.92	151.26
Malabon	112.70	117.26	135.01
Manila	134.47	146.52	140.56
Muntinlupa	100.71	121.36	115.96
Navotas	116.65	127.21	134.17
Parañaque	119.99	115.71	142.42
Pasay	131.58	144.83	148.38
Quezon City	126.52	126.42	132.49
Valenzuela	120.32	142.92	129.25
Average Metro Manila	124.93	131.26	131.62
Cavite Province			
Bacoor	130.76	116.89	118.99
Cavite City	122.64	119.01	128.31
Imus	125.18	122.12	120.33
Kawit	109.27	136.17	136.64
Noveleta	102.97	122.19	108.50
Rosario	118.20	129.81	123.35
Average Cavite	125.73	121.11	125.22
West Zone Average	124.99	130.30	130.98

Table 2.2: LPCD from 2011, 2016 and 2021

B. Sectoral Non-Domestic Demand

Non-domestic demand is the volume of water that commercial and industrial customers consume. The distinction between commercial and industrial customers is based on the primary activity that the customers are engaged in.

1. Commercial customers are those that consume water for any of the following activities:
 - (a) Wholesale and retail trade; repair of motor vehicles and motorcycles;
 - (b) Hotels and restaurants;
 - (c) Financial intermediation;
 - (d) Education services;
 - (e) Real estate, renting and business activities;
 - (f) Health and social work; and
 - (g) Other community, social and personal services
2. Industrial customers, on the other hand, are those that consume water for any of the following activities:
 - (a) Construction;
 - (b) Manufacturing;
 - (c) Transportation; and
 - (d) Communication

Similar to Maynilad's domestic demand forecast, the non-domestic demand also used both the sectoral and spatial projections from the 2021 Water Demand Study.

1. Total Number of Employees

Employment data were taken from the 2004-2020 Employment Situation reports of the Labor Force Survey by the PSA. National data for each subsector were used as a proxy for provincial employment levels due to the unavailability of the disaggregated data for 2019-2020. The cutoff year was set to 2019 because of the exogenous shock to employment caused by the pandemic in 2020. The data were then categorized into three subsectors – commercial, industrial, and government.

To account for the effect of the pandemic, the 2021 Water Demand Study introduced a recession index based on the closest comparable economic shock, the 1997 Asian financial crisis. This index was then applied to the computed employment growth rates per subsector and this effect is assumed to persist until 2024.

2. Liters per Business Activity (“LPBA”)

The unit of measurement for non-domestic demand is the LPBA. The LPBA is calculated as the total volume of water consumed, divided by the total size of labor employed by the subsectors. The premise is that any expansion of business operations typically leads to an increase in the employment rate, thus, translating into higher water consumption.

The 2021 Water Demand Study also recognizes the effects of the pandemic and as such it took into consideration the short-term effects it would have on the water consumption pattern of non-domestic customers. Similar to the assumptions made in the total number of employees, any changes in the LPBA resulting from the pandemic is assumed to return to normal by 2024, i.e., back to 2019 levels.

C. Spatial Demand

The spatial demand forecast makes use of the relationship between types of land-use and water consumption per area to arrive at the projected water demand. Specifically, the 2021 Water Demand Study gathered land-use and zoning plans from the LGUs and construction statistics from PSA and used these to approximate the demand growth per LGU.

Aside from the spatial demand forecast, Maynilad also reviewed the identified areas in the land-use plans of the LGUs and was able to identify potential domestic-related area developments that were not yet included in the land-use plans. Tables 2.3 and 2.4 list the additional domestic and non-domestic demand that were identified.

City / Municipality in the West Zone	Location/Establishment
Malabon	NHA Housing, Rodriguez, Panghulo, Malabon
Valenzuela	Potential expansion of vacant lots at Punturin-Bignay Bypass Road
Noveleta	Noveleta Resettlement
Manila	Camella Condo Homes Taft, 2587 Taft Ave, Malate, Manila

Table 2.3: List of Additional Domestic Development for Spatial Demand

City / Municipality in the West Zone	Location/Establishment
Parañaque	ASEANA/Pagcor E City
Manila	Manila Solar City (Manila Goldcoast Development Corp.)
Manila	Horizon Manila
Manila	City of Pearl Reclamation project

Manila	Manila Waterfront City Reclamation project
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Table 2.4: List of Additional Non-Domestic Development for Spatial Demand

D. Water Demand Projections

1. Domestic Demand Forecasts

For the domestic demand forecast, Maynilad adhered to the 2021 Water Demand Study's recommendation to use the sectoral demand forecasts scenario, which assumed a return to normal or pre-pandemic consumption in 2023 for the years 2022 to 2027 and to use the spatial demand forecasts for the years 2028 to 2046.

For years 2022 to 2027, the sectoral domestic demand was computed by multiplying the computed LPCD with the water-served population per LGU and the target service coverage per year per LGU. The water-served population corresponds to the forecast population per LGU adjusted to cover the following:

- (a) Individual and bulk residential and semi-business accounts serviced by Maynilad;
- (b) Accounts temporarily disconnected; and
- (c) Population served by communal (public) faucets

Figure 2.1 shows Maynilad's domestic demand projection for years 2022 to 2046.

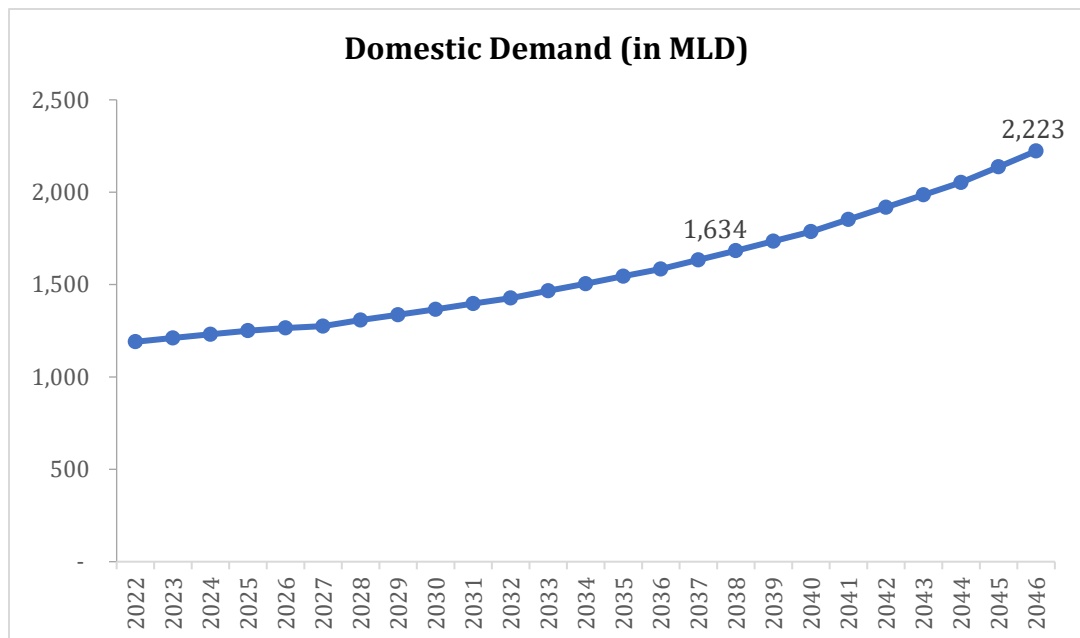


Figure 2.1: Domestic Demand Projection until 2046

2. Non-Domestic Demand Forecasts

For the non-domestic demand forecast, Maynilad also adopted the recommendation of the 2021 Water Demand Study to use the Industry-projected/Modified Realistic scenario for years 2022 to 2027, and to shift to spatial demand forecast from 2028 to 2046. The Industry-projected/Modified Realistic forecast is based on the assumption that the recession caused by the pandemic will return to business-as-usual by 2024, and that LPBA levels will return to levels seen in 2019 by 2024.

Figure 2.2 shows Maynilad's non-domestic demand projection for years 2022 to 2046.

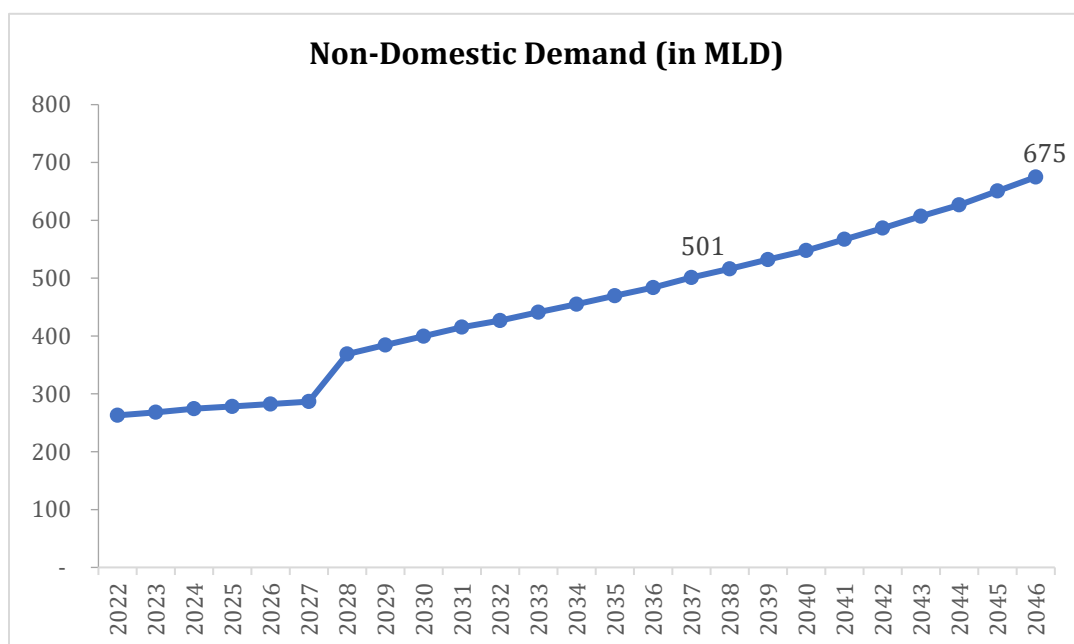


Figure 2.2: Non-Domestic Demand Projection until 2046

3. Total Water Demand Forecast

The total water demand is the sum of the domestic and non-domestic demand, presented in Figures 2.1 and 2.2.

Maynilad's total water demand projection is shown in Figure 2.3.

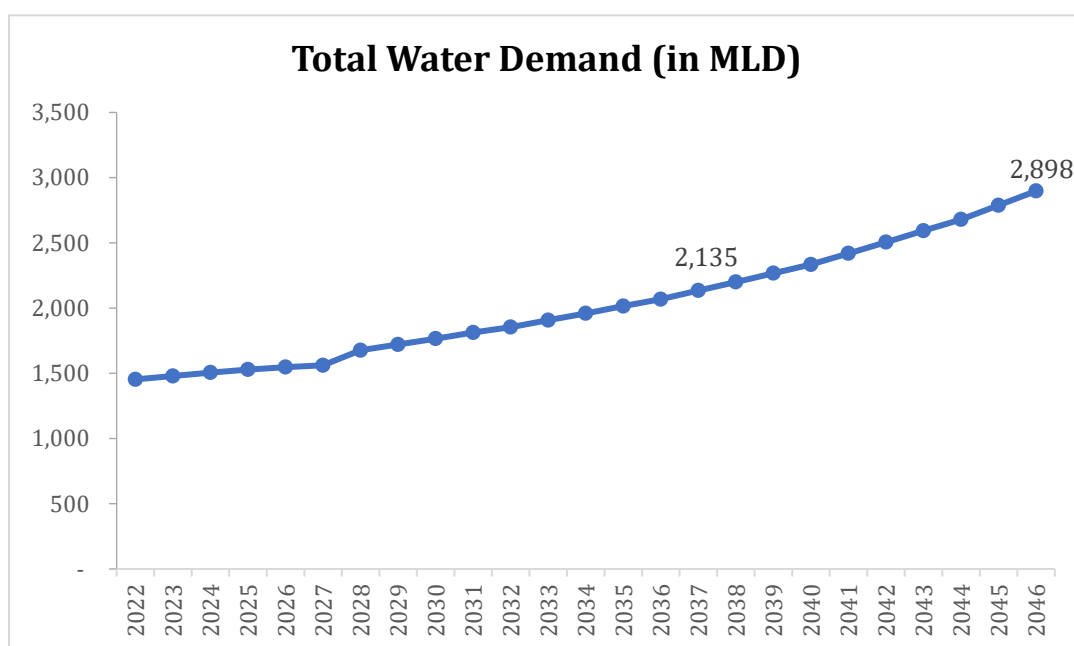


Figure 2.3: Total Water Demand Projection until 2046

II. Supply

Total Water Supply Requirement = Domestic + Non-Domestic + Total NRW

Year	2023	2024	2025	2026	2027	2031	2036	2041	2046
Water Demand	1,477	1,505	1,529	1,547	1,561	1,812	2,068	2,420	2,898
Total NRW	1,069	964	780	645	528	453	517	605	724
Total Supply Requirement (MLD)	2,546	2,469	2,308	2,192	2,089	2,266	2,585	3,025	3,622

Table 2.5: Total Water Supply Requirement

A. Supply Design Factor

To ensure water security of the Company's customers, the supply requirement was determined by adding 15% to the total supply or by multiplying the total supply by 1.15. This additional 1.15x is a design factor that adds an amount of supply that will mitigate (i) the impact of the Maximum Daily Demand ("MDD") or "weekend" water demand spikes in service levels, and (ii) losses in the headworks.

Another objective of the supply design factor is to be able to provide the customers with consistent service levels in terms of water supply availability

and pressure. In district metered areas (“**DMAs**”), a 15% increase in the weekend demand is very evident compared to the weekday demand (i.e., Monday to Friday). The 15% MDD was agreed upon during the water source roadmap workshop with the MWSS in November 2017.

Year	2023	2024	2025	2026	2027	2031	2036	2041	2046
Total Supply Requirement	2546	2469	2308	2192	2089	2266	2585	3025	3622
15% Design Factor	382	370	346	329	313	340	388	454	543
Total Supply Requirement with Design Factor (MLD)	2928	2839	2655	2521	2402	2605	2972	3478	4165

Table 2.6: Total Water Supply Requirement with 15% Design Factor

B. Existing Water Production Capacity

The Company has four WTPs. These are the La Mesa Treatment Plants (“**LMTP**”) 1 and 2, and Putatan WTP 1 and 2. LMTP 1 and 2 draw 60% of the raw water releases from Ipo/Angat Dam, and can produce 1,500 MLD and 900 MLD of potable water, respectively. Putatan WTP 1 and 2 extract raw water from Laguna Lake, and can each produce 150 MLD of potable water.

C. Total Supply Requirement and Production Capacity

To meet the water supply needs in the coming years, it is important to know when a new water source should be developed. This can be anticipated using a Total Supply Requirement and Plant Production Capacity Gap Analysis. In the 2016 Water Demand Study, two supply requirements were considered – first, without a design factor, and second, with the 15% design factor on top of the supply requirement.

Figures 2.4 and 2.5 below show the supply and demand gaps, under each of the two supply requirements.

Figure 2.4 shows the Supply Requirement vs. Production Capacity gap without considering the design factor. If no additional requirement other than the demand is considered, a new water source and new water treatment facility will be required by 2036, and NRW recovery will help augment the supply requirement as the target NRW in 2031 is 20%.

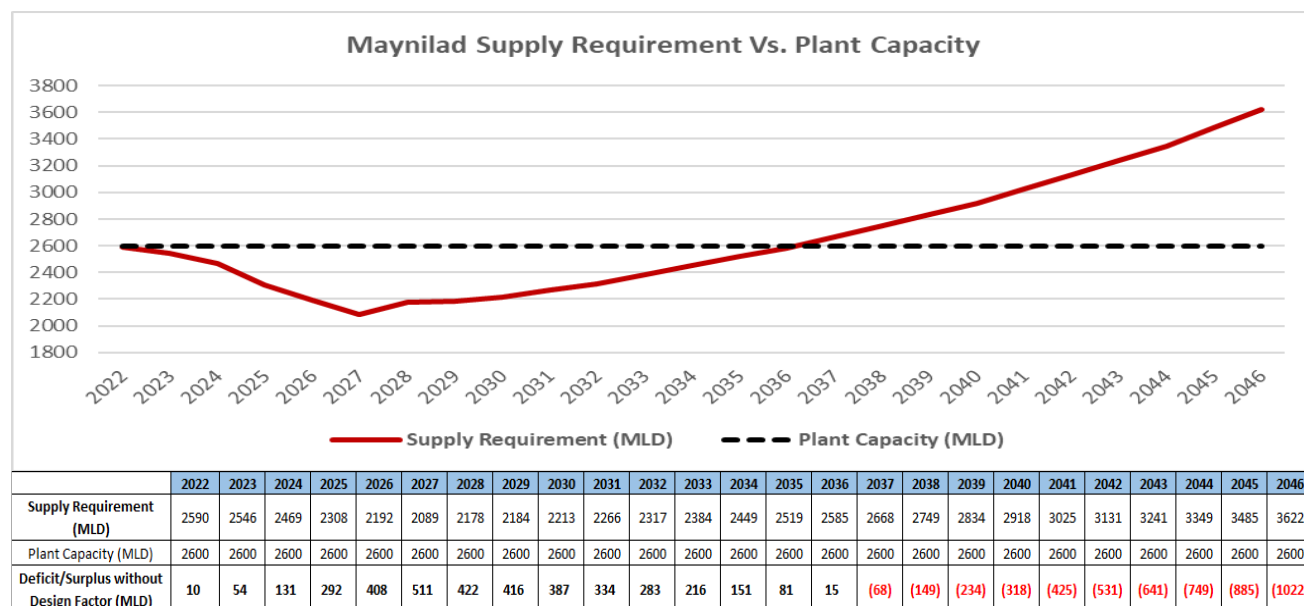
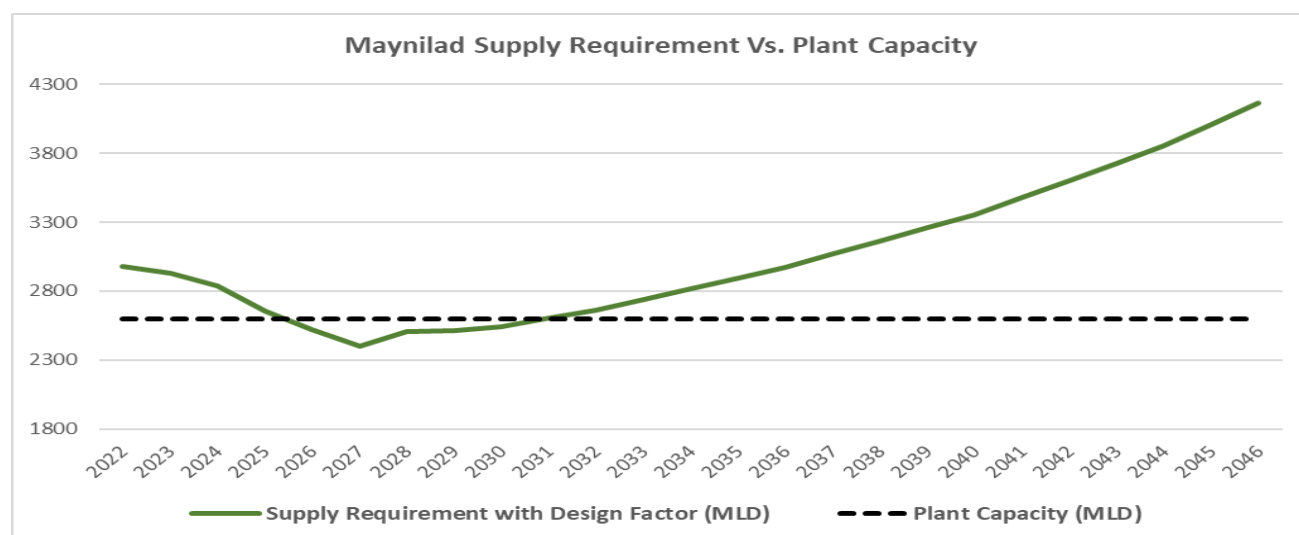


Figure 2.4: Supply Requirement vs. Plant Production Capacity Gap without Design Factor

Figure 2.5 shows the Supply Requirement vs. Plant Capacity gap with the 15% Design Factor added to the forecast water demand. The graph shows a supply deficit between 2022 to 2025. To partly address this, Maynilad is undertaking the construction of a 150MLD WTP in Poblacion, Muntinlupa. Once completed in 2024, the deficit will be reduced to 89MLD from the estimated 239MLD. Kaliwa Dam, the MWSS-led new water source development project, is expected to fully address the supply deficit. Based on MWSS's projections, the dam will be completed by 2028. Maynilad is constructing small-scale water treatment plants as reliability supply for use during unavailability of water supply from the major water treatment plants.



	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046
Supply Requirement with Design Factor (MLD)	2979	2928	2839	2655	2521	2402	2505	2511	2545	2605	2665	2742	2817	2896	2972	3069	3162	3259	3355	3478	3601	3727	3851	4007	4165
Plant Capacity (MLD)	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600
Deficit/Surplus with Design Factor (MLD)	(379)	(328)	(239)	(55)	79	198	95	89	55	(5)	(65)	(142)	(217)	(296)	(372)	(469)	(562)	(659)	(755)	(878)	(1001)	(1127)	(1251)	(1407)	(1565)

Figure 2.5: Supply Requirement vs. Plant Production Capacity Gap with 15% Design Factor

Chapter 3 Plans for Water

I. Water Sources

A. Existing Water Sources

The Concessionaires draw their raw water supply from the Angat and Ipo Dams, the water of which comes from the Umiray, Angat and Ipo Rivers.

Angat Dam is a multi-purpose dam operated by the Angat Hydro Power Corporation – a subsidiary of Korea Water Resources Corporation (K-Water). Water from this facility is used for irrigation, power generation, and domestic consumption.

Completed in 1984, Ipo Dam is a reinforced concrete dam structure with spillway gates, all of which are floodgates used to control the water level in the dam. Ipo Dam has a maximum elevation of 101 m., a height of 32 m., and a designed holding capacity of 6,000 million liters (“ML”). However, the current holding capacity is already reduced due to siltation resulting from activities within its watershed, such as illegal logging, slash and burn, charcoal making and the like, being undertaken by informal settlers.

MWSS has water rights to 4,000 MLD from Angat Dam. Under the Concession Agreement, 60% of the MWSS water allocation goes to Maynilad, and the remaining 40% goes to Manila Water. Table 3.1 below details the raw water allocation of both Concessionaires

Concessionaires	Volume (in MLD)	Percentage (%)
Maynilad (West Zone)	2,400	60
Manila Water (East Zone)	1,600	40
Total	4,000	100

Table 3.1: Raw Water Allocation per Concessionaire

The Company sources 88% of its total water supply from the Umiray, Angat and Ipo Rivers, and 12% from Laguna Lake. The remaining supply (0.2%) comes from groundwater sources. The largest lake in the Philippines, Laguna Lake, has a watershed that cuts across five provinces, nine cities, and 66 municipalities, including parts of Metro Manila. It has 21 major river tributaries and a single outlet into Manila Bay through the Napindan Channel. Its surface area is 900 sq. kms, and has a volume of 2.25 million cubic meters (“MCM”) (or 2,250 ML).

B. Water Sources Deficiency

With the population of Metro Manila steadily growing, there is a need to develop additional water sources in the coming years. Challenges to water security are multi-faceted and come from many factors, such as, but not limited to, the following:

1. Continuing degradation of the Ipo Watershed that affects dam management and raw water quality, particularly turbidity;
2. Unpredictable water quality of Laguna Lake;
3. Back flow of salt water from Manila Bay to Laguna Lake which results in high Total Dissolved Solids (“TDS”) and pollution associated with industrial waste;
4. Occurrence of sudden spikes in algae count and high turbidity;
5. Extreme climatic changes due to La Niña and El Niño phenomena;
6. Siltation in Ipo and Angat Dams;
7. Maintenance of old aqueducts and tunnels; and
8. ROW security along the aqueducts.

The foregoing factors have a direct impact on raw water quality and therefore affect Maynilad’s operations, hence, the need to strategically address them. For reference, high algal count (manifested in 2019 and 2021) and high turbidity in Laguna Lake are shown in the Figure 3.1 below.

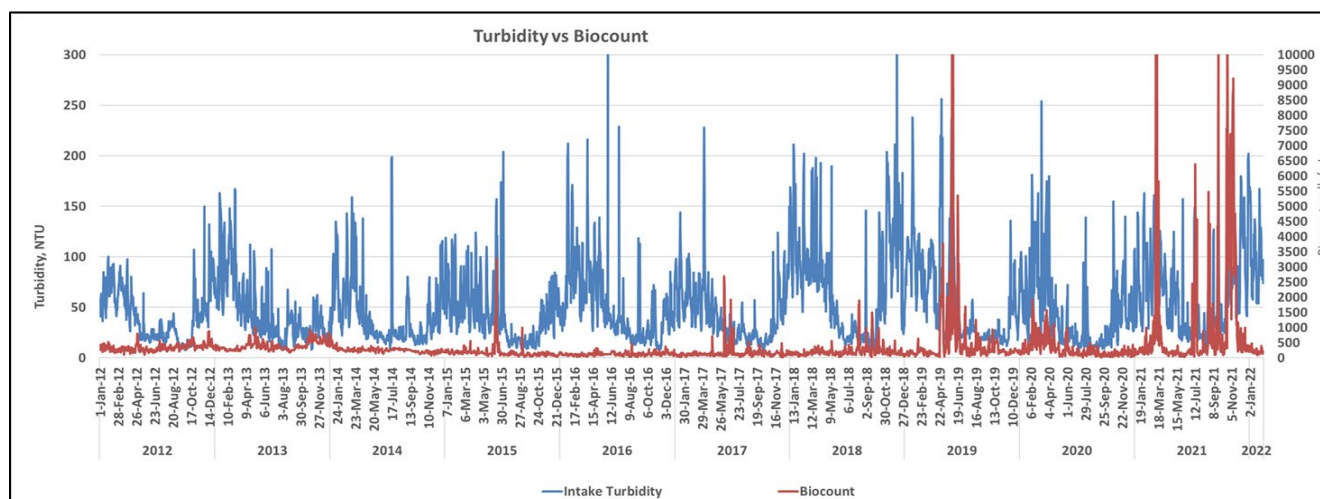


Figure 3.1: Turbidity and Algal Count in Laguna Lake

C. Future Plan for Water Sources

1. Rehabilitation of Water Sources

Raw water from the Umiray River is delivered to Angat Dam through the 14.5-km. Umiray-Angat tunnel with a diameter of 4.3 m. From Angat Dam, raw water may be conveyed through an auxiliary tunnel, the auxiliary by-pass units, and/or the low-level outlet (“LLO”), which will eventually pass through the river down to Ipo Dam.

Water from Ipo Dam is conveyed to the Bigte basins facility through four tunnels, each extending 6.4 kms. The basins are interconnected to allow flexibility of operations, as the need arises, for the isolation of an aqueduct. From the Bigte basins, water is conveyed to the Novaliches Portal (“Portal”) through the six Bigte-Novaliches Aqueducts (“BNAQ”). Each of the BNAQs is 15 to 16.5 kms long. From the Portal, 60% of the water is delivered to Maynilad’s LMTP 1 and 2 through their respective open channels.

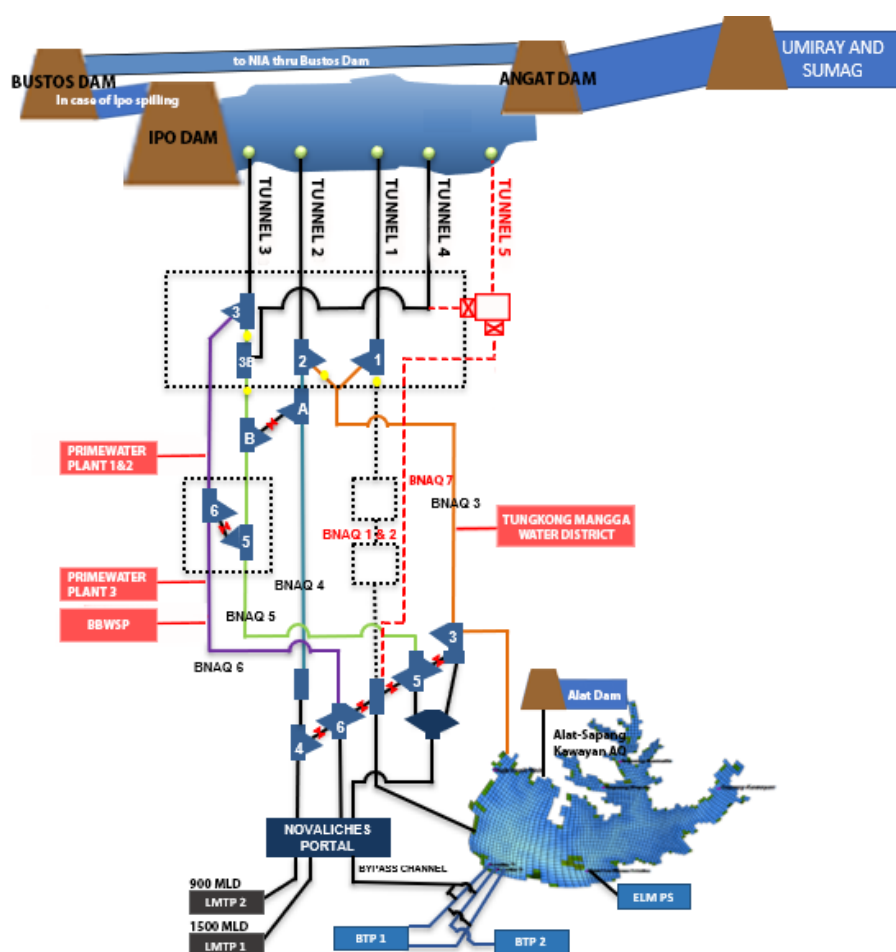


Figure 3.2: Configuration of Raw Water Transmission System

The Concessionaires, through the Common Purpose Facilities (“CPF”), are currently undertaking rehabilitation projects relating to Angat, and Ipo to increase their reliability and address their deficiencies. Some of these projects are the (i) the rehabilitation of BNAQ 4 and 5, (ii) protection of exposed aqueducts and rehabilitation of damaged blow-offs, (iii) slope protection along the Ipo access road, (iv) feasibility study for Angat Raw Water Reliability project, and (v) design and build contract for CPF forecasting, network communications and instrumentation project. There are also future additional conveyances such as Tunnel no. 5 and BNAQ no. 7 to improve raw water conveyance efficiency and to provide operational flexibility when existing tunnels and aqueducts need to be repaired and/or rehabilitated.

To improve Laguna Lake’s raw water quality, the Company will also undertake (i) mini-dredging, and (ii) the installation of a silt curtain before the intake of the Putatan WTPs.

2. Alternative Long-Term Water Sources for Metro Manila

Based on the 2021 Water Demand Study, the current production capacity of 2,600 MLD, and the additional 150MLD that will come from the new Poblacion WTP, will bring about a total of 2,750 MLD. This can sustain the water demand for the West Zone only until 2030, with the 15% design factor on top of the supply requirement.

However, seismic events and extreme climatic changes brought about by global warming pose significant risks to water supply. Given that (i) climate change is now the new norm, and (ii) the age of Angat Dam and its vulnerability to geological hazards is increasing, there is a need to develop a new water source and new water treatment plant(s) to provide a buffer supply.

The New Centennial Water Source - Kaliwa Dam Project (“**Kaliwa Dam Project**”), under the auspices of the MWSS, is being developed as a future water source. The Kaliwa Dam Project, with a yield of 600 MLD, will be the initial phase of an Integrated Laiban-Kaliwa Dam Project, with a total combined capacity of 2,400MLD. The yield from this future water source will be equally allocated between the Concessionaires. Maynilad will receive 300MLD raw water allocation through the construction of the 300MLD Teresa Water Treatment Plant and its conveyance line of 2.2 meter diameter pipe with a total length of around 50 kilometers to distribute supply to the Maynilad concession area. Other water sources that will contribute to the reliability of water supply for Maynilad include the New Water Water Treatment Plants (“**New Water**”) in Parañaque Pasay and Cupang with a total of 90MLD production capacity and Modular Water Treatment Plants (“**MTP**”) in Ligas and Molino with a total of 24MLD production capacity

II. Water Treatment Plants

A. LMTP 1 and 2

1. Capacities

The LMTPs have a combined production capacity of 2,400 MLD. LMTP 1 has a design capacity of 1,500 MLD, while LMTP 2 has 900 MLD. LMTP 1 and 2 are manually operated with central monitoring control rooms for the chemical dosing systems. Other processes are also manually operated. LMTP 1 and 2 are being upgraded to use a Supervisory Control and Data Acquisition (“SCADA”) system to enable the Company, among other things, to effectively monitor and control the water quality, tank levels, valves, and chemical pumps.

2. Treatment Processes

While both plants apply basic water treatment principles like coagulation, filtration, and disinfection, each one follows a different treatment process flow. LMTP 1 is a standard flocculation-settlement-rapid gravity filter plant that was commissioned in 1982. On the other hand, LMTP 2 is a pulsator-clarifier filter plant that uses modern vacuum process technology. It was commissioned in 1995. The treatment processes of LMTP 1 and 2 are shown in Figures 3.3 and 3.4, respectively, and discussed in detail below.

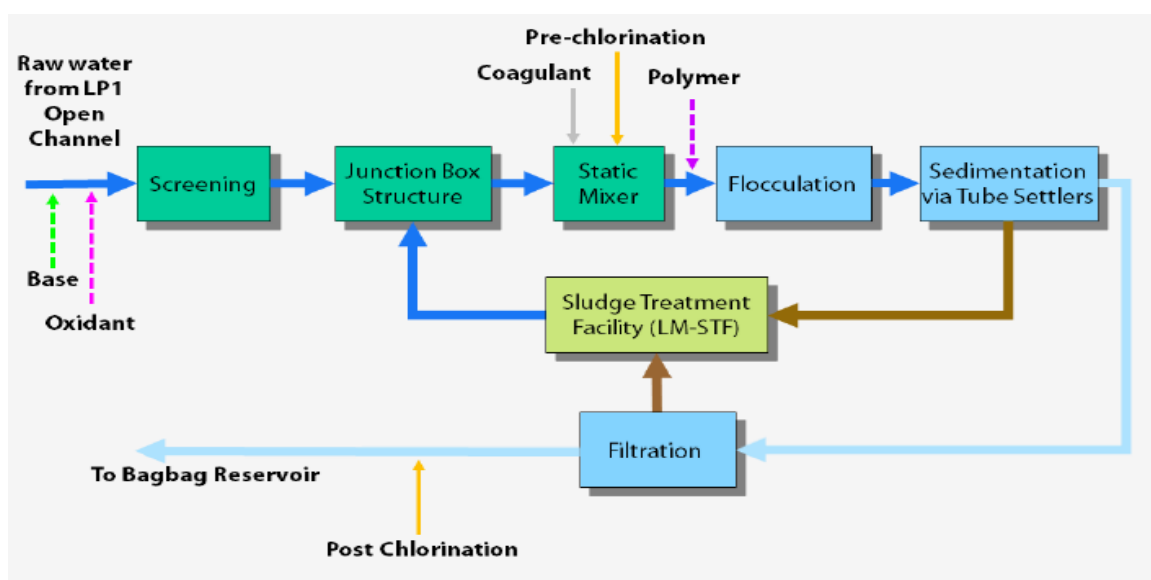


Figure 3.3: Process Flow of LMTP 1

(a) LMTP Treatment Processes

- (i) Screening – raw water enters the plant through screens that prevent the entry of foreign objects (i.e., grass, leaves, tree limbs, and other large floating objects). These screens protect the rapid mixers, flocculators, and flow meter sensors from damage. An automated mechanical raking machine is in place to ensure regular de-clogging of screens.
- (ii) Coagulation – coagulants added to the raw water react with the impurities to form precipitates called “flocs”. Other undesirable suspended particles in raw water attach to these flocs forming clusters.
- (iii) Flocculation – polymer is added to the coagulated water then mixed gently to enhance further agglomeration of the flocs into bigger and heavier particles until they become too heavy to float and begin to sink (settle).
- (iv) Sedimentation – flocculated water then enters the settling basins where heavy flocs settle at the bottom of the basin as sludge, which are periodically removed from the basin bottom. Clarified water enters the troughs, called launders, near the top of the basins.
- (v) Filtration – final purification of water is done by gravity filtration through 24 dual-media filters – 12 in the northern half, and 12 in the southern half of the plant. Each dual-media filter consists of a layer of anthracite coal on top of a layer of sand.
- (vi) Disinfection – chlorine is applied to the purified water and residual chlorine ranging from 1.0 to 1.3 parts per million (ppm) is maintained before it leaves the plant.
- (vii) Recovery lagoon – this is where the sludge from sedimentation and filtration are transferred. Excess water from the recovery lagoon is mixed with raw water passing through the junction box structure for coagulation.

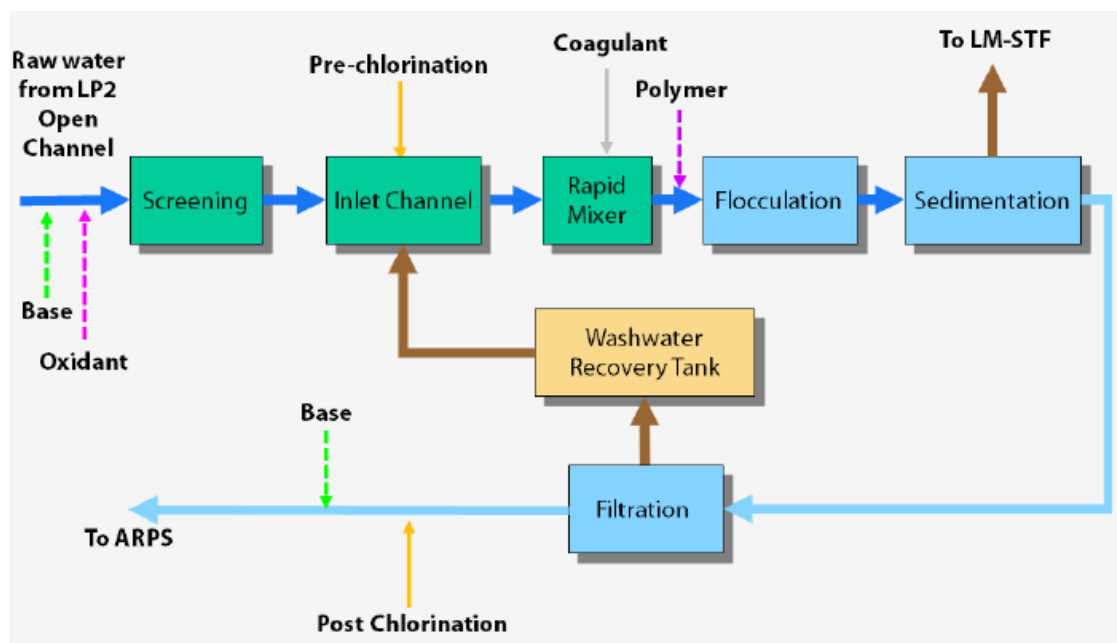


Figure 3.4: Process Flow of LMTP 2

(b) LMTP2 - Pulsator-Clarifier

LMTP 2 follows the same screening and coagulation process as LMTP 1. However, when it comes to flocculation, LMTP 2 uses a pulsator-clarifier for the removal of flocs and other impurities from the water. This is equivalent to the flocculation and sedimentation process of LMTP 1. As part of the process improvement, the pulsator clarifier will be modified to conventional sedimentation with tubular settlers. After clarification, water undergoes the same filtration through 20 single media rapid gravity sand filters and disinfection procedures and standards as LMTP 1.

3. Deficiencies of the Plants

The LMTPs have become extremely sensitive to varying raw water quality brought about by upstream deforestation over the years. Turbidity is considered as a major water quality parameter of interest to both plants. Thus, a more reliable chemical dosing facility is needed to ensure optimum coagulation of the suspended solids. At the height of the El Niño Phenomenon in 2014, raw water quality was poor, as evidenced by moderately high turbidity and abnormally high Manganese (“**Mn**”) content. During the 2010 El Niño, when the Angat Dam level went down, the CPF had to draw through the LLO of Angat Dam where heavy siltation was observed. These events all contributed to the discoloration of the treated water supplied to some parts of the LMTPs’ influence area.

High turbidity, high Mn, and the discharge of raw water through the LLO may recur and pose problems during El Niño season. Conversely, the “Habagat” season of 2012 also caused high turbidity in the raw water for several days. This high turbidity, which was carried by the tributary rivers of Ipo Dam, was a direct result of the denudation of the Ipo Watershed. Because the LMTPs were not designed to treat raw water with high turbidity, this forced the WTP’s to reduce their average daily production to comply with the PNSDW.

4. Asset Management of the Plants

Because the plants are currently undergoing rehabilitation and upgrading works, costs related to asset management are focused on upgrading the maintenance tools to increase their life and operational efficiency.

5. Plans for the Treatment Plants

To further improve the water quality output of the LMTPs, the Company will, in the next five years, do the following:

(a) Improve the operation of the following:

(i) Coagulation Control

The coagulant and flocculant dosing levels are normally changed four times a day. The frequency may increase when turbidity levels go up, which usually happen during inclement weather. The control of coagulant and flocculant dosing is important, because excessive coagulant dosing leads to higher treatment costs, public health risks, and lower operational efficiency. Conversely, under-dosing could result in failure to meet the required drinking water quality standards. If a flexible and reliable automation system coagulant and flocculant dosing is adopted, operator involvement will be reduced, thereby addressing the operational risk of coagulant or flocculant overdosing or under-dosing.

(ii) Sedimentation Process

During events of high raw water turbidity, the limitation in the retention time of water in the sedimentation basin affects the treatment capability of the LMTP 1 and 2. This shortens the filter-run operation, which reduces the efficiency of plant operations. Improvement of this process by using tubular settlers will increase the capability to settle large amounts of particles (sludge), thus, improving the quality of water to be filtered. Installation of bottom scrapers for LMTP-1 and sludge suckers for LMTP-2 will ease the maintenance of

the sedimentation basins (removal of sludge) and reduce water losses, both in draining and usage for cleaning.

(iii) Filtration Process

To enhance the LMTPs filtration processes, Maynilad will implement filter upgrades to the LMPTS as follows:

LMTP-1

- Process automation
- Replacement of filter media (anthracite and silica sand)
- Installation of underdrain and removal of gravel
- Upgrading from surface wash to scour air system
- To improve backwashing process
- Replacement of sluice gates

LMTP-2

- Process automation
- Replacement of filter nozzles and silica sand
- Replacement of butterfly valves and sluice gates
- Replacement of backwash water pumps and scour air blowers

Filter Backwash Control

Sand filters are backwashed manually and can last up to three days between washes. In order to wash a filter, the plant operators have to open and close several valves and start/stop the backwash and wash water recovery pumps. This is a time-consuming and laborious task. Filters at LMTP 1 and 2 are washed in strict rotation, unless changes in water quality output and filter performance become evident to the plant personnel. In this case, filters may be washed sooner than originally scheduled.

Once backwashing is automated, filters can be washed according to set parameters rather than personnel discretion. Aside from standardizing the volume of treated water used for this activity, automated filter backwashing may also result in reduced power consumption. Replenishment of the filter media is vital in the efficiency of the filtration. In addition, LMTP1 adopted the use of scour air together with water for backwashing to help conserve the volume of treated water used for the process.

(iv) SCADA

Shifting the operations of LMTP 1 and 2 from manual to a SCADA system will enable Maynilad to effectively monitor and control the

processes (filtration, clarification, backwashing, sludge extraction, recovery, chemical dosing, etc.), water quality, inflow and production, tank levels, valves, electro-mechanical equipment, and chemical pumps in these facilities. Various plant data/parameters (i.e., flows, motor current, temperatures, and water levels) can also be measured more accurately using this system in real-time. In case abnormal conditions are detected by the system, alarms can be triggered to notify the concerned personnel, so that appropriate action could be promptly taken.

(v) Sludge Processing Facility

Efficient sludge management plays a vital role in the water treatment process, especially during episodes of high turbidity. The proposed sludge processing facility will keep the sludge storage area of the sedimentation basins available, thus, making the process of sedimentation effective and efficient. Removal and treatment of sludge are legal requirements that need to be met.

- (b) Purchase of additional fuel tanks. This is to ensure the continuous operation of LMTP 1 and 2, particularly during periods of extended power outages; and

Cause the conduct of regular audit of all treatment plants including processes and equipment with the end-in-view of (i) assessing operation and maintenance procedures, and (ii) identifying inefficiencies and improvement opportunities.

B. Putatan WTP 1 and 2

1. Capacities

The Putatan WTPs, with a total production capacity of 300 MLD, source their raw water supply from Laguna Lake. These facilities were designed to produce potable water using microfiltration and reverse osmosis (“RO”) processes when the TDS in the raw water exceeds 500 ppm.

2. Treatment Processes

The water treatment processes at PWTP 1 are as follows:

- (a) Aeration – air is circulated to volatilize the lake water that flows from the Laguna Lake intake to the forebay. This is done so that dissolved oxygen can be added to the water, and elements such as ammonia and

other taste and odor-producing substances can be removed from the raw water.

- (b) Coagulation and Flocculation Dissolved Air Flotation ("**DAF**") – coagulant is added to the raw water while being pumped into the DAF tanks. This is where water, mixed with coagulant, binds with suspended solids, algae, silt, and metals to form large particles or clusters called flocs. Air is thereafter injected by the saturator into the mixture to form bubbles and make the flocs float.
- (c) Skimming – the floating flocs become sludge and are skimmed from the water's surface. Solids that settle at the bottom are likewise scraped off. These sludges are then sent to the decanter where polymer is added to enhance the formation of dewatered sludge.
- (d) Biological Aerated Filter ("**BAF**") - the BAF has a two to three-meter deep bed of relatively small sized filter media to provide a high surface area on which to grow a biomass. The filter bed is submerged through a downward flow of water. A blower sends air through a diffuser at the bottom of the bed, which generates bubbles that rise through the filter providing a steady stream of oxygen for the biomass to support the oxidation process. Trapped solids and a growing biomass gradually block the filter pathways, and these obstructions are cleared from time-to-time by air-scouring or back-washing with treated effluent. The waste backwash water then passes through a Sludge Treatment Facility ("**STF**").
- (e) Ultrafiltration ("**UF**") – a chemical is added to the product of DAF to eliminate Mn and some components that contribute to taste and odor problems. Water then goes to the pre-treated water tanks to provide retention and enough reaction between these components and the chemical. After the retention, water is pumped through strainers to acquire preliminary filtration, and then into UF trains that use high pressure filtration through a semi-permeable membrane in which colloidal particles, viruses, and larger molecules are retained, while the small-sized solutes and solvents are forced to move across the membrane by hydrostatic pressure. The backwash water used for regular cleaning of UF is recovered and passes through a STF.
- (f) **RO** – dissolved substances in the water are removed as pressure is used to pass the water through semi-permeable membranes in the RO process.

- (g) Chlorination – adding chlorine ensures disinfection of the water before it is stored in a reservoir. If necessary, treated water is further chlorinated before it is distributed to the customers.

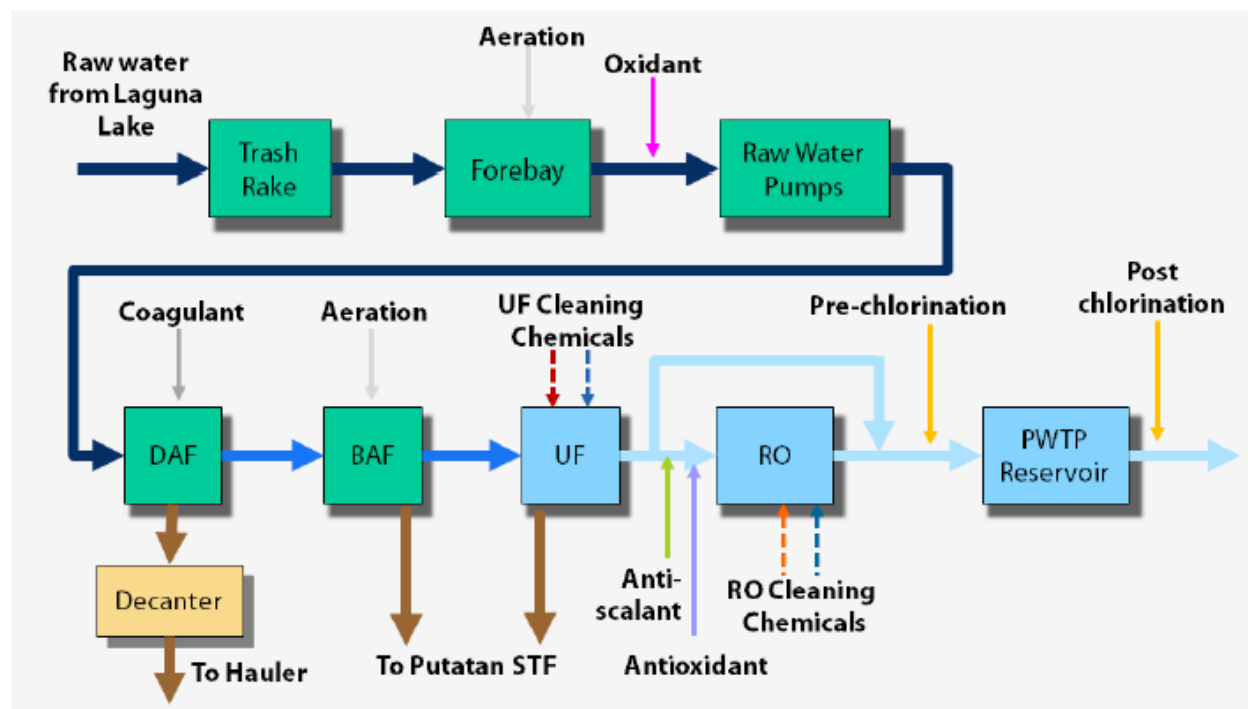


Figure 3.5: Process Flow of PWTP 1

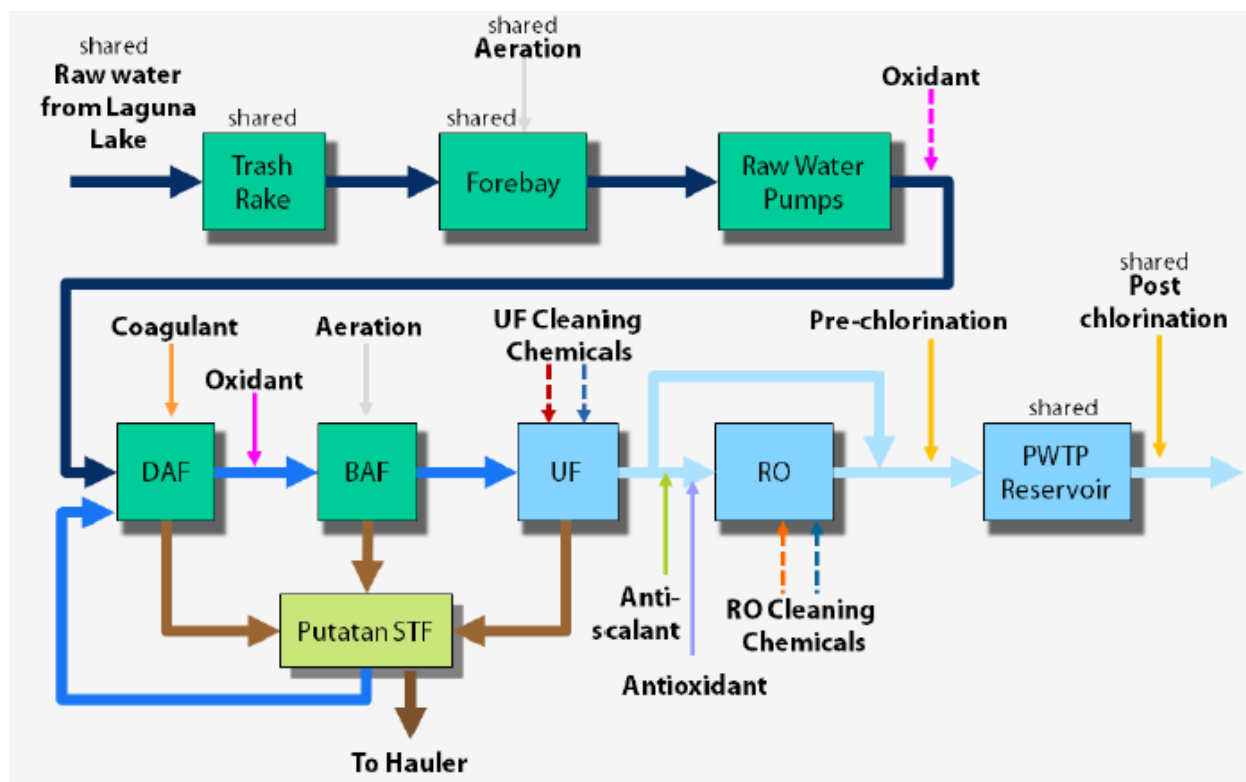


Figure 3.6: Process Flow of PWTP 2

3. Operation of RO Units

Putatan WTP treats the water from Laguna Lake. The lake water is brackish and includes high levels of TDS, ammonia, algae, and heavy metals. The RO units of PWTP 1 are operated when the TDS of the raw water is more than 500 ppm, and the presence of ammonia and algae is detected. This typically occurs during the summer months.

4. Deficiencies of PWTP 1

During its initial stage of operations, Putatan WTP 1 encountered high chlorine demand and an odor-related problem that was reportedly caused by ammonia and algae in the lake water. This was addressed by the installation of the BAF, and the staggered dosing of potassium permanganate before the BAF, to reduce ammonia concentration as well as organic matters causing taste and odor.

The Company also experienced high turbidity of the raw water, especially during the “Amihan” season. To resolve the situation, the Company adopted the recommendations of its consultant to install baffles at the intake structure

to increase retention time, which reduced the turbidity level before entering the WTP.

To monitor and control the effect of the varying raw water quality, there is a need to conduct a series of studies on Laguna Lake. The lake is affected not only by domestic wastewater, but also by industrial and agricultural wastewater, including wastes from aqua-farming in the lake. Reportedly, domestic discharges to the lake account for 30% of the pollution load, while industrial and agricultural discharges account for 30% and 40%, respectively. This means that the raw water from Laguna Lake could be contaminated by heavy metals, agri-chemicals, environmental hormones, and other harmful substances.

In addition to polluting substances, Laguna Lake is also subject to varying salinity, which adds to the complexity of water treatment at the Putatan WTPs. In sum, the issues relating to the raw water quality at the Putatan WTPs are the (i) large concentration of TDS, algae, and ammonia, and (ii) possible contamination due to the harmful substances contained in industrial and agricultural discharges.

5. Plans for Putatan WTP 1 and 2

To lessen raw water quality issues, the Company plans to do the following:

- (a) Regular dredging of the intake structure to prevent solids from getting into the system;
- (b) Daily cleaning of the UF/RO membranes to prevent membrane fouling;
- (c) Replacement of the membranes every five years or on a per need basis to maintain good filtration and efficiency;
- (d) Conduct of a feasibility study for Laguna Lake to determine with more certainty when the changes in raw water quality occur and what triggers them, and to find solutions to pre-empt potential raw water quality issues;
- (e) Replenishment of media filters in the BAF to maintain good filtration;
- (f) Conduct of regular audit, including its processes and equipment. The regular plant audit on the treatment plant processes will continually improve the existing processes of the plant in terms of identifying possible hazards, impact to the environment, and the quality of the plant output;

- (g) Acquisition of ultrasonic algae-mitigation equipment with coverage of 500m/unit to prevent algal proliferation; and
- (h) Installation of a new silt curtain about 200m (in radius) from the inlet and dredging of the intake of Putatan. This new silt curtain will be used as a pre-treatment for the reduction of turbidity, algae and solids entering the intake.

III. Water Network

A. Existing Water Distribution System

The current water distribution network of Maynilad is a relatively old water system, consisting of 6,962 kms of pipelines ranging from 50-mm to 3200-mm, and made up of various materials, such as reinforced concrete, steel, cast iron, ACP, ductile iron, and PVC. The 574-km. primary distribution network (main backbone) translates to about 8% of the total length of the pipelines. The Figure 3.7 below shows the schematic diagram of the primary distribution network.

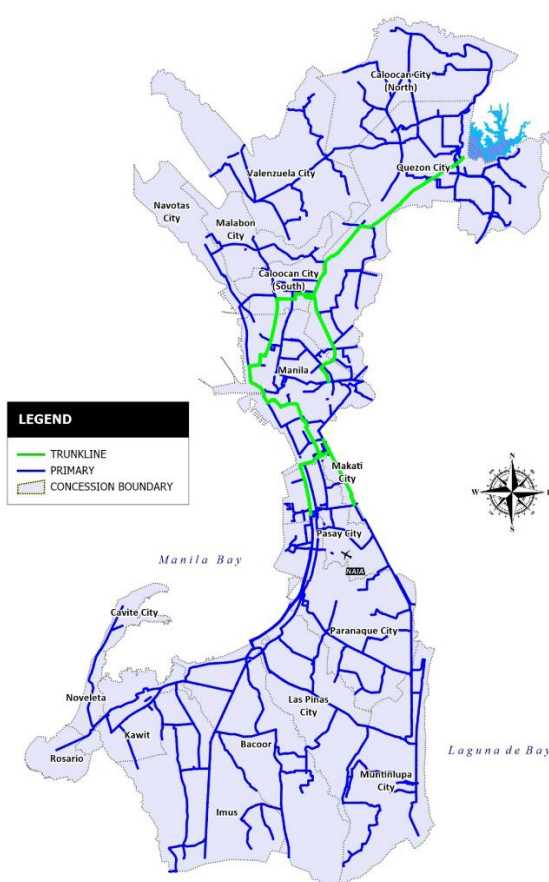


Figure 3.7: Schematic Diagram of Primary Network

The West Zone is divided into two districts: North and South. The North District is a combination of gravity and pump-fed distribution area because of its high elevation in North Caloocan, Valenzuela, Commonwealth and Novaliches. Large pumps in the La Mesa Pump Station boost the treated water to maintain service level.

The South District is basically a gravity-fed area where the supply comes from the 200ML Bagbag reservoir. Major pump stations like the Pagcor, Pasay, and Villamor Pump Stations boost the water to the southern-most portions of the concession in Pasay, Parañaque, Las Piñas, and Cavite. The Putatan WTP also supplies portions of Las Piñas and Muntinlupa through the Putatan water pump station.

Treated water produced by the WTPs, which is approximately 99% of the total supply, is distributed by gravity, by pumping, or a combination of both. For the pump-fed areas, it is distributed using 38 pump stations, 35 in-line booster stations, and 37 reservoirs with a total capacity of 750ML. Annex 3.1 shows the list of existing reservoirs, while Annex 3.2 shows the list of existing stations. All other areas covered by the concession that are not supplied with surface water are served by seven deep wells, which account for less than one percent of the total water supply. Annex 3.3 lists the seven active deep wells as well as other deep wells that are on standby and for turnover.

B. Appurtenances

Across the water distribution network, there are approximately 1,946 valves, which range from 350-mm to 3000-mm in size. These valves allow control and isolation of water flow during system adjustment, emergency, and pipeline dewatering. To maintain system design efficiency and provide system protection, 1,377 air valves are installed across the network. System design efficiency is maintained by venting air from the system as this restricts the flow of water, reduces water pressure, and increases pumping costs. Protection is provided by exhausting and admitting air during system operations including start-up, shutdown, and critical conditions (i.e., power failures and line breaks).

There are about 1,299 pressure-regulating valves (“**PRV**”) in the system, which are used to regulate the pressure in the network by giving enough pressure during peak demand, usually in the morning, and reducing it during non-peak demand, usually at nighttime. There are 1,561 pressure monitoring points (“**PMP**”) in the network, which are being used to check the service levels of each DMA, and also used to analyze the setting of the PRVs.

There are about 770 blow-off valves in the system. Blow-offs valves are primarily installed for dewatering and cleaning the system. Large diameter blow-offs (400-mm and above) require a direct outlet for clean-out with service gate valve and a regular dewatering outlet. Small diameter blow-offs (250-mm and below) are confined to a

single outlet. The blow-off outlet, which is laid near a drainage area or a creek, is installed in a tangential position at the bottom of the pipe

C. Central Control Monitoring (“CCM”)

CCM is the unit that is responsible for controlling all pumping stations in the distribution system. Emergency or abnormal situations in the hydraulic network can be detected through alarms in real-time, allowing the operators to react very quickly and send commands from the control room in order to minimize the impact of the problem, and, if necessary, deploy maintenance operators and technicians to the area of concern to address whatever the issue is. With the use of 1,420 permanent PMPs installed in the water distribution system, CCM can easily identify the location of areas experiencing low pressure to no water.

D. Deficiencies of the Present Water Distribution System

Efficient water distribution includes backup power during times of power interruptions which will affect the 38 pump stations and 35 in-line boosters. Most of the Company’s pump stations already have generator sets that can be used during power interruptions, but the challenge is how to ensure the 100% availability of the backup power.

Existing reservoirs are still not enough to cater to the requirements of the network during maintenance and water interruptions. Currently, the total reserve capacity of Maynilad is limited to 7.5 hours only versus the standard reserve capacity of 12 hours. The Company needs to construct more reservoirs to increase its reserve capacity by an additional two hours to have time for the maintenance team to resolve any problem in the network.

	Maynilad	EU Commission	US (Connecticut)
Reserve Capacity	7 hours and 30 Minutes	12 hours	24 hours

Table 3.2: Reserve Capacities of Maynilad and Other Utilities

Maynilad’s water distribution system is a combination of trunk lines and primary distribution lines. Trunk lines are pipes with a diameter ranging from 2000-mm to 3200-mm, while those measuring 350-mm to 1800-mm are considered primary distribution lines.

As of end of 2021, Maynilad has a total of almost 37 kms of trunk lines and 539 kms of primary pipelines from La Mesa, Fairview to the Cavite area. The network can supply potable water to the 1.5 million water service connections across the West Zone. The 576-km pipes are combinations of pre-stressed concrete cylinder pipes, steel pipes, ductile iron, cast iron, and high-density polyethylene pipes.

Currently, Maynilad has four WTPs, namely, LMTP 1 and 2, and Putatan WTP 1 and 2. To a certain extent, LMTP 1 and 2 can provide redundant water supply. However, redundancy is limited to particular areas within the influence areas of Putatan WTP, because of the configuration of the network. To optimize water supply network redundancy, the network of all WTPs should be interconnected to allow for supply flexibility. This way, in the event of a breakdown of any of the WTPs, water can be brought to the affected areas, because the lines are connected to one another.

Another deficiency pertains to the need of some pump stations to undergo rehabilitation and upgrading to improve structural resiliency. Periodic rehabilitation is also needed to ensure reliable and efficient operations.

E. Plans for the Water System

To address the issues and deficiencies discussed above, and to enable the Company to comply with its SOs, it will implement the following strategies, plans, and programs:

1. Increase the reliability of pump stations and in-line boosters

Procurement and replacement of new generator sets for various pump stations are necessary to ensure continuous operation during power interruptions, which also includes the replacement of drives in pump stations to ensure optimum operation.

2. Establish Water Distribution Flexibility

To provide flexibility, the Company plans to strategically interconnect the hydraulic systems (“HS”) to reduce supply disruptions during maintenance activities. The Company has included primary line supply flexibilities in its Capex line-up. For the sixth Rate Rebasing Period, the Company will give priority to primary pipe segments that will not require long pipelaying works to achieve supply flexibility.

3. Increased Supply Storage

The Company plans to put up additional reservoirs in areas currently experiencing low pressure during peak demand hours. These reservoirs will be used to store water during off-peak demand hours when water pressure is high, i.e., late at night or before daybreak. The stored water will then be released to accommodate additional demand during peak demand periods, while sustaining the required pressure. The reservoirs can also be used to address the MDD, and enhance network reliability, because stored water can be used during times of emergency and during network maintenance. One of

the big projects in terms of additional reserved capacity is the Bagbag 3rd cell and Parada reservoir which will give additional 140ML storage capacity

4. Increased Primary Network Reliability

The Company plans to re-assess the primary lines in order to increase their reliability in terms of possible breakage that might result in water interruptions that could affect a huge number of WSCs. The purposes of assessing the primary lines are to (i) be able to establish baseline information on the status of Maynilad trunk lines, (ii) include their life cycle cost and maintenance procedures, such as primary valve insertion, primary valve exercise, primary lines repainting, and primary valve calibration, and (iii) establish a guideline or matrix that will aid Maynilad in the assessment of pipe conditions, particularly, in determining whether a segment is subject for replacement or retrofitting.

5. Primary Pipeline Laying

To serve expansion areas in the West Zone and achieve the service coverage target, new primary pipelines need to be laid. The plan includes the installation of major pipelines to meet the demands of the growing population, especially in the southern part of the West Zone.

6. Rehabilitation/Refurbishment of Appurtenances

The Company continually refurbishes the primary appurtenances to ensure that they are always operable. This is to optimize the conversion of available water supply to billed volume, while minimizing losses in the form of leaks, which are directly proportional to water pressure (high leakage rate with high pressure). A valve management program will also be implemented to improve the control and distribution of water supply. Some of the projects included in this program are the investigation, refurbishment, exposure, relocation, and replacement of various valves along the distribution network.

7. Rehabilitation/Refurbishment of Appurtenances of Common Purpose Facilities

These projects include water source reliability and adaptation to climate change and are meant to (i) address raw water security by ensuring the availability of 48 CMS water supply at all times, (ii) address the need to develop additional future water sources, (iii) enhance operating efficiencies, (iv) optimize the operations of the raw water conveyance system, and (v) make existing assets more adaptable to climate change risks.

IV. Non-Revenue Water

A. Current NRW

Maynilad's Total and DMA NRW in 2021 were 45% and 31.8%, equivalent to 1,168 MLD and 667 MLD, respectively.

Total NRW is the difference between the volume of treated water produced by the plants and the volume of water billed to customers. It includes the losses in the primary distribution system ("PDS"), secondary and tertiary distribution system ("SDS/TDS"), and service connections up to the customer meters. This method of measurement has been used since 2018, with the commissioning of the outlet flow meters of LMTP 1 and 2.

DMA NRW is the difference between the volume of treated water that enters the DMA and the billed volume. It represents the losses in the SDS and TDS.

Figure 3.8 shows the annual Total and DMA NRW of Maynilad for the Subject Period.

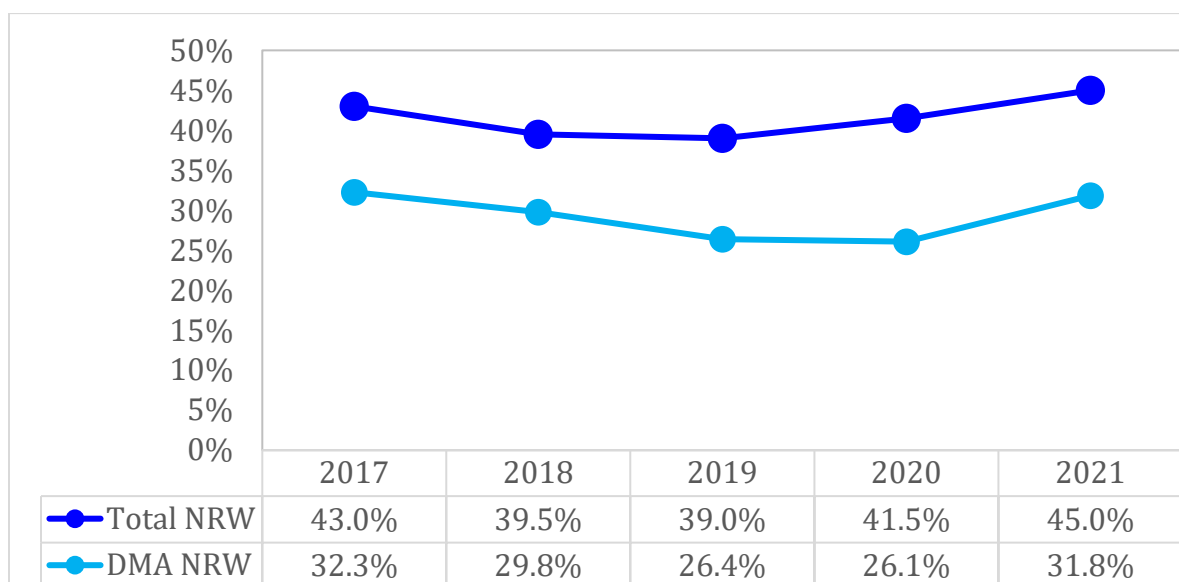


Figure 3.8: Annual Total and DMA NRW (2017 to 2021)

The Company's improvement in NRW was disrupted in 2020 and 2021 because of the reduction in Capex and due to the impact of the Covid-19 pandemic to operations. This resulted in the increase of both Total and DMA NRW.

B. NRW Strategy

Maynilad's NRW management strategy uses the DMA approach where the network is broken up into discrete and manageable areas. DMAs are small isolated areas where

the volumes of water entering and leaving the system are measured. Hydraulic systems (“HS”) are clusters of DMAs, including the primary lines.

Formation of DMAs and HS is necessary to quantify and distinguish the losses in the primary mains and secondary lines. This enables the Company to assess each system, identify the specific sources of NRW, and apply the necessary solutions to each problem.

As of the end of 2021, Maynilad has 1,626 DMAs and 156 HSs, covering the entire pipe network. Although 100% of the area has already been covered by DMAs since 2012, 37 additional DMAs were established from 2017 to 2021 as a result of service expansion and DMA-splitting.

DMAs are managed according to their performance using the International Water Association classification based on the prevailing water pressures and the volume of water lost for every connection. Type A DMAs are world class; Type B DMAs are good performing but still have potential for improvement; Type C DMAs are bad performing; while Type D DMAs are the worst performing DMAs. Table 3.3 shows the number of DMAs according to type.

DMA Type	Type A	Type B	Type C	Type D
Count of DMAs	496	224	294	612
%	31%	14%	18%	38%

Table 3.3: Classification of DMAs as of December 2021

Water balance is conducted for every DMA to determine the real and apparent components of water losses. Real losses are caused by leakages of pipes and facilities from the plant outlets to the customer meters. On the other hand, apparent losses are caused by meter inaccuracies, illegal connections, meter reading errors and data handling errors.

C. Active Leakage Control

Active leakage control is conducted to address real losses. It involves location and repair of surfacing and non-surfacing leaks. Surfacing leaks are usually reported by customers, while non-surfacing or underground leaks are located thru leak detection. Step testing is conducted to further divide the segments to allow for more efficient leak detection and pin-pointing. This is complemented by speedy and quality repair of leaks.

A total of 23,804 kilometers was covered by leak detection, and 24,905 leaks were detected inside DMAs from 2017 to 2021.

Leaks numbering 130,159 were repaired, including leaks reported by customers and employees from 2017 to 2021.

The annual accomplishments of leak detection teams in DMAs is summarized in Table 3.4, while the annual number of leaks repaired, including surfacing leaks, can be seen in Table 3.5.

Particulars	2017	2018	2019	2020	2021	2017-2021
Length Covered (kms)	4,926	5,273	5,471	4,139	3,995	23,804
Number of Leaks Detected	4,891	5,517	5,004	4,988	4,505	24,905

Table 3.4: Length of Pipes Covered and Number of Leaks Detected in the SDS/TDS (2017 to 2021)

Particulars	2017	2018	2019	2020	2021	2017-2021
Number of Leaks Repaired	26,792	21,382	28,683	22,719	30,583	130,159

Table 3.5: Number of Leaks Repaired in the SDS/TDS (2017 to 2021)

Active leakage control is also implemented to address real losses in the primary lines, or pipes with diameters bigger than 350 mm. The losses in the PDS can be quantified by getting the net flows of the flow meters supplying the HS and subtracting the flows of the DMAs within the same system. The computed losses are validated through physical water audit, which involves closing of all take-offs tapped at the primary segment that is being investigated. The leaks are located through the use of trunk main correlators and tethered leak detection system.

From 2017 to 2021, a total of 2,483 kms of PDS was inspected, detecting 416 leaks. Including reported leaks, Maynilad was able to repair 694 leaks in the primary lines.

Tables 3.6 and 3.7 show the annual output of PDS leak detection teams and the number of PDS leaks repaired, respectively.

Particulars	2017	2018	2019	2020	2021	2017-2021
Length Covered (kms)	416	521	526	506	514	2,483
Number of Leaks Detected	69	64	82	95	106	416

Table 3.6: Length of Pipes Covered and Number of Leaks Detected in the PDS (2017 to 2021)

Particulars	2017	2018	2019	2020	2021	2017-2021
Number of Leaks Repaired	128	104	139	157	166	694

Table 3.7: Number of Leaks Repaired in the PDS (2017 to 2021)

D. Selective Pipe Replacement

Selective replacement of identified segments of the network is another important aspect in Maynilad's strategy. Primary lines and distribution lines inside DMAs that have been diagnosed are prioritized based on the potential water recovery, frequency of bursts, age of pipes, maintenance cost and pipe materials (i.e., ACP and galvanized iron pipes ("GIP")). Rehabilitation may be total or partial, depending on the diagnosis and cost-benefit analysis. It includes replacement of mainlines, customer service pipes and water meters. It is only implemented when all diagnostic efforts have been exhausted. Properly executed selective pipe replacement projects address both physical and commercial NRW.

Using this approach, from 2017 to 2021, Maynilad was able to replace 1,154 kms of pipelines, equivalent to 25% of the 4,653 kilometers of pipes installed before 2007. This brought the percentage of old pipes replaced to 62%.

The annual length of pipes replaced from 2017 to 2021 can be seen in Table 3.8.

Particulars	2017	2018	2019	2020	2021	2017-2021
Length of Pipes Replaced (kms)	285	256	313	134	166	1,154

Table 3.8: Length of Pipes Replaced (2017 to 2021)

E. Meter Management

Maynilad's meter management program mainly focused on improving the accuracy and reliability of measurement of water consumption. It includes the periodic replacement of customer water meters, testing of meters, selection of the proper meter technology and correct sizing of meters.

Since 2008, the number of brands of meters has been reduced from 23 to three, resulting in better meter maintenance. Volumetric meters were introduced in 2013 for more accurate measurement. These meters also have a longer service life of 10 years, resulting in savings from replacement cost.

Maynilad currently implements a massive meter replacement ("MMR") program for customer meters. During the Subject Period, 413,741 small meters (those with

diameters ranging from 15 mm to 32 mm) and 2,984 large meters (meters with diameters of 40 mm and above) have been replaced.

The yearly number of meters replaced during the Subject Period can be seen in Table 3.9. The dip in quantity in 2020 was due to the deferment of the MMR activity because of reduced CAPEX and prioritization of essential CAPEX projects. The MMR program only resumed in the middle of 2021.

Particulars	2017	2018	2019	2020	2021	2017-2021
Number of small meters replaced	105,120	104,168	111,954	4,277	88,222	413,741
Number of large meters replaced	608	525	494	418	939	2,984

Table 3.9: Number of Customer Meters Replaced (2017 to 2021)

F. DMA Automation

Maynilad automated the process of gathering field data and monitoring to improve the efficiency of DMA management. This helps the NRW teams focus on DMAs with high NRW. Electromagnetic flow meters (“**EMF**”) are now used as district meters to ensure more accurate measurement of the system input volume. EMFs also have built-in loggers that record flow and pressure continuously. They are capable of transmitting the field data to the Telemetry server. PMPs installed at critical points of the DMAs are also equipped with loggers that are also sending pressure data.

Maynilad upgraded both the Telemetry database (called FieldMous) and the NRW management system (Netbase). Data required for NRW computation, such as flow and pressure, billing data from SAP, and asset data from the GIS database are consolidated into the NRW Management System for easier analysis. Among the benefits of DMA automation are better prioritization of job orders, faster reaction time, optimization of resources and improved safety of field employees.

G. Pressure Management

Pressure management is the most effective and efficient way of reducing leakage. It involves regulating the pressure thru the installation of pressure regulating valves (“**PRV**”) without compromising the service level. The general benefits of pressure management are elimination of unnecessary high pressures, reduction of background leakage, reduction of frequency of bursts and extended life of the pipe network. This helps in sustaining the NRW of DMAs that were already repaired or rehabilitated.

Maynilad has 1,262 PRVs, covering 91% of the DMAs as of December 2021.

H. Plans for NRW Management

The Company aims to reduce the Total NRW to 25% by 2027, and to 20% by 2030. The 20% level of NRW will be maintained until the end of the concession. The DMA NRW will be reduced to 20% by 2026 and will be maintained at 20% moving forward.

Figure 3.9 plots the target NRW values from 2021 until the end of the Concession in 2046.

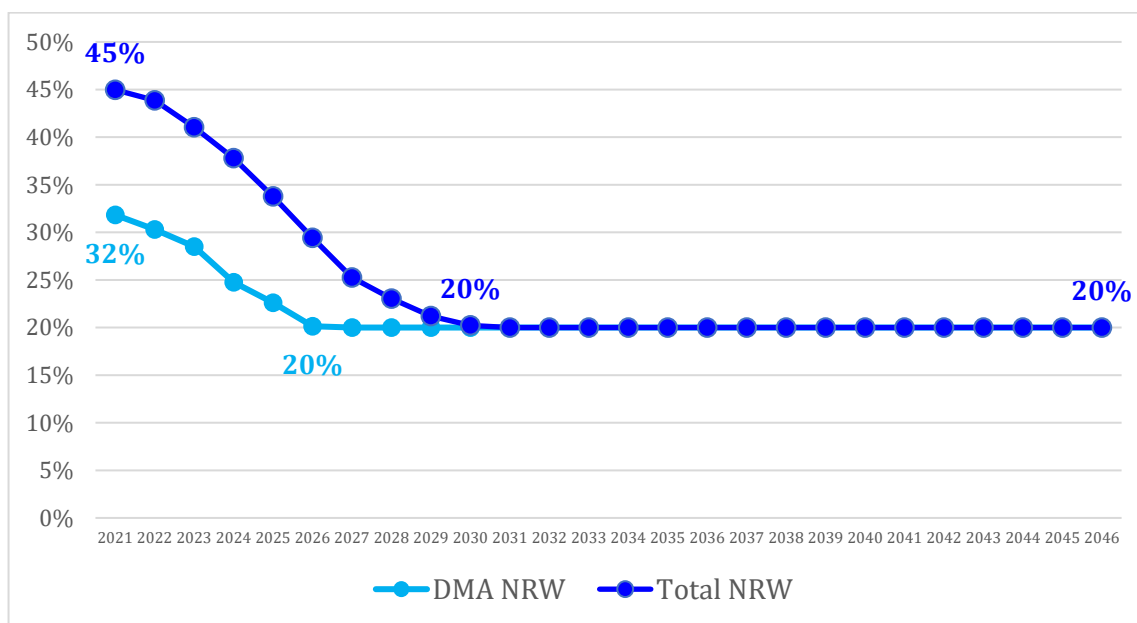


Figure 3.9: Annual Total and NRW Targets (2022 to 2046)

The Company plans to meet the targets by focusing on the following programs:

1. DMA splitting, diagnostic, and leak repair;
2. Meter management;
3. Purchase of leak detection equipment;
4. Selective pipe replacement; and
5. Primary line assessment and repair

Water that will be recovered from these activities will be re-allocated to achieve the target service level obligations and support the expansion program.

1. DMA Establishment, Diagnostic and Leak Repair

From 2023 to 2027, Maynilad plans to establish 185 DMAs. The new DMAs will be coming from future expansion areas, from conversion of DMAs with multiple inflows into single inflow, and from splitting of large DMAs into more manageable sizes. This will help in implementing more efficient pressure management schemes and active leakage control.

111,000 longitudinal repairs of main lines and service pipes will be implemented to reduce the NRW. 980 valves will be installed to enable the NRW teams to conduct step testing in DMAs with high NRW.

1,015 insertion points for the tethered leak detection equipment (“IT-JD7”) will be installed in selected segments of SDS/TDS where conventional leak detection methods are challenging to conduct. These IT-JD7 will serve as access points for the sensors. Aside from leaks, these will be used to detect illegal connections.

Additional works necessary to make the DMAs manageable will be implemented under this program. Installation of PRVs, PMPs and instrumentation boxes for PRVs are included in this program.

Table 3.10 summarizes the quantities under DMA establishment, diagnostic, and leak repair.

Particulars	Unit	2023	2024	2025	2026	2027	2023-2027
DMA Establishment/ Splitting	No. of DMAs	15	40	45	55	30	185
Leak Repair (CAPEX only)	No. of Repairs	24,000	24,000	24,000	24,000	15,000	111,000
Valve Installation	No. of Valves	220	220	220	220	100	980
Leak Detection Insertion Points (IT-JD7)	No. of IT-JD7	235	235	225	220	100	1,015
Installation of PMPs	No. of PMPs	136	40	45	55	30	306
Installation of PRVs	No. of PRVs	132	81	90	55	30	388
Installation of Instrumentation Boxes for PRVs	No. of I-boxes	11	10	10	3	3	37

Table 3.10: DMA Establishment, Diagnostics and Leak Repair (2023 to 2027)

2. Meter Management

Maynilad’s meter management program will ensure accurate flow measurement. Aside from measuring customer consumption, the program will also cover the measurement of plant production, flows in the PDS, flows in and out of major pump stations and reservoirs, and flows at the cross-border to

the East Zone. The meter management program includes the installation of non-mechanical meters, mechanical meters and other initiatives by the Integrated Meter Management Department.

(a) Non-Mechanical Meters

(i) Replacement of Flow Meters in DMAs

EMFs have been used in majority of the DMAs since 2012. The typical economic life of such meters is eight to 10 years. The replacement cycle started in 2022 and will continue in 2023 and 2024.

(ii) Replacement of Large Meters

The Company intends to increase the number of non-mechanical meters in customers from 120 to 2,325 by 2027 to improve the accuracy of measurement in top accounts with meter diameters of 40mm and larger.

(iii) Installation of Reservoir Meters

Maynilad aims to complete the inlet and outlet meters of major pump stations and reservoirs to help monitor and manage the efficiency of their operations. This will be used to address PDS NRW because the meters will help identify leaks inside those facilities. Nine locations were identified for installation from 2023 to 2027.

(iv) Replacement of Production Meters

Maynilad plans to replace and upgrade the flow meters that were included in the La Mesa Production and Transmission Flow Metering Project, which started in 2015 and was completed in 2017. It is composed of 17 meters at the plant inlets, outlets and at strategic locations inside the La Mesa compound up to the Bagbag Reservoir. This will ensure the accuracy of measurement of plant production and will help audit the efficiencies of the plants and the losses in the 3200-mm transmission line.

(b) Mechanical Meters

(i) Replacement of Flow Meters in DMAs

Ideally, all district meters should be electromagnetic to ensure the accuracy of the DMA supply. However, there are still locations where mechanical meters are currently the appropriate and more applicable type of meters. Maynilad intends to replace 240 of these mechanical district meters every two years until all are gradually replaced with non-mechanical meters.

(ii) Replacement of Large Meters

This program aims to periodically replace the meters of the remaining large customer accounts with mechanical meters that do not satisfy the criteria for non-mechanical meters. 844 replacements will be implemented in 2023 to 2028.

(iii) Replacement of Small Meters

Maynilad plans to sustain the on-going replacement cycle for small meters to ensure the accurate measurement of consumption of accounts with diameters smaller than 40mm. For the period 2023 to 2028, all meters will be installed with volumetric water meters. This type of meter is more accurate and has a longer service life compared to velocity meters.

(iv) Installation of New Fire Hydrant Meters

Maynilad started installing meters in the most frequently used fire hydrants in 2013 with the objective of accounting for the volume of water withdrawn. This helps fine-tune the figures for the unbilled consumption component of NRW in the water balance. As of 2021, there are 1,020 metered hydrants across the West Zone and Maynilad has included a provision for 100 hydrants for 2023 to 2027. Mechanical meters with a diameter of 75 mm will be installed under this program.

(v) Replacement of Existing Fire Hydrant Meters

Maynilad plans to replace the hydrant meters to maintain the accuracy of registration. The replacement cycle will be seven years based, on the level of consumption that these meters register.

(vi) Other Provisions

Maynilad aims to upgrade the technology that is being used in the meter test bench, mobile measurement and meter calibration. There is also a provision to test meters capable of drive-by automated meter reading, which became a necessity with the current pandemic situation.

The details of the Meter Management Program from 2023 to 2027 can be seen in Table 3.11.

Particulars	2023	2024	2025	2026	2027	2023-2027
Non-Mechanical Flow Meters	937	936	149	145	158	2,325
(i) Replacement of Flow Meters in DMAs	600	547	0	0	0	1,147
(ii) Replacement of Large Meters (40mm and up)	328	389	149	145	141	1,152
(iii) Installation of Reservoir Meters	9	0	0	0	0	9
(iv) Replacement of Production Meters	0	0	0	0	17	17
Mechanical Meters	165,816	160,675	78,146	68,222	66,048	538,907
(i) Replacement of Flow Meters for DMAs	80	50	50	50	10	240
Replacement of Large Meters (40mm and up)	169	169	169	169	168	844
(ii) Replacement of Small Meters (below 40mm)	165,397	160,286	77,757	67,833	65,700	536,973
<i>Volumetric Meters</i>	<i>146,125</i>	<i>160,286</i>	<i>77,757</i>	<i>67,833</i>	<i>65,700</i>	<i>517,701</i>
<i>Velocity Meters</i>	<i>19,272</i>	-	-	-	-	<i>19,272</i>
(iii) Installation of new fire hydrant meters	20	20	20	20	20	100
(iv) Replacement of old fire hydrant meters	150	150	150	150	150	750
Others	5	2,011	10,022	10,020	10,025	32,083
(i) GP/DMA permanent clamp-on meter	5	10	20	20	25	80
(ii) Replacement/ Technology Upgrade of Large Meter Test Bench	0	0	1	0	0	1
(iii) Replacement/	0	0	0	0	0	0

Technology Upgrade of Small Meter Test Bench						
(iv) Universal testing machine	0	1	0	0	0	1
(v) Mobile Calibration	0	0	1	0	0	1
(vi) New Meter Technology	0	2,000	10,000	10,000	10,000	32,000

Table 3.11: Meter Management (2023 to 2027)

3. Leak Detection Equipment

Active leakage control is a critical component of Maynilad's NRW strategy and it is highly reliant on the ability to detect and pinpoint non-surfacing leaks. In order to locate leaks more accurately, Maynilad's leak detection teams should have the most sophisticated leak sounding equipment and leak noise correlators. The new sets of equipment will replace the ageing existing sets and will include upgrades, such as improved sensor stability, improved leak sensitivity, improved image quality, internal corrosion investigation and integrated pipe wall assessment. Instruments for investigating large primary lines (>2000 mm) will also be purchased.

Maynilad also plans to replace the old unit Sahara Tethered Leak Detection System purchased in 2009, including the vehicle that carries the equipment to improve the performance of the team.

Table 3.12 shows the planned purchases of leak detection equipment from 2023 to 2027.

Particulars	2023	2024	2025	2026	2027	2023-2027
Sounding Equipment			2			2
Leak Noise Correlator for SDS/TDS			5	5	5	15
Leak Noise Correlator for PDS			1	3	1	5
In-line Tethered Leak Detection System for SDS/TDS				1		1
In-line Tethered Leak Detection System for PDS				1		1

Table 3.12: Leak Detection Equipment to be Purchased (2023 to 2027)

4. Selective Pipe Replacement in the SDS/TDS

Maynilad will continue its selective pipe replacement program for the SDS/TDS, comprising pipes with diameters of 300mm to 75mm. This program includes three types of projects, namely: (i) replacement of ACP lines, (ii) standardization of GIP temfacil lines, and (iii) full and partial pipe replacement of DMAs with high NRW. Upgrading of pipe sizes to achieve the required service level obligations will also be done.

592 kms of SDS/TDS will be rehabilitated from 2023 to 2027. The annual length of pipes to be replaced is shown in Table 3.13. Locations of these pipe replacement projects are in Annexes 3.9 to 3.13.

Particulars	2023	2024	2025	2026	2027	2023-2027
ACP Line Replacement	70	0	0	0	0	70
GIP/ Temfacil Line Replacement	132	29	0	0	0	160
Full and Partial Pipe Replacement	84	119	109	25	25	362
Total Length	286	148	109	25	25	592

Table 3.13: Selective Pipe Replacement in the SDS/TDS (in kms)

5. Primary Line Assessment and Leak Repair

Active leakage control in the PDS is a major source of NRW recoveries. Following the execution of HS validation and audit, the segments with high losses need to be subjected to leak detection and pipe inspection. One component of this program is the installation of insertion taps that serve as access points for the Sahara probes, contact points for correlators and measuring points during water audits. 355 insertions taps are planned to be installed from 2023 to 2027.

Another component of the program is the repair of leaks in the PDS, both detected and reported. Maynilad plans to repair 800 leaks in the PDS from 2023 to 2027.

Table 3.14 summarizes the number of insertion taps to be installed and the leak repairs to be undertaken along the primary lines.

Particulars	2023	2024	2025	2026	2027	2023-2027
Installation of Insertion Taps	155	130	30	20	20	355
Primary Leak Repair	160	160	160	160	160	800

Table 3.14: Primary Line Assessment and Leak Repair (2023 to 2027)

6. Selective Pipe Replacement for PDS

Selected segments of primary lines with heavy losses will be replaced. These are lines with high maintenance costs, and with frequent bursts which cause water service interruptions and inconvenience to customers. For the period 2023 to 2027, Maynilad plans to replace 47 kms of PDS. This includes the one-km long ACP line along General Luis Road (Quezon City), and old steel and cast-iron lines along McArthur Highway (Valenzuela), D. Tuazon (Quezon City), Quirino Avenue (Manila), SLEX West Service Road (Parañaque), President's Avenue (Parañaque) and the Ayala Alabang Village Transmission Line (Muntinlupa).

The length of PDS that will be replaced in 2023 to 2027 can be found in Table 3.15.

Particulars	2023	2024	2025	2026	2027	2023-2027
ACP Primary Line Replacement	1	0	0	0	0	1
Selective Primary Pipe Replacement	3	14	8	8	12	46
Total Length	4	14	8	8	12	47

Table 3.15: Selective Pipe Replacement in the PDS (in kms)

V. Plans for Expansion Areas

Water service coverage in 2022 is approximately 94.7%. In order to increase water service coverage to 95.1% by 2026, Maynilad plans to:

- (a) recover more water from areas with high NRW;
- (b) complete the additional WTP in Putatan;
- (c) install new primary lines and construct pump stations and reservoirs; and
- (d) lay new secondary and tertiary pipelines.

The foregoing initiatives will also result in improved water service levels (i.e., 24-hour supply and 16 psi pressure) to existing customers.

From 2023 to 2027, a total of 106,074 new water service connections (“NWSC”) will be installed in expansion areas in the West Zone. Table 3.16 shows the annual NWSCs to be installed in the expansion areas.

New Water Service Connections	2023	2024	2025	2026	2027	2023-2027
Expansion	14,785	15,494	25,530	24,815	24,156	104,780
Individualization	20	231	800			1,051
Standardization of MSA*			243			243
Total	14,805	15,725	26,573	24,815	24,156	106,074

*meter banking to individual tapping

Table 3.16: New WSC in Expansion Areas (From 2023 to 2027)

Of the 106,074 NWSCs, approximately 1,051 accounts will come from private subdivisions, which, Maynilad assumes, will be converted into open communities. Also, 243 accounts will be standardized from meter banking to individual tapping connection. Annex 3.7 shows the list of bulk accounts and identified potential expansion areas.

A. Service Expansion Program Capex

Service Expansion Programs are designed to provide water to unserved areas in the West Zone. It is composed of pipe-laying and network improvement projects that will directly benefit residents not receiving piped-in water service from the Company. A map of the service expansion can be seen in Annex 1.6.

B. Pipe-laying for the Secondary and Tertiary Distribution Systems

From 2023 to 2027, pipelines from 100-mm to 300-mm in diameter will be laid in various portions of the West Zone. Once completed, these pipe-laying projects will allow the Company to connect new water service connections. Maynilad will already allocate an annual budget for those customers who are not yet willing to connect during the pipe laying works but will eventually apply for new connection.

Chapter 4 Plans for Wastewater

Section 5.2 of the CA, which is retained in the RCA, specifies the general obligations of Maynilad regarding the provision of wastewater services to its customers. This includes (i) supply of sewerage services to its customers, (ii) compliance with wastewater standards, and (iii) septic and sanitation cleaning services, among others.

I. Roadmap to Full Coverage

In compliance with the RCA and the 2008 Supreme Court Writ of Continuing Mandamus, this New Business Plan considers full wastewater coverage by the end of the RCA with five-year time slices consistent with the compliance years. Figure 4.1 below depicts the service coverage roadmap until 2046.

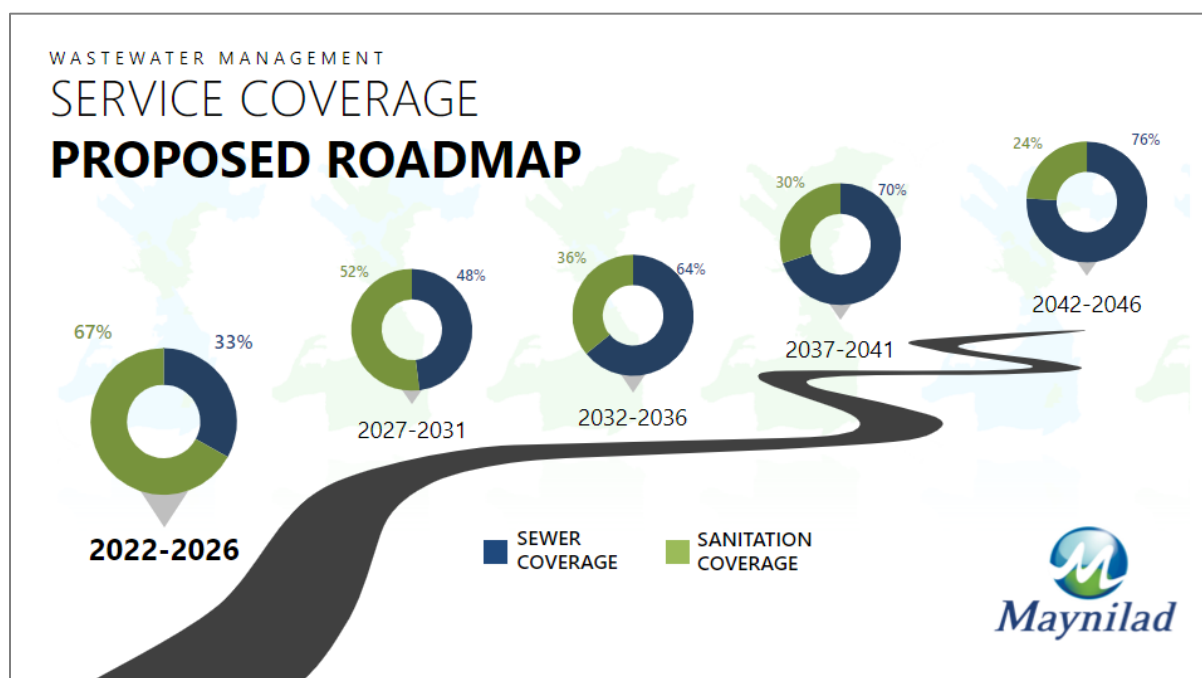


Figure 4.1: Service Coverage Roadmap

For the period 2022-2026, implementation of wastewater projects will continue with the objective of adding five operational WRFs. Sewer coverage is expected to reach 33% by 2026 (42% using the old formula).

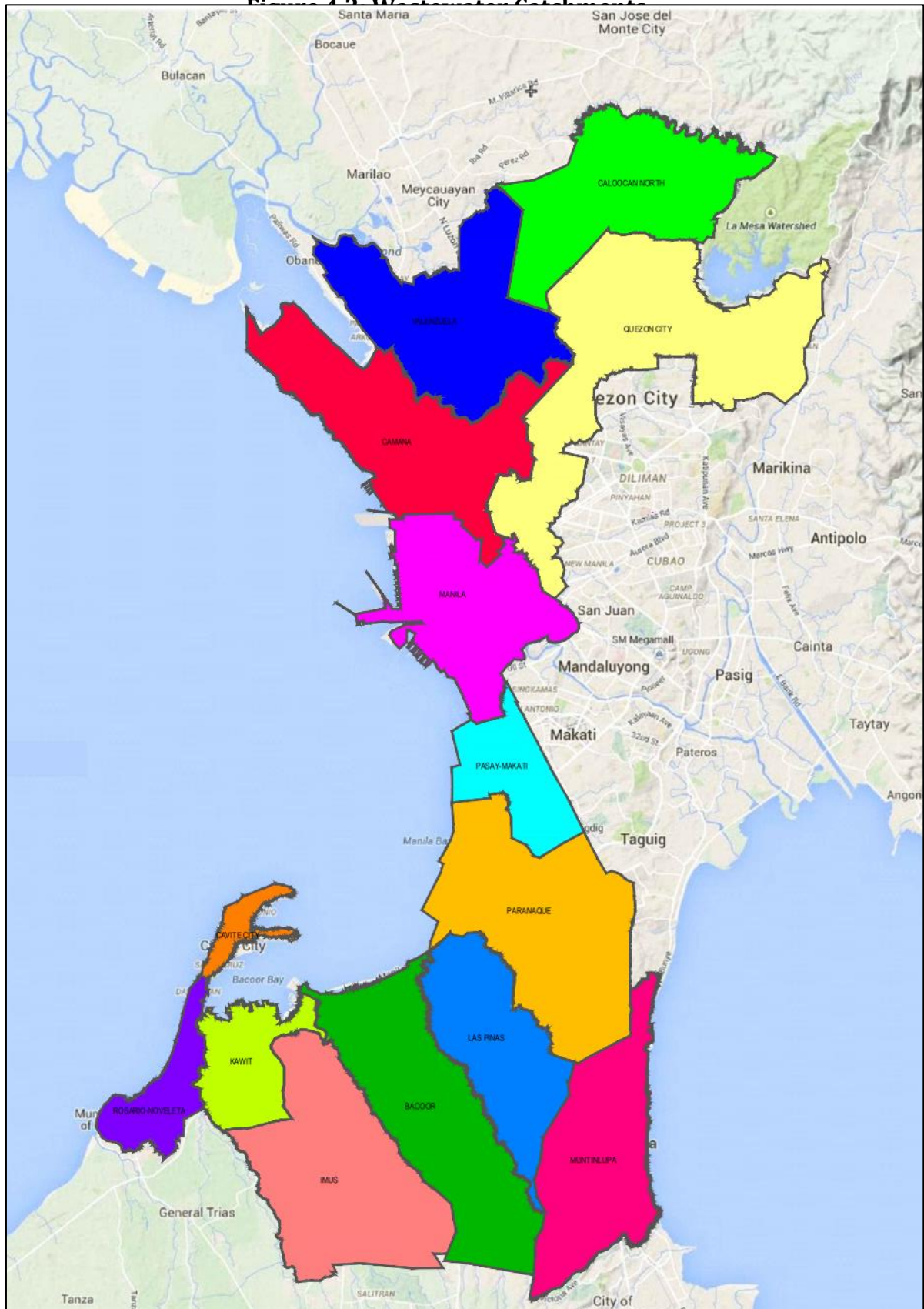
For the next phases, additional wastewater facilities will be constructed to serve the rest of the West Zone. It is proposed that the project be implemented in stages using the catchment and sub-catchment approach. Alongside consistent operational excellence, innovations in wastewater treatment are expected to materialize. Taking sewerage service to a higher level, water reuse will be practiced and waste-to-energy facilities will be utilized. The use of solar energy in the operation of our facilities is also being considered to reduce dependence on

purchased electricity and lessen carbon footprint. Proper planning, maximization of resources, and improvements in efficiency will enable the realization of these targets.

The wastewater catchment is a delineated surface where wastewater is generated, regardless of topographic features. Typical delineation of wastewater catchment for the project area is built closely within political boundaries. However, development(s) built on sloping terrain near a wastewater catchment boundary may affect the wastewater catchment. Thus, resulting delineations of areas may include partial extensions of the wastewater catchment beyond political boundaries.

Based on the 2021 Water Demand Study and available feasibility studies, Maynilad trimmed down the major wastewater catchments in the West Zone to 14 from the original 18. These catchment areas are:

1. Caloocan North
2. Quezon City
3. Valenzuela
4. Navotas- Malabon- South Caloocan
5. Manila
6. Pasay
7. Parañaque
8. Las Piñas
9. Muntinlupa
10. Bacoor
11. Imus
12. Kawit
13. Rosario - Noveleta
14. Cavite City



II. Sewerage Services

A. Existing Sewerage Systems

Maynilad is operating six sewerage systems or catchments composed of 22 WRFs which serve a population of over 2 million or over 21% of the total water-served population in the West Zone as of 2021. The existing sewerage systems as of the said period are presented in Figure 4.3 below, and these are located across the West Zone in the following catchments:

1. Manila Catchment;
2. Quezon City Catchment;
3. Caloocan-Malabon-Navotas (CAMANA) Catchment;
4. Muntinlupa Catchment;
5. Pasay Catchment; and
6. Parañaque Catchment.

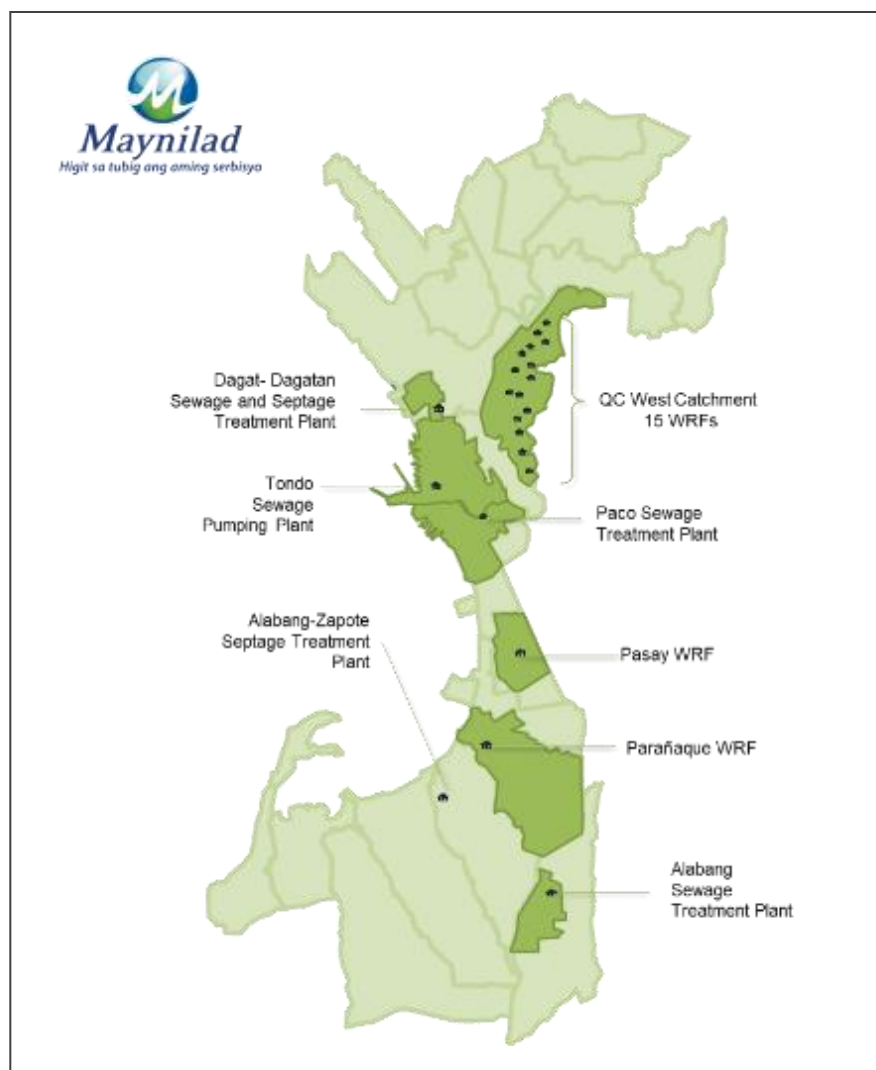


Figure 4.3: Existing Sewerage System

1. Manila Catchment

The Manila Catchment has a total land area of approximately 39.2 km², with a total population of 1,588,740 (2020), consisting of 814 barangays in Manila, and six barangays in Quezon City. Approximately 70% of the land area of the City of Manila is covered by an existing separate sewer network.

Manila Catchment is divided into three sub-catchments: Manila North, Manila East, and Manila South.

The existing facilities in Manila Catchment are shown in Table 4.1.

Manila Catchment Facilities	
Tondo Sewage Pumping Plant  Capacity: 432,000 CMD Technology: Grit Removal & Aeration System Type of Sewer System: Separate Address: Asuncion St. cor. C.M. Recto Ave., Tondo, Manila Receiving Body of Water: Manila Bay	Paco Water Reclamation Facility  Capacity: 410 CMD Technology: Moving Bed Bioreactor (Johkasou) Type of Sewer System: Combined Address: Cristobal St corner Athena Street, Paco, Manila Receiving Body of Water: Estero de Santibañez

Table 4.1: Manila Catchment Existing Facilities

(a) Manila North Sub-Catchment

Manila North, formerly known as the Central Manila Catchment, contains one of the oldest sewerage systems in Asia, dating back to the 1900s. The catchment is mainly composed of Tondo Sewage Pumping Plant (“**TSPP**”) and its conveyance system which caters to around 116,000 water-served accounts or more than 930,000 population. It serves the barangays in Tondo, Sta. Cruz and Legarda.

TSPP

The TSPP has a design capacity of 432,000 cubic meters per day (“**CMD**”). The Manila North sewer network is a separate sewer system that conveys storm water and sewage in separate pipes.

Wastewater from the customers' sewer service connections is conveyed to the separate sewer system and enters the TSPP from the following sources: (i) the joint flow from the southern and northern trunk sewers; (ii) the flow from the Tondo Foreshore and (iii) the flow from the Dagupan system. Refer to Figure 4.4 for the TSPP Sewage Flow Diagram.

In this facility, wastewater undergoes preliminary treatment before it is pumped into Manila Bay through a 3.9-km outfall. Its effluent is designed to pass the DENR Administrative Order (DAO) 1990-35 effluent standards.

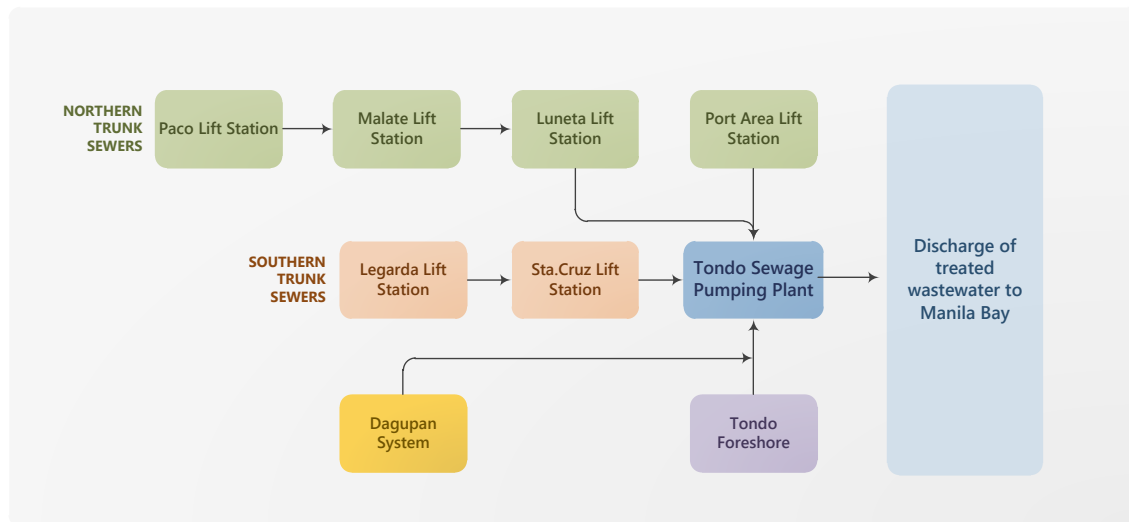


Figure 4.4: TSPP Sewage Flow Diagram

(b) Manila South Sub-Catchment

The existing Manila South sub-catchment covers a portion of Paco, serving more than 11,000 people.

Paco WRF

The 410-CMD Paco WRF utilizes a combined sewer system and is designed to collect storm water runoff, domestic sewage, and commercial wastewater in the same pipe.

It uses Johkasou technology that utilizes a moving bed bioreactor (“**MBBR**”) technology. The MBBR technology inside the Johkasou is based on a specially designed plastic biofilm carrier or bio-carriers that are suspended and in continuous movement within a tank or reactor before discharging the treated wastewater to Estero de Santibanez.

2. Quezon City Catchment (San Juan River Catchment)

Quezon City is the most populous city in the Philippines with a population of 1,824,675 (2020). The Quezon City Catchment is divided into four sub-catchment areas for the West Zone: the Quezon City North, Quezon City West, Quezon City Central and Quezon City East.

Maynilad's existing wastewater facilities in the city are under the Quezon City West catchment.

(a) Quezon City West Sub-Catchment

Within Quezon City West are 15 decentralized WRFs with a combined capacity of 73,000 CMD, catering to around 100,000 water-served accounts, with an equivalent population of more than 726,000.

The WRFs cover a total land area of 2,495 has, consisting of residential households with some commercial, industrial and institutional establishments. The system collects wastewater generated in the area through interceptor pipes and conveys it to the WRFs, which is then discharged to Dario Creek, Mariblo Creek and San Juan River.

Table 4.2 below shows the profile of existing facilities in Quezon City West.

Quezon City West Facilities	
Congressional WRF 	Capacity: 567 CMD Technology: Sequencing Batch Reactor ("SBR") Type of Sewer System: Separate Address: Congressional Ave corner Hereford Street, Barangay Bahay Toro, Project 8, Quezon City Receiving Body of Water: Culiati Creek

<u><i>Legal WRF</i></u> 	Capacity: 409 CMD Technology: SBR Type of Sewer System: Separate Address: Legal corner Premium Street, GSIS Village, Project 8, Quezon City Receiving Body of Water: Dario Creek
<u><i>Grant WRF</i></u> 	Capacity: 621 CMD Technology: SBR Type of Sewer System: Separate Address: Grant Street, Barangay Bahay Toro, Project 8, Quezon City Receiving Body of Water: Dario Creek
<u><i>Baesa WRF</i></u> 	Capacity: 390 CMD Technology: STM Aerotor Type of Sewer System: Combined Address: Saint Paul St. Remerville Subdivision, Barangay Baesa, Quezon City Receiving Body of Water: Dario Creek

<u><i>San Antonio WRF</i></u> 	Capacity: 3,310 CMD Technology: MBBR Type of Sewer System: Combined Address: San Jose Street corner West Riverside Street, Barangay San Antonio, Quezon City Receiving Body of Water: San Juan River
<u><i>Del Monte WRF</i></u> 	Capacity: 3,510 CMD Technology: MBBR Type of Sewer System: Combined Address: Caragay Street, Barangay Damayan, Quezon City Receiving Body of Water: San Juan River
<u><i>Tandang Sora WRF</i></u> 	Capacity: 1,200 CMD Technology: STM Aerotor Type of Sewer System: Combined Address: Real Village, Tandang Sora Quezon City Receiving Body of Water: Dario Creek
<u><i>Bahay Toro WRF</i></u> 	Capacity: 13,400 CMD Technology: MBBR Type of Sewer System: Combined Address: Fema Road, Bahay Toro, Quezon City Receiving Body of Water: Dario Creek

<u><i>Samson WRF</i></u> 	Capacity: 1,900 CMD Technology: STM Aerotor Type of Sewer System: Combined Address: Lorraine Street corner Cristine Street, Parkway Village, Apolonio Samson, Quezon City Receiving Body of Water: San Juan River
<u><i>Bagbag WRF</i></u> 	Capacity: 10,400 CMD Technology: SBR Type of Sewer System: Combined Address: Homeland Townhomes, Tandang Sora Avenue, Barangay Tandang Sora, Quezon City Receiving Body of Water: Dario Creek
<u><i>Paltok WRF</i></u> 	Capacity: 4,900 CMD Technology: MBBR Type of Sewer System: Combined Address: Lot 18 Block 52 of PSD-1650, Bo. San Francisco Del Monte, Quezon City Receiving Body of Water: Mariblo Creek
<u><i>Tatalon WRF</i></u> 	Capacity: 8,100 CMD Technology: SBR Type of Sewer System: Combined Address: G. Araneta Avenue cor. E. Rodriguez Boulevard, Barangay Tatalon, Quezon City Receiving Body of Water: San Juan Rive

<u><i>Talayan WRF</i></u> 	Capacity: 15,400 CMD Technology: Conventional Activated Sludge Type of Sewer System: Combined Address: P. Florentino Street, Barangay Sto. Domingo, Quezon City Receiving Body of Water: Talayan Creek
<u><i>Kapiligan WRF</i></u> 	Capacity: 6,000 CMD Technology: MBBR Type of Sewer System: Combined Address: 37-A Kapiligan Street, Barangay Doña Imelda, Quezon City Receiving Body of Water: San Juan River

Table 4.2: Quezon City West Catchment Existing Facilities

(i) Congressional WRF

This WRF serves portions of Bahay Toro, and was upgraded from a communal septic tank ("CST") to a WRF in 2010. The Congressional WRF was the first WRF commissioned by Maynilad utilizing the SBR system, and has a capacity of 567 CMD, serving a population of 4,200. Residential and semi-business establishments in this sub-catchment are being served by a separate sewerage system.

(ii) Legal WRF

This WRF started operating in October 2012. It is one of the former CSTs upgraded into a full-blown WRF, and is located in a 288 m² lot in Project 8, Quezon City. It utilizes the SBR system and has a capacity of 409 CMD, serving a population of 5,000. This sub-catchment uses the existing 4.7 kms of separate sewer lines, which collect and convey the sewage from the households to the WRF for treatment. The treated effluent is discharged to Dario Creek.

(iii) Grant WRF

This WRF started its process-proving in January 2013, and was turned over to Maynilad in August 2013. The Grant WRF is one of the former

CSTs upgraded into a full-blown WRF. It utilizes an SBR system, and has a capacity of 621 CMD. It is situated in a 458 m² lot serving a population of 7,200 belonging to a portion of Brgy. Bahay Toro, Quezon City. This sub-catchment uses the existing 4.6 kms. of separate sewer lines, which collect and convey the sewage from the households to the WRF for treatment. The treated effluent is discharged to Dario Creek.

(iv) Baesa WRF

This WRF is the first of the 11 WRFs in the Quezon City West Catchment completed in July 2011. The Baesa WRF is situated in a 287 m² lot, and has a capacity of 390 CMD, serving a population of 4,300. Wastewater coming from households in the catchment area is intercepted from the drainage outfalls and conveyed to the Baesa WRF for treatment before its discharge to the Dario Creek.

(v) San Antonio WRF

This WRF started operating in May 2013. The facility is located in a 605 m² lot in Project 8, Quezon City. It utilizes MBBR technology, and has a capacity of 3,310 CMD, serving a population of 58,100. It discharges treated effluent to the San Juan River.

(vi) Del Monte WRF

This WRF started operating in October 2013. It is located in a 574 m² lot in Project 8, Quezon City. It utilizes MBBR technology, and has a capacity of 3,510 CMD, serving a population of 34,500. This WRF discharges treated effluent to the San Juan River.

(vii) Tandang Sora WRF

This WRF is a 1,200 CMD plant utilizing STM-Aerotator technology. It serves 14,500 people in Brgy. Tandang Sora, Quezon City. STM-Aerotator technology uses the Integrated Fixed Film and Activated Sludge ("IFAS") system. Treated effluent is discharged to Dario Creek.

(viii) Paltok WRF

This WRF started operating in September 2013. It utilizes the MBBR technology, and has a capacity of 4,900 CMD, serving nearly 50,000 people. It is located in a 1,091 m² lot in Paltok, Quezon City, and discharges treated effluent to Mariblo Creek.

(ix) Samson WRF

This WRF is a 1,900 CMD plant located at Parkway Village, Brgy. A. Samson, Quezon City. It utilizes STM-Aerotator technology and serves a population of 20,000 in the sub-catchment area. The STM-Aerotator technology uses the IFAS system. Treated effluent is discharged to San Juan River.

(x) Kapiligan WRF

This WRF is located at Kapiligan St., Brgy. Doña Imelda, Quezon City. It has a design capacity of 6,000 CMD, and uses the MBBR technology. Kapiligan WRF serves a population of 38,600. Treated effluent is discharged to San Juan River.

(xi) Tatalon WRF

This WRF is located at E. Rodriguez Ave. corner Araneta Ave., Tatalon, Quezon City. It has a design capacity of 8,100 CMD, and uses the SBR technology. The Tatalon WRF serves a population of 77,300. Treated effluent is discharged to San Juan River.

(xii) Bagbag WRF

This WRF started operating in December 2014. It is located in a 3,516 m² lot in Brgy. Tandang Sora. It has a capacity of 10,400 CMD, and uses the SBR technology. It serves more than 100,000 in the sub-catchment area. Treated effluent is discharged to Dario Creek.

(xiii) Bahay Toro WRF

This WRF is located at Fema Road, Bahay Toro, Quezon City. It has a design capacity of 13,400 CMD, and uses the MBBR technology. This WRF serves a population of 135,000 in the catchment area. Treated effluent is discharged to Dario Creek.

(xiv) Talayan WRF

This WRF is located at P. Florentino St., Brgy. Santo Domingo, Quezon City. It has a design capacity of 15,400 CMD, and uses Conventional Activated Sludge (“CAS”) as its mode of treatment process. The Talayan WRF serves 154,300 people. Treated effluent is discharged to the San Juan River.

3. Muntinlupa Catchment

The Muntinlupa Catchment consists of nine barangays with a population of 515,048 (2020), covering a total land area of 3,768 has.

This catchment is divided into three sub-catchments: Alabang, Cupang, and Tunasan. The Alabang sub-catchment has an existing sewerage system in Muntinlupa, while the Cupang and Tunasan sub-catchments are still under development and will be discussed further in the next section under On-going Projects.

(a) Alabang Sub-Catchment

The Alabang WRF serves this sub-catchment area and was constructed by Ayala Land, Inc. in 1983 on a three-hectare lot inside the Ayala Alabang Village. It was turned over to Maynilad in 2009.

The WRF has a capacity of 10,000 CMD, serving the residents of Ayala Alabang Village, Alabang Town Center and Madrigal Business Park through a 70-km separate sewer system.

The WRF was rehabilitated in 2014 to restore it to its original design capacity, increasing operational efficiency and improving wastewater services in the area.

Muntinlupa Facility	
Alabang Water Reclamation Facility 	Capacity: 10,000 CMD Technology: Conventional Activated Sludge Type of Sewer System: Separate Address: San Juanico St., Ayala Alabang Village, Alabang Muntinlupa Receiving Body of Water: Pasong Diablo River

Table 4.3: Muntinlupa Catchment Existing Facility

4. Pasay-Makati Catchment

The Pasay-Makati catchment area is composed of all the 201 barangays in Pasay and five barangays in Makati, which is part of the West Zone. It covers a land area of 1,747 has. and has a total population of 461,667 (2020).

The 46,600 CMD Pasay WRF is the newly-built facility located in the Pasay-Makati South sub-catchment. It was inaugurated in 2018 and completed the process-proving stage in 2020. It serves around 205,000 of the water-served population.

The wastewater generated by customers within this sub-catchment area is intercepted at the drainage outfalls and conveyed through a combined sewer network consisting of 9.5 kms of sewer lines, 272 manholes, and three pump stations.

The treated effluent, which is compliant with DAO 1990-35 standards, is discharged at the nearby Maricaban creek.

Table 4.4: Pasay Catchment Existing Facility below shows the project profile of the Pasay WRF.

Pasay-Makati Facility	
Pasay Water Reclamation Facility 	Capacity: 46,600 CMD Technology: Conventional Activated Sludge Type of Sewer System: Combined Address: C. Jose Street, Brgy. 168 Malibay, Pasay City Receiving Body of Water: Maricaban Creek

Table 4.4: Pasay Catchment Existing Facility

5. Parañaque Catchment

Parañaque has a land area of 4,488 has. with a population of 786,238 (2020).

The Parañaque WRF, located in the Parañaque south sub-catchment area, operates with a capacity of 76,000 CMD, and is presently the largest WRF of Maynilad, capable of serving a total population of about 455,000. It utilizes a Biological Nutrient Removal technology which enables it to comply with the newest effluent standards by DENR. It was inaugurated in 2019 and was turned over to Maynilad in 2020.

Still under development, Parañaque South's sewer network is presently composed of 50 kms. of sewer lines, 47 pump stations and 998 sewer manholes. Table 4.5 below shows the project profile of the Parañaque WRF.

Parañaque Facility	
Parañaque Water Reclamation Facility 	Capacity: 76,000 CMD Technology: Conventional Activated Sludge Type of Sewer System: Combined Address: Sucat Road, Brgy. San Dionisio, Parañaque City Receiving Body of Water: Malabon Creek

Table 4.5: Parañaque Catchment Existing Facility

6. Existing Joint Sewage and Septage Treatment Plants (“SSpTP”)

(a) Veterans Village Water Reclamation Facility

The Veterans Village WRF (Project 7 Sewage and Septage Treatment Plant) is located at the former Project 7 Imhoff tank, and has a design sewage treatment capacity of 2,400 CMD and septage treatment capacity of 240 CMD (at 16 hours operation). It has two acceptance units with screening and grit removal capabilities and screw-type dewatering processes to treat the septage collected from the customers.

This facility uses a flocculation, coagulation, and dewatering type of technology. The dewatered sludge is at 20-25% dry solids.

Veterans Village Water Reclamation Facility	
	Sewage Capacity: 2,400 CMD Technology: SBR Type of Sewer System: Separate Septage Capacity: 240 CMD

Veterans Village Water Reclamation Facility	
	Technology: Volute Dewatering Press Address: 11 Road A Street, Veterans Village, Project 7, Quezon City Receiving Body of Water: Culiati Creek

Table 4.6: Profile of Veterans Village Water Reclamation Facility

(b) Dagat-dagatan Sewage and Septage Treatment Plant

The sewage treatment facility in Dagat-dagatan SSpTP was completed in 1981 by the National Housing Authority and was then handed to MWSS in 1991, before it was turned over to Maynilad in August 1997. It has a treatment capacity of 26,000 CMD and covers an area of 332 has. which serves portions of Caloocan, Malabon, and Navotas.

Around 2,400 accounts are connected to the Dagat-dagatan SSpTP which serves about 16,200 people. The system uses an aerated lagoon- type treatment process where wastewater from the households is pumped into lagoons and treated through a biological process. After eight days of retention in the lagoons, the treated water is discharged to the Maypajo Creek.

In 2004, under the Manila Second Sewerage Project (“**MSSP**”) funded by the World Bank, the facility was rehabilitated to improve its efficiency and performance. This included the rehabilitation of the sewage pumping station, installation of new surface aerators, construction of baffle walls, and desludging of the lagoons that led to the reduction of the pollutants being discharged.

The septage treatment facility in Dagat-dagatan SSpTP was constructed in 2003 to 2005 under the MSSP and has a capacity of 450 CMD. It uses coagulation/flocculation and screw-type dewatering processes to treat the septage.

In 2008, Dagat-dagatan SSpTP again underwent rehabilitation, mainly of its buildings, to ensure structural stability and the well-being of its personnel.

In 2017, Maynilad implemented the Dagat-dagatan Development Plan that aims to improve and rehabilitate deteriorating facilities to ensure comfortable working environment and operational efficiency.

This facility uses flocculation, coagulation, and dewatering type of technology. The dewatered sludge is at 20-25% dry solids.

Dagat-Dagatan Sewage and Septage Treatment Plant	
	Sewerage Capacity: 26,000 CMD Technology: Waste Stabilization Pond
	Septage Capacity: 450 CMD (16hrs) Technology: Dewatering (Screw Press) Address: Dagat-Dagatan Avenue, Sawata Area, Maypajo, Karangalan, Caloocan City Receiving Body of Water: Maypajo Creek

Table 4.7: Profile of Dagat-dagatan Sewage and Septage Treatment Plant

B. On-going Projects

As of 2021, wastewater projects in Valenzuela, Muntinlupa, CAMANA, Bacoar and Manila catchments are in various stages of implementation, as described below.

1. Valenzuela Catchment

The ongoing wastewater project in Valenzuela is located in the Valenzuela west sub-catchment. It is expected to be partially energized in 2022 and will be fully completed in 2023. Once operational, the facility will help abate pollution in the Tullahan River by preventing the discharge of untreated wastewater.

Valenzuela West WRF

Valenzuela west sub-catchment spans a land area of approximately 3,000 has. and is composed of 31 barangays.

The ongoing development of this catchment will consist of a 60,000 CMD WRF and a 28-km sewer network. The project will cover a land area of approximately 1,600 has., serving the population of Karuhatan, Gen T. de Leon, Marulas, Maysan, and some portions of adjacent barangays.

Table 4.8 shows the project profile and beneficiaries of the ongoing project.

VALENZUELA WEST CATCHMENT	
Map	Project Profile
	Address: F. Bautista St., Brgy. Marulas, Valenzuela City Capacity: 60,000 CMD Technology: CAS Type of Sewer system: Combined Length of sewerlines: 28 kms. No. of Pump Stations: 24 No. of IBSs: 101
	Beneficiaries
	Area Covered: 1,633 has. Population (2020): 319,860 Receiving Body of Water: Tullahan River

Table 4.8: Profile and Beneficiaries of Valenzuela West Catchment

2. Muntinlupa Catchment

In addition to the Alabang sub-catchment, Maynilad is currently expanding its sewerage system in Muntinlupa through the development of Cupang and Tunasan sub-catchments.

The ongoing project will involve (i) the construction of two WRFs, and (ii) installation of combined interceptor systems. Upon completion, more than 200,000 of the water-served population will be covered by the sewerage system, helping protect Laguna Lake from untreated wastewater.

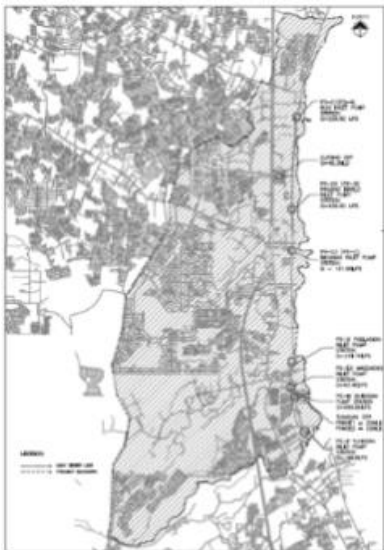
(a) Cupang WRF

The Cupang sub-catchment covers about 1,300 has. of land and serves a population of 280,000 in the barangays of Alabang, Bayanan, Buli, Cupang, and Sucat in Muntinlupa City. The 46,000 CMD Cupang WRF and the combined interceptor system projects are under construction and nearing their completion.

(b) Tunasan WRF

The Tunasan sub-catchment covers a slightly smaller land area of 998 has. and caters to a population of 93,000 in Barangay Tunasan. The project involves laying of interceptor pipes, construction of pump stations and a 20,000 CMD WRF.

Table 4.9 shows the project profile and beneficiaries of the ongoing projects in the Muntinlupa Catchment.

MUNTINLUPA CATCHMENT	
Map	Project Profile
Muntinlupa Catchment  Cupang WRF  Tunasan WRF	Address: M. L. Quezon Rd., Brgy. Cupang, Muntinlupa City. Capacity: 46,000 CMD Technology: CAS Type of Sewer system: Combined Length of sewerlines: 3.70 kms. No. of Pump Stations: 3 No. of Lift Stations: 0 No. of IBSs: 2
	Project Profile
	Address: Buendia St., Brgy Tunasan, Muntinlupa City Capacity: 20,000 CMD Technology: CAS Type of Sewer system: Combined Length of sewerlines: 1.4 kms. No. of Pump Stations: 1 No. of Lift Stations: 0 No. of IBS: 4
	Beneficiaries
	Area Covered: 2,330 has. Population (2020): 221,900 Population (2046): 301,600

MUNTINLUPA CATCHMENT	
Map	Project Profile
	Receiving Body of Water: Laguna de Bay

Table 4.9: Profile and Beneficiaries of Cupang and Tunasan Sub-Catchments

3. CAMANA Catchment

The CAMANA (South Caloocan, Malabon and Navotas) catchment is one of the largest catchment areas in the West Zone, composed of three cities with 199 barangays, and a combined catchment land area of 4,455 has.

CAMANA WRF

The wastewater project aims to upgrade the capacity of the existing Dagatdagatan SSpTP from 26,000 to 205,000 CMD. From serving small portions of the three cities, the plant will fully cater to the combined cities of South Caloocan, Malabon, and Navotas.

Aside from capacity upgrade, the facility will also undergo a technology upgrade from waste stabilization ponds to a Modified Ludzack-Ettinger (“**MLE**”) process to comply with the DAO 2021-19 standards.

CAMANA CATCHMENT	
Map	Project Profile
	Address: Capacity: 205,000 CMD Technology: CAS-MLE Type of Sewer system: Combined Length of sewer lines: 77 kms. No. of Pump Stations: 8 No. of Lift Stations: 10
	Beneficiaries Area Covered: 4,996 has. Population (2020): 738,534 Receiving Body of Water: Maypajo Creek

Table 4.10: Profile and Beneficiaries of the CAMANA Catchment Project

4. Manila Catchment

The TSPP under the Manila North sub-catchment is designed to comply with the DAO 1990-35 effluent standards. With the updating of these standards, further treatment processes are required. Specifically, the facility must be upgraded to comply with the Class SB effluent standard stated in the newly-implemented DAO 2021-19.

Manila North WRF

A new WRF with a capacity of 180,000 CMD will be constructed downstream of the TSPP before discharging into Manila Bay. A new conveyance system will also be constructed to connect the TSPP to the new WRF.

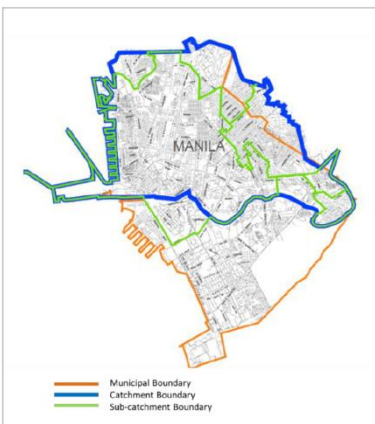
MANILA NORTH CATCHMENT	
Map	Project Profile
 The map shows the Manila North Catchment area. It includes a legend with three items: 'Municipal Boundary' represented by an orange line, 'Catchment Boundary' represented by a blue line, and 'Sub-catchment Boundary' represented by a green line. The map shows the city of Manila with these boundaries overlaid. The catchment boundary is the outermost, followed by the sub-catchment boundary, and then the municipal boundary.	Capacity: 180,000 CMD Type of Sewer system: Separate Receiving Body of Water: Manila Bay

Table 4.11: Profile and Beneficiaries of the Manila North Sub-Catchment Project

5. Las Piñas Catchment

The Las Piñas catchment has a land area of 3,214 has. with a population of 588,946 (2020). Half of its land area is residential and the remaining half is used for commercial, industrial and institutional purposes.

Las Piñas WRF

The 88,000 CMD Las Piñas WRF is the sole wastewater facility to be constructed in the Las Piñas catchment. The original plan was to construct three WRFs in this catchment area, as recommended in the FS conducted by OEC and validated by Nippon Koei. Opportunely, the acquired lot can accommodate the wastewater flow for the entire Las Piñas catchment, allowing Maynilad to opt for a centralized sewerage system.

The WRF is situated near the Alabang-Zapote Septage Treatment Plant (South SpTP) along Alabang-Zapote Road, Barangay Pamplona Uno and will be discharging its effluent to the Zapote River. The WRF is designed to comply with the standards required by DAO 2021-19.

Table 4.12 below shows the project profile of the Las Piñas Catchment.

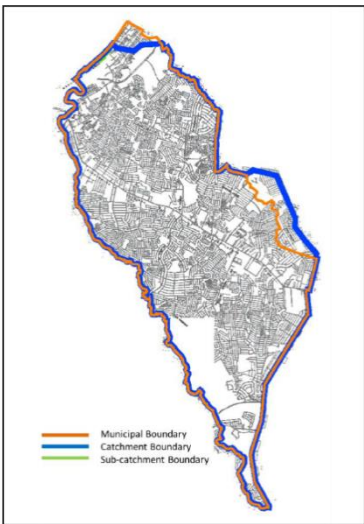
LAS PIÑAS CATCHMENT	
Map	Project Profile
	Address: Alabang Zapote Road, Brgy. Pamplona Uno, Las Piñas City Capacity: 88,000 CMD Technology: CAS-A20 Type of Sewer system: Combined
	Beneficiaries
	Area Covered: 3,214 has. Population (2020): 588,946 Receiving Body of Water: Zapote River

Table 4.12: Profile and Beneficiaries of the Las Piñas Catchment Project

6. Bacoor Catchment

The Bacoor Catchment has a total land area of 4,318 has. with a total population of around 428,000.

In August 2009, Ayala Waterworks turned over to Maynilad the operations and maintenance of the waterworks and sewerage systems of the Ayala Southvale Village (“**ASV**”) in Bacoor City. The ASV has two small WRFs that use the dipped membrane activated sludge process in treating the wastewater generated by its residents. The ASV has 3,755 meters of separate sewer network.

The ongoing project in this catchment is the ASV WRF which has a design capacity of 710 CMD, and can serve a population of around 2,000. The on-going rehabilitation is geared towards compliance with DAO 2021-19 effluent standards.

7. Integrated Sludge Management System (“ISMS”)

Wastewater treatment produces a semi-solid, nutrient-rich by-product called sludge. Sludge undergoes further treatment to remove pollutants and reduce its volume to an acceptable level to ensure safe and proper disposal.

The total volume of sludge produced is directly proportional to the number of treatment facilities and its capacities. This is compounded by the treatment processes involved such as the nutrient removal process, which is required to comply with the latest effluent standard or the DAO 2021-19.

Sludge disposal is very costly in terms of operating costs, thus, creating a need to look for alternative solutions for sludge management – an Integrated Sludge Management Program (“ISMP”). The ISMP aims to provide Maynilad a vision on the development of an ISMS, considering all existing and future water and wastewater facilities.

8. Conveyance System Projects

Alongside WRF projects, the conveyance of the combined sewer system projects is being implemented to ensure that the wastewater generated by the catchments are intercepted and transported to the facilities for treatment before its disposal.

(a) Parañaque South Conveyance System (Flow Enhancement Project)

The flow enhancement project will cover a land area of 106 has. that will cater to the barangays of San Dionisio and La Huerta. The project will involve the construction of five kms of sewer lines, interceptor systems and pump/lift stations. The project will convey a maximum of 5,000 CMD of wastewater to the 76,000 CMD Parañaque WRF.

PARAÑAQUE STAGE 1 PACKAGE 1 SEWER SYSTEM	
Map	Project Profile
	Land Area: 106 has. Barangays Served: Brgy. San Dionisio and Brgy. La Huerta Type of Sewer system: Combined Length of sewer lines: 5 kms No. of Pump Stations: 2 No. of Lift Stations: 0 No. of IBSs: 10

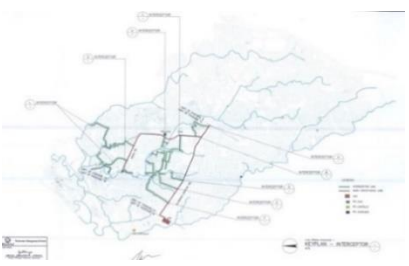
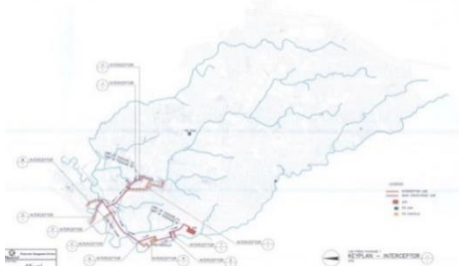
Table 4.13: Profile of Parañaque Stage 1 Package 1 Sewer System

(b) Las Piñas Conveyance System

The wastewater generated in the Las Piñas catchment will be conveyed to the treatment facility through a sewer network with approximately 74 kms. of sewer lines, three pump stations, and 39 lift stations distributed across four packages, namely, Packages 1A, 1B, 2 and 3.

Package 1A covers barangays B.F. International Village, Manuyo Dos, Manuyo Uno, Pamplona Tres, Pulang Lupa Dos, Pulang Lupa Uno, Talon Tres, and Talon Uno, while Package 1B covers barangays Daniel Fajardo, Elias Aldana, Manuyo Dos, Manuyo Uno, Pamplona Uno, Pulang Lupa Dos, Pulang Lupa Uno, and Zapote.

Table 4.14 below shows the project profile of the Las Piñas Conveyance System.

LAS PIÑAS CONVEYANCE SYSTEM	
Map	
Las Piñas Conveyance System (4 Packages) 	
Las Piñas Package 1A 	Las Piñas Package 1B 
Project Profile (All Packages)	
Type of Sewer system: Combined	

LAS PIÑAS CONVEYANCE SYSTEM	
Map	
Length of sewer lines: 75 kms No. of Pump Stations: 3 No. of Lift Stations: 39	

Table 4.14: Las Piñas Conveyance System

(c) Manila North Rehabilitation Project (former “CMSS Rehabilitation Project”)

The sewerage system of Manila North catchment dates back to the 1900s. To ensure the reliability of the sewer network and accommodate additional wastewater from the increasing population of domestic customers and commercial establishments, rehabilitation of the sewer line is necessary.

The project is composed of five packages that will cover a part of Sta. Cruz and Malate. It has approximately 7,000 linear meters of sewer lines, ranging from 200 mm to 1200 mm in diameter. It includes 30 affected barangays, and will cater to more than 3,900 unsewered domestic and commercial accounts.

Table 4.15 below shows the areas for rehabilitation and the project profile.

The possible challenges in this project are the anticipated traffic issues, obstruction of existing utilities and high-water table in the construction area. Critical to the successful implementation of the project is the support and cooperation of government agencies, barangays and LGUs.

MANILA NORTH REHABILITATION PROJECT	
Map	Project Profile
	Areas Served: Sta. Cruz and Malate No. of Barangays served: 30 Type of Sewer system: Separate Length of sewer lines: 7,098m

Table 4.15: Manila North Rehabilitation Project

(d) Adopt-an-Estero Project

In collaboration with the different government agencies involved in the rehabilitation of Manila Bay, Maynilad took part in the DENR Adopt-an-Estero project that aims to clean and rehabilitate all the creeks that eventually discharge to Manila Bay. Maynilad identified all esteros in the City of Manila for rehabilitation and prioritized the critical esteros which will allow immediate implementation.

The rehabilitation of Estero Dela Reina and Estero de San Antonio de Abad began in 2018. The combined sewerage system is composed of 986 linear meters of sewer lines, 31 sewer manholes, and 20 interceptor box systems.

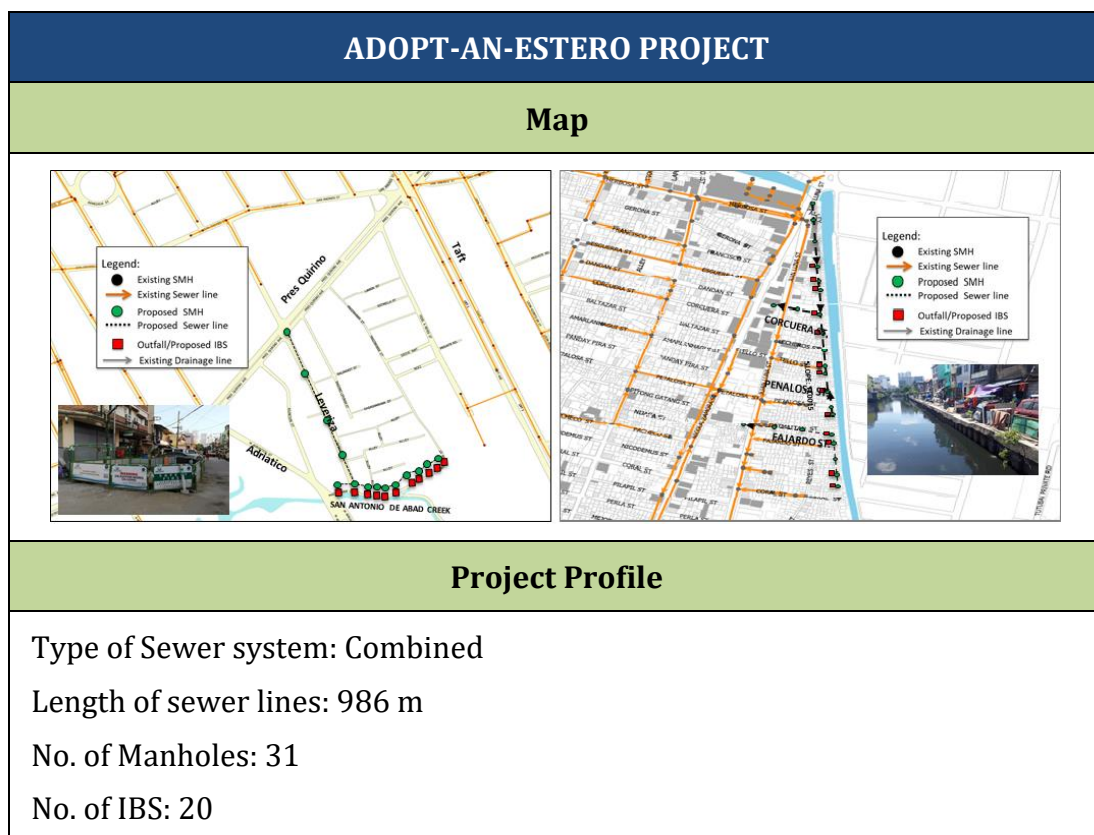


Table 4.16: Adopt-An-Estero Project Profile

(e) Sewer Line Replacement in Mendiola-Nepomuceno-Zamora

The existing sewer lines along Mendiola crossing Estero de Pandacan in Manila were found to be damaged, causing intermittent overflows to the drainage and nearby creeks. This prompted the replacement of the sewer line project to prevent further harm to the receiving bodies of water.

The Mendiola line serves 575 accounts, conveying its wastewater to the Legarda Lift Station. The Nepomuceno line collects wastewater from 682 accounts, leading to the Paco Lift Station. The Zamora line serves 784 accounts, conveying wastewater to the Paco Lift Station.

Wastewater from the three lines is pumped to the TSPP. The Mendiola-Nepomuceno-Zamora Sewer Line Replacement Project will be able to accommodate new sewer service connections in the area.



Figure 4.5: Sewer Line Replacement in Mendiola-Nepomuceno-Zamora

C. Challenges Encountered in the Sewerage System

1. Project Implementation

Acquiring Lots for WRF and Pump Stations

The West Zone, with a total population of 9.8 million in 2021 and a total land area of 540 km², is a highly dense area. Due to the congestion in majority of the cities in the West Zone, procuring technically feasible lots for the treatment plants and the pump/lift stations is a challenging task.

A specific example is the difficulty in acquiring a suitable land for the expansion of the CMSS to enable it to comply with (i) DAO 2021-19, and (ii) the upgraded SB classification of Manila Bay. The TSPP, which is part and parcel of the CMSS, requires a land area suitable for the installation of a secondary treatment process, which involves the removal of ammonia, nitrogen, and phosphorous. The Company has been hard-pressed in acquiring a suitable expansion site for the TSPP.

2. Obtaining Permits and Imposition of Additional Requirements

One of the main reasons for the delays of projects in the pre-construction phase is the long and tedious process of obtaining a permit for wastewater projects from the LGUs and other relevant government agencies. In some cases, delays are also encountered in the construction or implementation phase when the LGUs impose additional requirements, such as the posting of significant cash bonds.

3. ROW issues

The construction of sewers and interceptors in highly developed areas presents a significant constraint in engineering design. Many clearances from barangays and homeowners' associations ("**HOA**") inside the subdivisions are needed before permits are issued. Several HOAs and developers have refused entry to Maynilad for purposes of installing sewer lines inside the subdivisions.

4. Presence of informal settlers along easements

Occupied easements make it impossible to lay interceptor pipes at the most practical and inexpensive route. Likewise, informal settlers directly dispose of their solid and liquid/domestic wastes in the waterways. This negates the efforts to discharge effluents with passing standards. While the government is relocating informal settlers away from the easements, Maynilad is considering a new route (usually the parallel road nearest to the waterways) for the conveyance system to be able to fully intercept wastewater flow, which will entail additional costs.

5. Unavailability of updated drainage maps

The unavailability of accurate as-built drainage plans in the different cities and municipalities makes the combined sewer system design challenging. The terms of reference for the preparation of the feasibility study include on-site checking through walk-the-line visits of the entire drainage system to confirm drainage flow and catch-all wastewater generated in a catchment. This takes a significant amount of time in the planning stage.

6. Poor traffic conditions

Heavy traffic in the cities is a major hindrance to the approval of construction of sewer systems along the road. The urgency of having sewer network systems in the cities is not the same as that of laying water lines. Likewise, installation of interceptor pipes will cause short term economic dislocation and disturbance whenever there is a need to close some of the streets during construction.

7. Community acceptance of sewerage projects

Most communities perceive wastewater projects as dirty, odorous, and noisy. Some people object to sewerage projects based on this perception, causing delays in project implementation. Public consultations, as well as information, education, and communication campaigns, are being done to increase public awareness and project acceptability.

8. Difficulty in installing sewer network crossing political boundaries

In designing sewerage systems, the political boundaries of the different cities and municipalities must be taken into consideration. LGUs do not usually allow wastewater from neighboring cities to be treated in their area. This has financial implications because topographical benefits that can offer savings by way of reduced capital and operational expenses could not be taken advantage of. Because wastewater catchments are mostly aligned with political boundaries, Maynilad designs conveyance systems to minimize crossing between cities/municipalities.

9. Covid-19 Pandemic

The Covid-19 pandemic has forced the government to implement unprecedented lockdowns, mandating businesses to close for extended periods. Population movements became restricted and the natural supply chain was disrupted. The supply and delivery of goods simply stopped. Materials and equipment needed to carry out on-going projects were affected.

Community quarantine and barangay lockdowns due to the pandemic also restricted the application for permits and construction activities in 2020. During Enhanced Community Quarantine (ECQ) periods, limitations in manpower affected the duration and progress

of construction activities. LGUs also reduced the manpower in their offices in compliance with the guidelines set by the government to reduce the risk of virus transmission which further delayed the LGU's issuance of permits.

10. Operational Challenges

(a) Poor solid waste management practices

Improper solid waste disposal affects the continuous flow of wastewater from households to treatment facilities. Wrong practices such as (i) flushing of trash down the toilets, and (ii) disposing of garbage in drainage systems, result in blockage of the wastewater conveyance system. As a consequence, pollution-reduction in the receiving bodies of water cannot be achieved despite high-process efficiency in the treatment facilities.

(b) Theft of sewer appurtenances

Sewer appurtenances used to be made of iron and steel and buried along the roads. These appurtenances are prone to theft. And so, iron and steel appurtenances were replaced with concrete material as a solution. Likewise, bar screens are replaced with welded perforated screens to make it difficult to be stolen.

(c) Untreated wastewater from industries

As the combined sewerage system utilizes the existing drainage system to collect and transport wastewater to treatment facilities, it is vulnerable to unlawful discharges from non-complying establishments or industries. These untreated effluents contain pollutants that are beyond the domestic quality of wastewater. Because Maynilad's WRFs are designed to treat wastewater of domestic quality, industrial/commercial effluent intrusions affect the treatment efficiency and damage the facility equipment resulting in the temporary shutdown of the WRF.

(d) Affected Utilities

Projects implemented by other major utilities as well as road upgrading and construction can affect the existing sewer network. Damaged sewer lines can cause a temporary shutdown of facilities due to the loss of wastewater flow in the system.

(e) Covid-19 Pandemic

To comply with the guidelines set by the government and to protect the health and safety of the personnel in wastewater operations, Maynilad limited the number of personnel deployed in the sewer network operations and maintenance. Barangays also implemented lockdowns in areas with high Covid-19 cases which restricted Maynilad from accessing certain sewer networks requiring maintenance or rehabilitation. This affected the volume of wastewater treated by the WRFs.

Maynilad also discontinued the sampling and laboratory analysis of wastewater influent quality to protect its personnel against the possibility of the virus being present in untreated wastewater.

D. Wastewater Projects for Sewerage Expansion (2022 – 2026)

The Sixth Rate Rebasing Period is characterized by the continued expansion of the sewerage systems in Valenzuela, Las Piñas, CAMANA, and Muntinlupa. By the EO 2026, wastewater coverage is expected to reach 100% with sewerage services at 33% and sanitation services at 67% (*42% and 82% respectively using the old formula*).

Figure below presents the wastewater service area map by end of 2026.

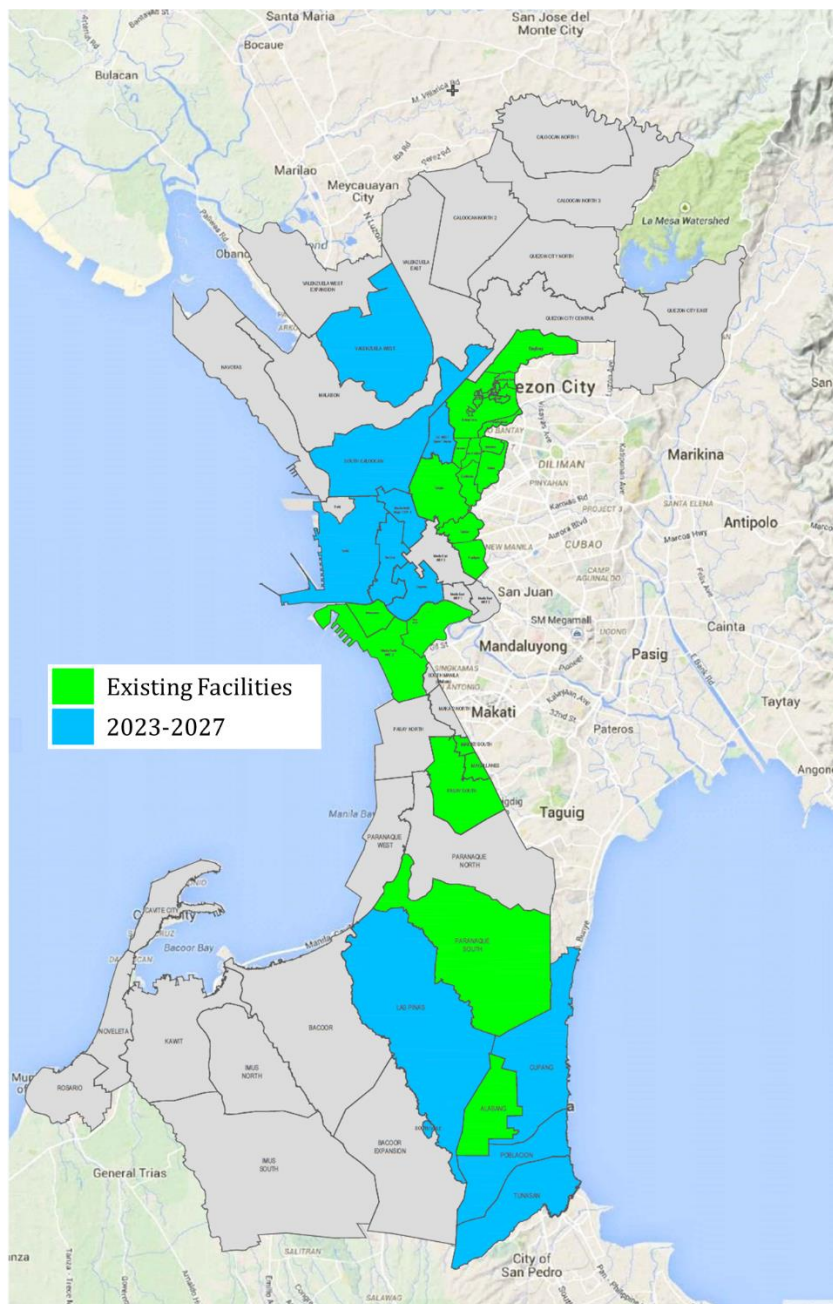


Figure 4.6: Service Area Map (EO 2026)

It is also during this period that Maynilad will start the retrofitting and upgrading of existing WRFs that will incorporate the nutrient removal process to comply with the new DAO 2021-19 general effluent standard. Alongside the expansion projects, network reliability projects will remain critical in increasing the efficiency of the sewerage systems through the rehabilitation of existing sewer lines in Manila North Sewerage System (former CMSS).

To ensure the timely completion of future wastewater projects and achieve sewer coverage targets, Maynilad will implement pre-construction activities, particularly ROW and lot acquisition for WRFs and pump stations, prequalification for consultancy services, drafting of bid documents, and detailed engineering design for sewer network.

Using the new formula in calculating the sewer coverage, Maynilad will cover about 33% of the total customers or around 42% of the total water-served population of the concession area by the end of 2026. Presented in the table is the list of projects that will contribute to the sewer service coverage for the period 2022-2026.

No.	Conveyance Projects
1	CAMANA Conveyance (South Caloocan, Upper Talayan, Sta. Cruz)
2	Las Piñas Conveyance (Package 2)
3	Muntinlupa Stage 2 (Este Honor)
4	Tondo Foreshore

Table 4.17: Proposed Conveyance Projects (2022-2026)

1. CAMANA Catchment (Conveyance Project)

The CAMANA Conveyance System is a combined sewerage system consisting of 77 kms of sewer lines, 11 pump/lift stations. The project will cover the areas of South Caloocan, Malabon, Navotas, and some portions of Manila and Quezon City. The implementation of conveyance projects in South Caloocan, Upper Talayan (in Quezon City) and Sta. Cruz (in Manila) will start in 2024, while the packages in Malabon and Navotas areas will start in 2028.

Once completed, it will convey wastewater to the CAMANA WRF which will serve more than 1.3 million people.

Table 4.18 below shows the project profile of the CAMANA Conveyance System.

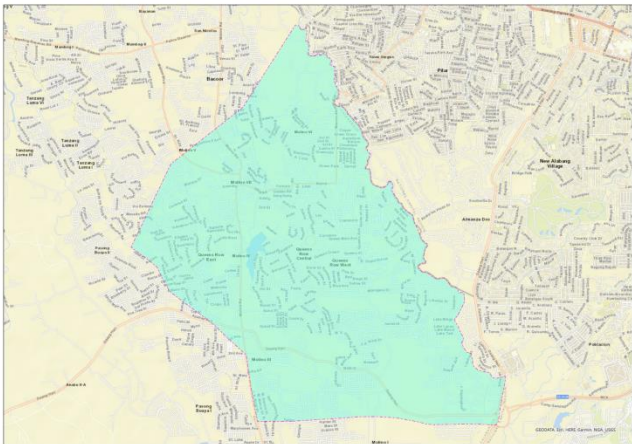
CAMANA CONVEYANCE SYSTEM	
Map	Project Profile
	South Caloocan, Upper Talayan and Sta. Cruz Type of Sewer system: Combined Length of sewer lines: 31 kms No. of pump/lift Stations: 6
	Malabon and Navotas Type of Sewer system: Combined Length of sewer lines: 46 kms No. of pump/lift Stations: 5

Table 4.18: CAMANA Conveyance System

2. Las Piñas Catchment Conveyance Project

The construction of additional 45 kms of sewer lines and 30 pump/lift stations will convey the wastewater generated in Las Piñas to the treatment facility. Packages 2 and 3 projects will complete the conveyance system in the Las Piñas catchment and will contribute to 100% sewer coverage in the area.

Contruction of Package 2 of the Las Piñas conveyance system which covers barangays Almanza Dos, Almanza Uno, Pamplona Dos, Pulang Lupa Dos, Talon Dos, Talon Kuatro, Talon Singko and Talon Tres will start in 2023, while Package 3 which covers barangays Almanza Dos, Almanza Uno, B.F. International Village, Ilaya, Manuyo Dos, Manuyo Uno, Pilar, Pulang Lupa Uno, Talon Dos, Talon Singko and Talon Tres will start in 2025. Once completed, the two conveyance system packages will cater to an additional 357,000 people.

Table 4.19 below shows the project profile of the Las Piñas Conveyance System Packages 2.

LAS PIÑAS CONVEYANCE SYSTEM	
Map	
	
Project Profile	
Package 2 Type of Sewer system: Combined Length of sewer lines: 21 kms No. of pump/lift Stations: 10	

Table 4.19: Las Piñas Conveyance System

3. Muntinlupa Catchment (Conveyance Project)

The Muntinlupa catchment covers the entire wastewater catchment in the city of Muntinlupa. The catchment consists of nine barangays with a total land area of 3,768 has., and a population of 515,048 (2020). The existing Alabang WRF and the ongoing Muntinlupa Stage 1 serve more than 300,000. To expand Maynilad's wastewater services to the remaining unserved portions, Muntinlupa Stage 2 will be developed during this period.

Muntinlupa Stage 2 (Este Honor)

The Este Honor Sewerage System is an expansion project for the Muntinlupa catchment which will provide additional flow to Cupang WRF, and serve portions of the barangays of Alabang, Cupang, and Putatan. The project will consist of the construction of (i) an interceptor system for sewage collection, and (ii) a lift station

that will convey the wastewater to the existing Cupang sewerage system. This will provide an additional 10,000 CMD to Cupang WRF, catering to an additional 12,800 population.

MUNTINLUPA STAGE 2	
Map	Project Profile
	Este Honor Pump Station Capacity: 10,000 CMD Barangays Served: Portions of Brgy Alabang, Cupang, and Putatan Estimated Population Served once completed: 12,800 Type of Sewer system: Combined Length of sewer lines: 0.33 km

Table 4.20: Muntinlupa Stage 2 Project Profile

4. Manila Catchment (Conveyance Project)

For this Rate Rebased period, interceptor box systems (“**IBS**”) will be installed in the Tondo foreshore area. These will support additional sewer service connections and further increase the sewer coverage in the Manila North Sub-catchment area.

E. Other Projects

1. Feasibility Studies

A feasibility study is essential in planning sewerage infrastructure and treatment plant facilities as it determines if a project is technically and legally feasible as well as economically justifiable. This includes the preparation and comparison of different sewerage schemes and the review of the different sewage treatment technologies.

2. Manila North Rehabilitation Project

The ongoing rehabilitation project in Manila North only covers portions of Sta. Cruz and Malate. To achieve full rehabilitation of the remaining areas in this catchment, a

feasibility study will be conducted to develop strategies and evaluate the best option and technologies to be used.

3. Nutrient Removal Standards for Wastewater Treatment

The implementation of DAO 2021-19 by the DENR involves the updating of general effluent standards for parameters that require nutrient-removal processes. A feasibility study will be conducted to update and review the existing Maynilad wastewater standards to optimize the design, operation and maintenance of existing and future treatment facilities. The study will involve an assessment of various technologies and processes for nutrient removal, and study of the most economical approach to enable compliance with the new standards.

4. ROW and Lot Acquisition

One significant step in planning a sewerage system is acquiring land that is feasible for the proposed sewerage scheme. Listed below are the projects that will commence pre-construction activities such as ROW and lot acquisition.

	Lot Acquisition	Commitment Year
2023-2027		
1	CAMANA PS/LS	2023
2	Bacoor PS/LS	2026
3	Imus North PS/LS	2026
4	Quezon City East PS/LS	2027
5	Muntinlupa Stage 2 PS/LS	2024

Table 4.21: Right of Way and Lot Acquisition

5. Retrofitting of Existing Facilities to comply with DAO 2021-19

In June 2021, DAO 2021-19 or the Updated Water Quality Guidelines and General Effluent Standards for Selected Parameters was released which provides for the required effluent standards for nitrates, phosphates, and fecal coliform.

Table 4.22 below shows the comparison between DAO 1990-35 and DAO 2021-19 for Class C waters.

Parameter	Units	DAO 1990 – 35 Class C	DAO 2021-19 Class C
Biological Oxygen Demand (BOD)	mg/L	50	50
Oil and Grease	mg/L	5	5
Surfactants	mg/L	5	15
Ammonia	mg/L	0.50	4
Nitrates	mg/L	-	14
Phosphates	mg/L	-	4
Fecal Coliform	MPN/100mL	-	400

Table 4.22: DAO 1990-35 and DAO 2021-19 Effluent Standard for Class C water

In order to provide wastewater solutions to its customers, Maynilad plans to upgrade 19 of its existing facilities to comply with the new effluent standards.

The table below shows Maynilad's facilities that are being planned for upgrading in 2023-2027, which are all in the tender process.

Facility	Current Technology	New Technology	Year
Bagbag	SBR	SBR	2024
Congressional			
Tatalon			
Veteran's Village (Project 7)			
Paco	MBBR	IFAS/MBBR	2024
Pasay	CAS		
Alabang Village	CAS	A2O	2024

Facility	Current Technology	New Technology	Year
Cupang	CAS	IFAS/MBBR	2025
Talayan	CAS		2025
San Antonio	MBBR		2027
Bahay Toro			2025
Del Monte			
Kapiligan			
Paltok			
Samson			
Tandang Sora	STM Aerotor		
Alabang-Zapote (South SpTP)	SBR	CAS	2023

Table 4.23: WRFs for upgrading to comply with DAO 2021-19

6. Sewer Network Projects

(a) New Sewer Service Connections (“NSSC”)

To maximize the utilization of existing facilities and expand service coverage, Maynilad will continue to install NSSCs to the existing sewer lines in the Manila North Sewerage System. Installation of additional 2,000 NSSCs each year is targeted to be accomplished in the Sixth Rate Rebasing Period. This is still within the design capacity of the sewer lines and will require no urgent upgrade.

As of 2021, 58.2% of the population of Manila is connected to the Central Manila catchment. To expand the service coverage in Manila, Maynilad will concentrate in areas where the bulk of unsewered accounts is located.

(b) Network Reliability

Network reliability projects are necessary to maintain and improve the optimum performance of existing sewerage systems. Several operational challenges are encountered as the pipes age. They start to deteriorate, debris

and grease accumulate, and intrusions are likely to occur. These undesirable conditions may possibly result in sewer backflows, customer complaints, and poor collection of sewage for treatment.

In a study conducted by GHD in March 2012, several portions of the Manila North Sewerage System were found to be structurally defective, and others in fair to poor condition, thus, needing rehabilitation and replacement.

Maynilad will therefore implement several network reliability projects consisting of maintenance, rehabilitation, and upgrading of existing sewerage systems. Applicable to the Manila North Sewerage System and relevant to the ongoing rehabilitation of other sewer lines, reliability projects will be in the pipeline for the Sixth Rate Rebasement Period. Sewer line repair projects along the streets of G. Tuazon, Constanica, Gastambide, Earnshaw, Port Area and other areas in Manila City will be implemented.

(c) Flow Enhancement Projects

To increase operational efficiency, Maynilad will undertake flow enhancement projects. These include conveyance systems that could increase flow in an area, thereby improve facility utilization and compensate for deferred conveyance systems due to ROW issues.

The team will continue to monitor and maintain the accessibility of sewer manholes and implement enhancement projects should the manholes be directly affected by road constructions and drainage improvement projects to be undertaken by the DPWH and the city government.

(d) Maintenance

Providing wastewater services does not only involve putting up and expanding the sewerage system; facilities and equipment require deliberate maintenance, especially the ones that are nearing the end of their useful life.

To ensure the efficiency of our ageing treatment facilities and conveyance systems, a maintenance plan was developed with the Integrated Asset Management, the division that centralizes and handles all maintenance plans and programs of Maynilad. The plan aims to implement comprehensive maintenance of all Maynilad WRFs and purchase of the necessary equipment, such as analyzers and variable frequency drives to prolong equipment life and optimize plant operations.

(e) Asset Renewal Plan

Maynilad is implementing its asset management program aimed at creating an industry-aligned set of processes, procedures and tools for the inspection and

maintenance of plant and equipment to improve reliability while lowering costs.

One of the components of the program is the asset management plan that seeks to (i) document the current state of the assets (e.g., asset inventory, valuation, condition, risk), and (ii) project the long-range asset renewal (i.e., rehabilitation and replacement) requirements of Maynilad. The plan is intended to provide a rational framework for understanding and planning Maynilad's asset portfolio and consolidate its asset information into a structured framework to provide a basis to support long-term organization, operations, and asset management decisions.

The Asset Renewal Plan is part of Maynilad's asset management plan. The Asset Renewal Plan is a comprehensive process that will ensure that assets will sustainably perform the required function while managing life-cycle costs. It is based on the condition, reliability, operational performance and the remaining useful life of the asset.

(f) Turned Over Wastewater Facilities

With the recent initiatives of MWSS in drafting and approving policies on the turnover of wastewater facilities operated by both private and government entities, Maynilad is also anticipating taking over the operation and maintenance of these sewerage facilities, for as long as they are in accordance with the requirements stated these policies.

To date, there is already an existing "Policy Guidelines for the Turnover of Sewerage System from Government Entities with Housing Developments."

F. Project Timelines and Risks

The completion of wastewater projects depends on the timeline and risks laid out from lot acquisition to implementation. The table below shows in detail the requirements in each stage of the project to ensure timely completion and attainment of sewer coverage:

Ongoing Las Piñas Package 1A and 1B	
Stage	Requirements
Implementation	Ease of acquisition of excavation, building, and other relevant permits and clearances from City, Barangay, and Homeowner Associations (HOAs)/Subdivisions.
	Ease of relocation of informal settlers residing along creeks, <i>esteros</i> , and other waterways affected by Las Piñas Conveyance Projects.
	Exemption from election moratorium for 2025 mid-term elections.

	Minimal to no redesign/realignment of conveyance due to government projects, such as road and drainage improvement types, of DPWH, MMDA, LGU, and other agencies.
	No Force Majeure events will be encountered throughout the project
	Ease of energization of WRF, Pump Stations, and Lift Stations through coordination with Meralco

Table 4.24: Project Timeline and Risks for the Ongoing Las Piñas Package 1A and 1B

Las Piñas Package 2	
Stage	Requirements
Procurement	Failure of bidding does not occur due to lack of qualified contractors, Package 2 awarded by 2023.
Implementation	Ease of acquisition of excavation, building, and other relevant permits and clearances from City, Barangay, and Homeowner Associations (HOAs)/Subdivisions.
	Ease of relocation of informal settlers residing along creeks, <i>esteros</i> , and other waterways affected by Las Piñas Conveyance Projects.
	Exemption from election moratorium for 2025 mid-term elections.
	Minimal to no redesign/realignment of conveyance due to government projects, such as road and drainage improvement types, of DPWH, MMDA, LGU, and other agencies.
	No Force Majeure events will be encountered throughout the project
	Ease of energization of WRF, Pump Stations, and Lift Stations through coordination with Meralco

Table 4.25: Project Timeline and Risks for Las Piñas Package 2

Planned CAMANA Conveyance Packages 1-3 (Part 1)	
Stage	Requirements
Lot Acquisition	Six (Packages 1-3) out of eleven (Packages 1-5) lots required for the CAMANA Conveyance are acquired by 2022 (Packages 1-3) / 2023 (Packages 4&5)
	Involvement of MWSS in the expropriation process for lots not acquired by 2022 (Packages 1-3) / 2023 (Packages 4&5)
Design	As-built drawings of existing drainages, pipelines, and other utilities that may affect the CAMANA Conveyance design are provided by South Caloocan, Manila, Quezon City, Malabon, and Navotas.
	Final detailed engineering design for CAMANA Conveyance completed by 2023 (Packages 1-3) / 2024 (Packages 4&5)
	Creek Interceptor as an alternative for capturing wastewater approved by MWSS/ concerned agencies.
Procurement	Failure of bidding does not occur due to lack of qualified contractors. Packages 1-3 are awarded to contractors by 2024.
Implementation	Memorandum of Understanding between Maynilad and South Caloocan, Manila, Quezon City, Malabon, and Navotas is finalized by 2023, before the awarding of Packages 1-3 .
	Ease of acquisition of excavation, building, and other relevant permits and clearances from City, Barangay, and Homeowner Associations (HOAs)/Subdivisions.
	Ease of relocation of informal settlers residing along creeks, <i>esteros</i> and other waterways affected by CAMANA Conveyance project
	Exemption from election moratorium for 2025 mid-term elections.
	Minimal to no redesign/realignment of conveyance due to government projects, such as road and drainage improvement types, of DPWH, MMDA, LGU, and other agencies.
	No Force Majeure events will be encountered throughout the project
	Ease of energization of WRF, Pump Stations, and Lift Stations through coordination with Meralco

Table 4.26: Project Timeline and Risks for the Planned CAMANA Conveyance Packages 1-3 (Part 1)

III. Sanitation

Maynilad is obliged under the CA to offer septic and sanitation cleaning services to its customers not connected to the separate sewerage system and meet its agreed service coverage target at specified five-year time slices. Septic and sanitation cleaning services are defined as the emptying of domestic septic tanks and subsequent sludge disposal at regular intervals.

In the previous Rate Rebasing periods, customers not yet connected to the sewerage system may avail of the desludging service, at no additional cost, once every five years. Customers connected to the combined sewerage system also have septic tanks that serve as the primary treatment of wastewater which must be emptied regularly to enable them to continuously function properly. These customers used to be able to avail of desludging service at no additional cost once every seven years.

On 13 July 2021, MWSS RO and the Concessionaires signed an agreement on the new guidelines in reporting SOs on water, sewer, and sanitation. The 2021 agreement states that the regular desludging cycle that is done once every five years shall be done for customers in unsewered areas beginning 2022. The sanitation coverage will then be computed using the moving five-year cumulative coverage accomplishment.

On 29 October 2019, the DOH released Administrative Order 2019-0047 to set a national standard on the design, construction, operation, and maintenance of septic tank systems. Under Section VI C.1, it was specified that septic tanks must be desludged every four years to maintain its designed treatment efficiency.

The MWSS has an on-going discussion with the DOH on the frequency of regular desludging of septic tanks. MWSS proposes the implementation of a five-year interval, instead of a four-year interval, because the latter has a substantial cost implication.

For this New Business Plan, the five-year interval is used in projecting sanitation accomplishments and the associated capital and operational expenses.

A. Sanitation Programs

Maynilad offers two sanitation services to residential and semi-business customers—programmed desludging and desludging-on-demand.

1. Programmed Desludging

Programmed desludging refers to the pro-active desludging service in an identified programmed area at no additional cost. Programmed areas refer to a geographical area consisting of clusters of customers usually delineated by a barangay boundary. Maynilad schedules the desludging activities in the programmed areas in coordination with the head of the barangay or HOA to maximize information dissemination.

At the height of community quarantine in Metro Manila in 2020 due to the COVID-19 pandemic, Maynilad suspended the face-to-face community briefings and moved to virtual platform to minimize health risks and still be able to continue with the information campaign.

2. Desludging-on-Demand

Desludging-on-demand refers to the reactive desludging service rendered upon the request of customers.

Upon request, a customer's desludging history will be checked and verified. An inspection will also be conducted prior to scheduling the desludging service to ensure its feasibility for execution. Customers can avail of the desludging service at no additional cost if they have not availed of the service in the last five years.

1. Dagat-Dagatan SSpTP

The septage treatment facility of Dagat-dagatan SSpTP, which has a capacity of 450 CMD, uses coagulation/flocculation and screw-type dewatering processes to treat the septage. It was constructed from 2003 to 2005 under the World Bank- funded MSSP.

Dagat-Dagatan Sewage and Septage Treatment Plant	
	Septage Capacity: 450 CMD (16hrs) Technology: Dewatering (Screw Press)
	Sludge Quality: Dewatered Sludge at 20-25% dry solids

Table 4.27: Dagat-Dagatan Sewage and Septage Treatment Plant

2. Veterans Village Water Reclamation Facility

Veterans Village WRF is located at the former Project 7 Imhoff tank site with a designed septage treatment capacity of 240 CMD, assuming 16 hours of plant operation. It has two acceptance units with screening and grit removal capabilities and screw- type dewatering processes to treat the septage collected from the customers.

Veterans Village Water Reclamation Facility	
	Septage Capacity: 240 CMD Technology: Volute Dewatering Press
	Sludge Quality: Dewatered Sludge at 20-25% dry solids

Table 4.28: Veterans Village Water Reclamation Facility

3. Alabang-Zapote SpTP (South SpTP)

The 500 CMD Alabang-Zapote SpTP began its operation in March 2016. It was built to collect septage from septic tanks of customers in the southern portion of the West Zone. It is one of the projects funded by a World Bank loan.

Table 4.29 shows the profile of the Alabang-Zapote SpTP. This facility uses a flocculation/coagulation /dewatering type of technology. The dewatered sludge is at 20-25% dry solids.

Alabang-Zapote Septage Treatment Plant	
	Capacity: 500 CMD (16hrs)
	Technology: Dewatering (Screw Press)
	Sludge Quality: Dewatered Sludge at 20-25% dry solids

Table 4.29: Profile of Alabang-Zapote Septage Treatment Plant

4. Equipment and Vehicles

The desludging operations of Maynilad require the use of Vacuum Truck Units (“**VTU**”) with capacities of 10m³ and 4m³ to collect septage from septic tanks. VTUs are vehicles installed with desludging equipment to siphon septage and transport it to the nearest septage treatment facility to separate the solid from the liquid and further reduce the pollutants. The liquid component of the septage will undergo treatment before disposal to bodies of water. The solid component or sludge is eventually hauled, and disposed of in a fertilizer-processing plant, by a service provider.

As of the end of 2021, there are 57 units of 10m³ VTUs and 31 units of 4m³ VTUs. Each 10 m³ VTU can desludge an average of five septic tanks per trip, while each 4 m³ VTU can desludge an average of two septic tanks per trip. Once the tank gets filled, the collected septage is transported, discharged and processed at the Dagat-Dagatan SSpTP, Veterans Village WRF or Alabang-Zapote SpTP.



Figure 4.8: Vacuum Truck Units

C. Challenges Encountered in the Sanitation Program

Sanitation services include the collection and transport of septage from individual septic tanks to the septage treatment facilities for processing and safe disposal of bio-solids.

The major challenges encountered in the implementation of the sanitation program are, as follows:

1. Customer Acceptance

For 2017 to 2021, the average acceptance rate of Maynilad customers is about 54%. The customers who refused to avail of the desludging service did so for the following reasons:

- (a) They do not want to be disturbed if there is no problem yet with the septic tank;
- (b) They are discouraged by the cost of making the septic tanks accessible, especially if the septic tank is obstructed, and
- (c) They do not know where the septic tank is located, or the septic tank does not have the proper manhole access, among others.

2. Inaccessible septic tanks

In densely populated areas in the West Zone where narrow roads and alleys are commonplace, there are septic tanks that cannot be accessed even by smaller VTUs and long VTU hoses. In some cases, there are households that have constructed rooms on top of their septic tanks which can only be accessed by breaking their floors.

3. Worsening traffic

The worsening traffic condition is affecting the efficiency of septage collection and transport resulting in the decreasing number of trips per shift.

4. Covid-19 pandemic

Community quarantine and barangay lockdowns due to the pandemic restricted the desludging operations in 2020. During the ECQ period, desludging services were put on hold until the restrictions were relaxed to protect the health and safety of the Maynilad personnel and the customers. Community briefings, which were conducted prior to the programmed desludging, where the barangay officials and their constituents were invited, were held online to avoid physical contact and mass gatherings.

D. Projects for Sanitation (2022 – 2026)

For the Sixth Rate Rebasing Period, Maynilad estimates that only 45% of its customers who are offered desludging services in 2022 and 2023 will accept or avail of the service considering the pandemic. The reluctance of the customers to avail of sanitation services due to health and safety reasons was evident since 2020 and still continues to affect desludging operations. But as lockdowns and community quarantines are lifted, the Company anticipates an increase to 50% from 2024 to 2026.

Based on the proposed sanitation coverage targets and the projected volume of septage to be collected and treated, the required treatment and collection facilities needed can be calculated using historical data and assumptions.

1. Equipment and Vehicles

The required number of vacuum trucks is dependent on the estimated volume of septage to be collected, the number of truck trips per day, and the equipment availability.

With the completion of the Alabang-Zapote SpTP in 2016, desludging operation is being regionalized to improve the turn-around time of vacuum trucks.

The Dagat-dagatan SSpTP and Veterans Village WRFs will handle all septage collected in the northern part of the concession while the Alabang-Zapote SpTP will handle all septage collected in the southern part of the concession area.

There is a need to periodically re-fleet the vacuum trucks of over 10 years old that are used in the collection and transport of septage from households. This is to maximize the efficiency and sustainability of the trucks. Moreover, periodic re-fleeting of other mobile equipment i.e. mobile grit washer, skid and backhoe loaders, and dump trucks used in transporting sludge for proper disposal will also be required.

IV. Wastewater Plans and Programs (2027-2046)

A. Sewerage Plans

For the next phases of the wastewater roadmap discussed earlier, Maynilad will continue to implement wastewater projects geared towards achieving full wastewater coverage in the West Zone. Maynilad aims to achieve 76% sewer coverage by 2046 (*88% using the old formula*), with sanitation services serving the balance.

Maynilad will continue to implement the combined sewer system approach in most of its future wastewater projects because it is faster to implement, more cost-efficient and less disruptive to all stakeholders. Projects in the Manila catchment will be geared towards maximizing the use of the hybrid system to minimize disturbances in the city.

From 2027 to 2031, four wastewater projects with a combined capacity of 81,000 CMD and two conveyance projects will be completed to meet 100% wastewater coverage by 2031, with 49% served by sewerage services (*58% using the old formula*).

No.	Wastewater Projects	No. of Treatment Facility	Capacity (CMD)
2027-2031			
Water Reclamation Facility			
1	Kawit	1	13,000
2	Imus North	1	34,000
3	Cavite City	1	12,000
4	Muntinlupa Stage 3 – Poblacion	1	22,000
Conveyance Project			
5	Las Piñas (Package 3)		-
6	CAMANA Conveyance (Malabon and Navotas)		-

Table 4.30: 2027-2031 Wastewater Projects

From 2032 to 2036, four wastewater projects with a combined capacity of 254,000 CMD will be completed to meet 100% wastewater coverage by 2036, with 64% provided sewerage services (76% using the old formula).

No.	Wastewater Projects	No. of Treatment Facility	Capacity (CMD)
2032-2036			
Water Reclamation Facility			
1	Rosario-Noveleta	1	7,000
2	Bacoor	1	65,000
3	Quezon City East	1	59,000
4	Quezon City Central	1	123,000

Table 4.31: 2032-2036 Wastewater Projects

From 2037 to 2041, one wastewater project with a capacity of 77,000 CMD will be completed to meet 100% wastewater coverage by 2041, with 69% provided sewerage services (81% using the old formula).

No.	Wastewater Projects	No. of Treatment Facility	Capacity (CMD)
2037-2041			
Water Reclamation Facility			
1	Caloocan North (WRF 1)	1	77,000

Table 4.32: 2037-2041 Wastewater Projects

From 2042 to 2046, two wastewater projects with a combined capacity of 113,000 CMD will be implemented to meet 100% wastewater coverage by the end of 2046, with 76% provided sewerage services (88% using the old formula).

No.	Wastewater Projects	No. of Treatment Facility	Capacity (CMD)
2042-2046			
Water Reclamation Facility			
1	Caloocan North (WRF 3)	1	76,000
2	Imus South	1	37,000

Table 4.33: 2042-2046 Wastewater Projects

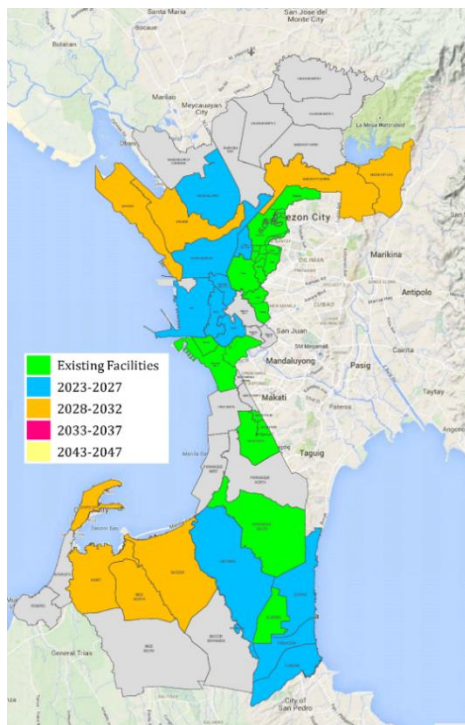


Figure 4.9: Service Area Map (EO 2031)

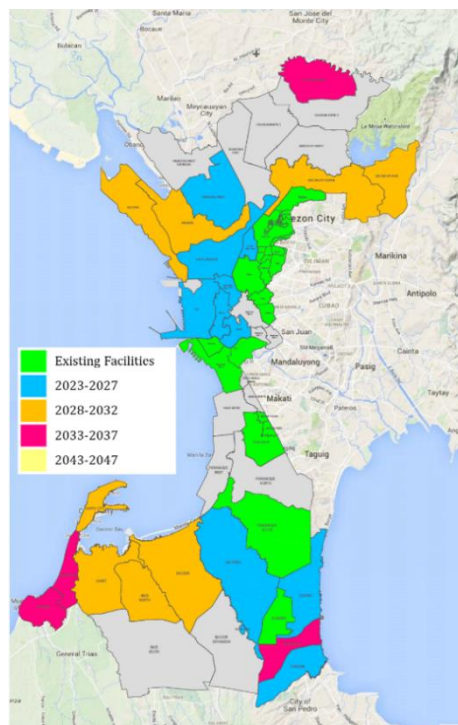


Figure 4.10: Service Area Map (EO 2036)

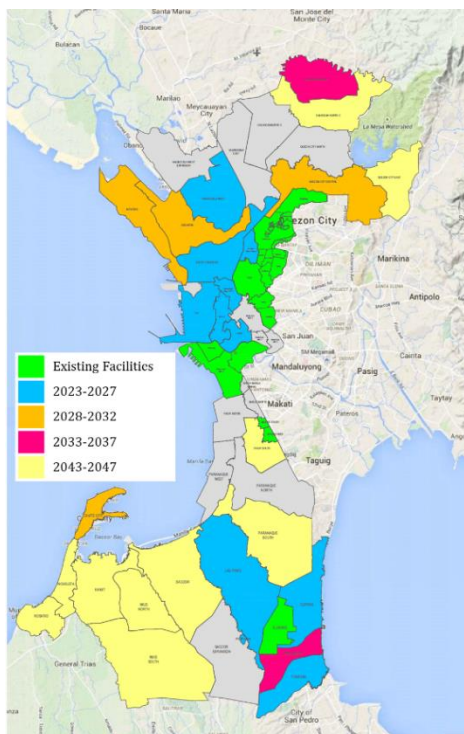


Figure 4.11: Service Area Map (EO 2046)

B. Sewer Service Connections

As part of Maynilad's SO, the installation of 2,000 NSSCs per year will continue until 2040. This will maximize the utilization of the existing sewer network systems and contribute to the increase in sewer coverage. With this, more wastewater from our customers will be conveyed and treated in our treatment facilities prior to its discharge in the receiving bodies of water.

C. Maintenance

In order to provide wastewater services in the West Zone, the Company must ensure that its facilities and equipment are utilized and maintained until the end of their useful life.

Maynilad, with the help of its Integrated Asset Management Team and Facilities Management Department, will continue to implement maintenance activities. This will ensure efficiency of ageing equipment and facilities and the proper maintenance of newly constructed treatment facilities. The plan will also involve not only the implementation of maintenance plans across all Maynilad facilities but also the purchase of pertinent machines such as sensors, analyzers and a variable frequency driver that can optimize plant operations and prolong useful life.

D. Asset Renewal Plan

Maynilad will continue to implement its asset renewal plans to ensure that assets perform the required function in a sustainable manner, while managing life cycle cost.

Moreover, the asset renewal plan will minimize hazards and risks to the safety of any person and their property as far as practicable. The plan seeks to deliver operational performance at efficient cost by ensuring that all decisions to replace or maintain assets are economical.

E. Process Improvement

Operation of WRFs will still continue until 2047. Process improvement projects will be implemented to enhance operational efficiency. Maynilad will ensure that all WRFs are operating at optimal performance.

With stricter environmental laws currently being implemented in the country, Maynilad conducted an in-house study to evaluate the existing facilities and their rehabilitation requirements in order to comply with general effluent standards. Another study is the creation of the ISMS that will focus on the effective utilization of sludge produced by all Maynilad facilities.

F. Manila Sewerage Rehabilitation Project (former “CMSS Rehabilitation Project”)

As the separate sewerage system of Manila North Catchment (formerly CMSS) was constructed in the early 1900s, rehabilitation of its sewer network is vital. Maynilad will continue to implement rehabilitation programs in Manila North Catchment from 2027 to 2036 to ensure the reliability of the sewer network, and its capacity to accommodate additional wastewater from the increasing population of domestic customers and commercial establishments. Critical to the successful implementation of the project is the continuing support and cooperation of government agencies, barangays, and LGUs.

G. Sanitation Plans

As Maynilad will continue to provide sanitation services to customers not yet served by sewerage services, there will be a need for periodic re-fleeting of over 10-year-old VTUs used in the collection and transport of septage from households to the septage treatment facilities.

Aside from the VTUs, there will also be a periodic re-fleeting of other equipment such as (i) mobile grit washers that are used for cleaning and washing grit collected, (ii) backhoe and skid loaders for transporting biosolids to drying beds, and (iii) dump trucks for transporting biosolids to designated drying areas prior to hauling of an accredited service provider.

Chapter 5 Customer Experience and Retail Operations

In the first quarter of 2021, Maynilad's Customer Experience and Retail Operations Division ("CXRO") reorganized its 10 Business Areas ("BA") into two business districts (i.e., North and South) to better manage the water supply allocation and the network maintenance activities in their respective locations. The reorganization was also implemented to further improve the review and evaluation of the BA's financial targets and performance.

The North and South Business Districts are each comprised of five BAs. Each BA has four sections, namely, Commercial Management, Technical Management, Zone Management, and Administrative Services.

The CXRO also has three departments to provide strategic support to other facets of customer experience and retail operations, namely, Key Accounts Relations ("KAR"), Customer Experience ("CX") and Business Operations Central Services ("BOCS").

KAR serves as the main touchpoint of Maynilad's top accounts and provides them the necessary account management services. CX develops and implements customer service strategies, and customer-focused programs and projects, aimed at further raising the level of overall customer experience for Maynilad customers. BOCS serves as the overall support to CXRO and provides strategic and support services to the business districts, BAs and external customers through contact center operations, including social media interactions.

I. Customer Classification

Water/sewer service accounts are classified into four categories, depending on the economic activity being undertaken in the dwelling or establishment. These categories are (i) Residential, (ii) Semi-Business, (iii) Commercial (Business Group I) and (iii) Industrial (Business Group II).

A. Residential

This classification is for water/sewer service for the domestic/sanitary use of a person, family or group of families living in one structure, compound, apartment, multi-storey building or subdivision which is clearly designed, built and used only as a domicile. This also applies to charitable institutions that use water exclusively for domestic/sanitary purposes.

Domestic/sanitary purposes include cooking, washing, bathing, flushing, laundry, and maintaining the swimming pool, lawn and/or garden, all for the use of the permanent residents, their guests and domestic helpers only (workers are excluded).

The Residential type is either (i) "individual dwelling units" or (ii) "multiple dwelling units" which may either be vertical or horizontal.

Vertical dwellings include high-rise buildings (condominiums)¹ and low-income housing projects (BLISS Housing). On the other hand, horizontal dwellings include subdivisions, villages, townhouses, low-income housing projects and blighted/low income communities.

B. Semi-Business

This classification is for water/sewer service that is for the use of any person, establishment or institution engaged in small or marginal non-domestic/economic activity. Small scale (home-based) businesses, premises devoted to religious worship and/or activities, and certain government institutions that meet the requirements under the RO's Implementing Rules and Regulations Nos. 2013-02, 2013-03 and 2013-07, respectively, fall under this category.

C. Commercial (Business Group I)

This classification is for water/sewer service that is for the use of any person, establishment or institution, whether private or public, that is engaged in non-domestic/economic activities (e.g., banks, shopping malls, hospitals, schools, restaurants, hotels and others).

Establishments that are classified in the Philippine Standard Industrial Classification ("PSIC") under agriculture, fishery and forestry, wholesale and retail trade, transportation, storage and communication, financing, insurance, real estate and business services, community, social and related services are all included under the Commercial group.

D. Industrial (Business Group II)

This classification is for water/sewer service that is for the use of any person, establishment and institution, both private and government, that is engaged in the conversion, transformation or processing of goods from one form to another of higher economic value.

Establishments classified in PSIC under mining and quarrying, manufacturing, electricity, gas and water, and construction are included in the Industrial group.

Condominiums, high-rise and other multiple dwellings still under construction and are intended for sale or lease shall be classified under this category.

¹ Subject to the qualifications stated in the IRR No. 2013-04.

The initial rate classification for newly constructed and unoccupied buildings shall be determined based on the ratio of residential to non-residential units as built and/or sold.

Of the four categories, residential customers contribute the highest billed volume and revenues, followed by the commercial customers.

As of December 2021, Maynilad's customers totaled 1,501,371 WSC, of which 95.52% are domestic customers consuming about 435.88 MCM of water.

Table 5.1 below summarizes the number of Maynilad's customers per category and their respective billed volume and revenue contribution for 2021.

Customer Category	Billed Services (As of Dec 2021)		Billed Volume (Dec 2021)		Billed Revenues (Dec 2021)	
	Accounts	%	MCM	%	M₱	%
Residential	1,385,247	92.26%	399.94	76.96%	11,836.84	54.84%
Semi-business	48,875	3.26%	35.94	6.92%	1,502.43	6.96%
Commercial	56,509	3.76%	59.27	11.41%	5,670.73	26.27%
Industrial	10,740	0.72%	24.50	4.71%	2,573.63	11.93%
TOTAL	1,501,371	100%	519.65	100%	21,583.63	100%

Table 5.1: Contribution by Customer Category

In addition to supplying potable water, Maynilad also provides sewerage services to customers that can be connected to available sewerage systems. Sewered customers are those connected to sewerage systems that convey wastewater from households to facilities where wastewater is treated before being discharged to the receiving bodies of water.

Majority of the unsewered customers fall under the Residential category, followed by Semi Business, Commercial and Industrial. The same ranking applies to sewerage customers.

Aside from offering sewerage services to its customers, Maynilad offers septic tank cleaning or sanitation services to all of its customers in unsewered areas at regular intervals of five (if outside the combined system) to seven years (if within a combined system), as the case may be.

Table 5.2 below shows the unsewered and sewerage billed services per customer category.

Customer Category	Billed Services (As of Dec 2021)	Ave Tariff/cu. m. (EO Dec 2021)	Billed Services (EO Dec 2021)	Ave Tariff/cu. m. (EO Dec 2021)
	UNSEWERED		SEWERED	
Residential	1,320,955	29.31	64,292	34.00
Semi-Business	44,732	42.23	4,143	39.68
Commercial	47,471	92.42	9,038	107.55
Industrial	9,822	104.33	918	116.44
Revenue ₱/cu.m.	1,422,980	39.94	78,391	58.54

Table 5.2: Customer Profile

II. Historical Performance

In 2018, Maynilad's actual billed volume was at 527.15 MCM, only 0.74 MCM short of its target for that year. The following year, raw water shortage from Angat and Ipo Dams severely limited Maynilad's water production. Consequently, Maynilad missed its billed volume target for 2019.

2020 ushered in the Covid-19 pandemic and the restrictions implemented by the government in 2020-2021 constrained some establishments to effect temporary, and in some cases, permanent closure of their service connections. The consumption of non-domestic accounts significantly decreased.

This 2022, it is expected that most establishments will re-open and resume operations. Maynilad hopes that the resumption of business activities will increase the consumption of its non-domestic accounts, and will eventually allow Maynilad to increase its billed volume closer to its target volume.

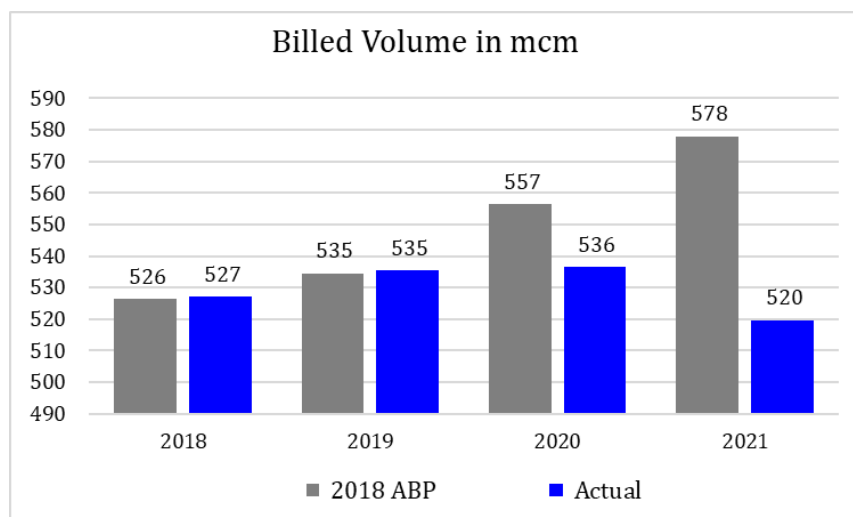


Figure 5.1: Target vs. Actual Billed Volume for 2018-2021

III. Service Area Division and Clustering

To improve the management of water supply and the coordination with the LGUs, Maynilad divided the West Zone into 10 BAs based on territorial boundaries. The cities/municipalities that each BA covers are presented in Table 5.3 and Figure 5.2 below.

Business Area	City / Municipality
Navotas/South Caloocan	Southern part of Caloocan, Navotas, and a small portion of Quezon City
Malabon/Valenzuela	Malabon, Valenzuela, and a small portion of Caloocan City
South Quezon City	Southern part of Quezon City
North Quezon City	Northern part of Quezon City
North Caloocan	Northern part of Caloocan City
Manila	Manila
Parañaque-Pasay/Makati	Makati, Parañaque, Pasay and a portion of Muntinlupa and Las Piñas
Muntinlupa-Las Piñas	Muntinlupa and Las Piñas
East Cavite	Bacoor and Imus
West Cavite	Cavite, a portion of Imus, Kawit, Noveleta, and Rosario

Table 5.3: BAs and the Cities/Municipalities Covered

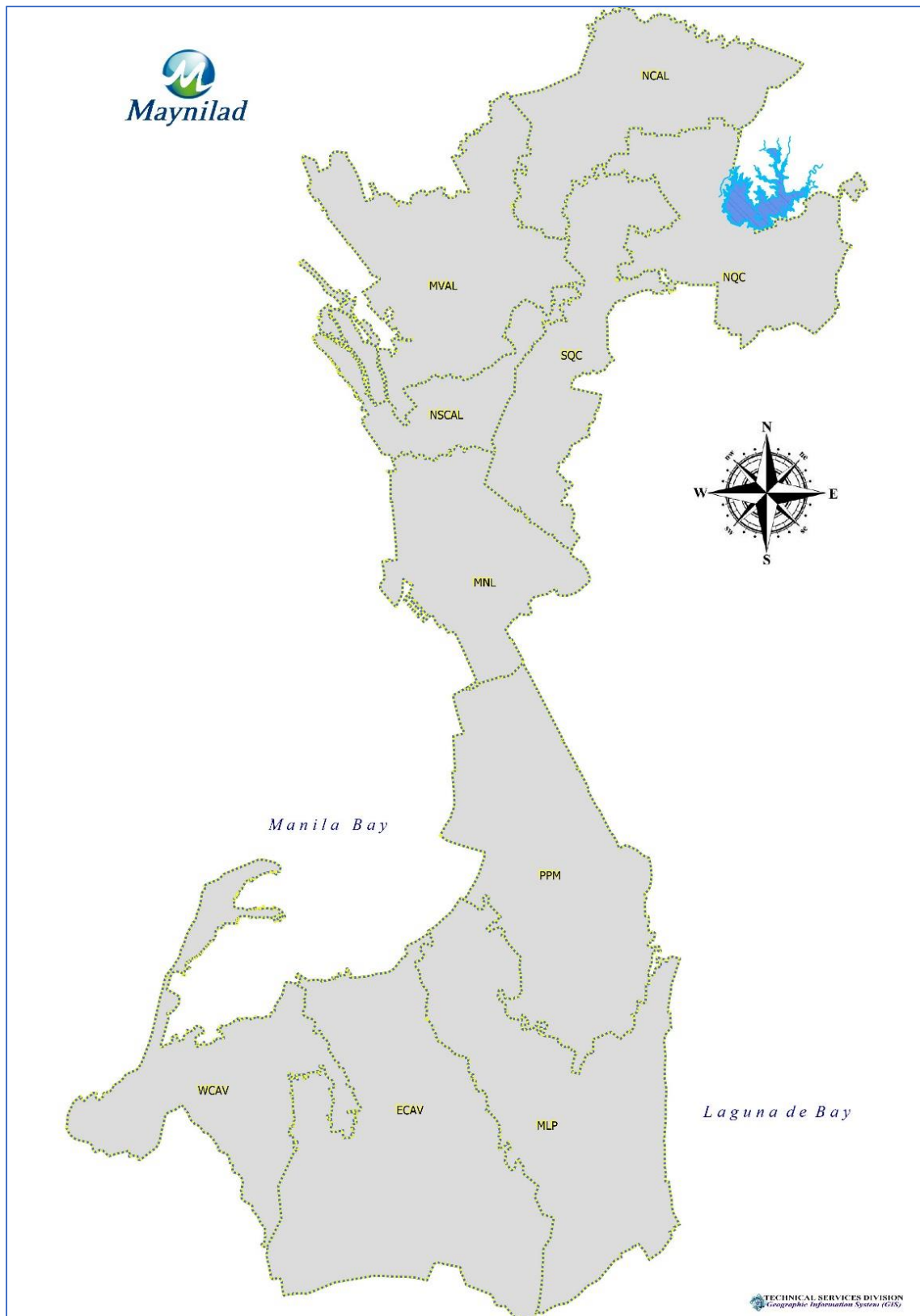


Figure 5.2: Concession Area Divided per BA

Each BA serves 150,000 customers on average, and is subdivided into zones, each servicing around 27,000 accounts.

As of December 2021, Manila BA has the highest number of accounts, with 195,856, while West Cavite BA (which is the expansion area of Maynilad) has the least, with 47,769.

The table below shows the BAs in the West Zone with their corresponding number of billed services, average consumption, service levels and average DMA-NRW, as of December 2021.

Business Area	Billed Services (As of Dec 2021)	Average Daily Consumption (cu.m. per day)	Water Availability (24 hours %)	Average Pressure (24/7psi %)	DMA-NRW (Ave %)
Navotas/South Caloocan	128,973	0.82	100.00%	95.49%	26.43%
Malabon/Valenzuela	175,265	0.87	80.57%	86.34%	36.27%
South Quezon City	162,849	0.89	92.38%	92.45%	43.69%
Manila	195,856	1.25	99.56%	93.04%	38.45%
East Cavite	108,057	0.68	90.58%	76.36%	19.76%
North Quezon City	175,861	0.80	99.34%	95.83%	25.71%
Parañaque - Pasay/Makati	178,502	1.31	100.00%	71.09%	27.52%
North Caloocan	152,022	0.81	71.43%	78.52%	30.41%
West Cavite	47,769	0.95	100.00%	94.00%	13.01%
Muntinlupa-Las Piñas	176,217	0.87	95.37%	50.12%	38.03%

Table 5.4: Billed Services, Average Daily Consumption and Service Levels and Average DMA-NRW per BA

IV. Supply, Network and Project

Each BA maintains its distribution facilities and WSCs. Usual maintenance activities include declogging of water service pipes, decommissioning of old and dilapidated mainlines, insertion of valves, raising of manholes and replacement of fire hydrants.

Discussions on the BAs' profile as of December 2021 and projects in the next five years are presented below.

A. North Business District

The North Business District is a combination of pump-fed water supply (from North A, B and C Pumping Stations (“**PS**”) sourcing water from (i) LMTP 1 and 2, and (ii) gravity-fed from Bagbag Reservoir.

1. North Caloocan BA (“NCAL**”)**

NCAL is composed of 23 barangays, and occupies a land area of approximately 40.32 sq. km.

NCAL has 152,022 WSC, of which 98% are domestic and 2% are non-domestic accounts.

NCAL’s water supply comes from La Mesa North A and B PS and North A-Annex (Sacred Heart PS and Gravity Reservoir). 71.43% of NCAL customers enjoy 24-hour water supply. The average DMA-NRW is 30.41%.

From 2017 to 2020, NCAL implemented pipelaying projects at (i) Sixta Matias and St. Thomas, North Olympus Phase 3, and installed 750 NWSCs (ii) Dolmar Goldenhills 2 Subdivision, and installed 280 NWSCs, and (iii) Union Workers Subdivision, and installed 250 NWSCs. The pipelaying projects have a total length 6.5 kms.

From 2017 to 2021, in order to rehabilitate the DMA, improve the water supply and reduce the NRW level in the area, Maynilad, through its Central NRW (“**CNRW**”) Division, implemented total pipe replacement (“**TPR**”) and partial pipe replacement (“**PPR**”) projects, amounting to ₱38.41 million, in (i) HS Zabarte in Castle Spring Subd., Gloria Ville Subd., along Yakal St. in Brgy. 188, Airos Subdivision, and (ii) HS Camarin under Camarin Road/Barugo St. (Matarik Bldg.).

Maynilad is currently implementing TPR and PPR projects along PH9 PKG8 Bagong Silang, St. Dominic St./Barracks Road, Uyguangco Tala, Kanlaon St./Langit Rd., Zapote Camarin Area, and in Congressional area. These projects aim to recover 1.2 MLD of NRW.

2. Navotas-South Caloocan BA (“NSCAL**”)**

NSCAL has an approximate land area of 18.74 sq. km. and serves 183 barangays.

NSCAL has a total of 128,973 WSC, of which 95% are domestic and 5% are non-domestic accounts.

NSCAL's water supply comes from Bagbag Reservoir (gravity-fed system). 100% of NSCAL's customers enjoy 24-hour water supply. The average DMA-NRW is 26.43%.

Maynilad implemented various service level improvement ("SLI") projects in NSCAL from 2017 to 2021, such as (i) TPR and PPR projects of about 31,240 linear meters of newly laid pipes; (ii) additional short mainline extensions; (iii) meter replacements; and (iv) other related rehabilitation activities.

In 2021, Maynilad completed two restoration activities under HS C3 and HS 7th Avenue. These projects enabled Maynilad to recover NRW.

Maynilad is currently implementing the following SLI projects in NSCAL: (i) HS Susano in Hillcrest Subd., (ii) HS 7th Avenue along 8th/7th St., and (iii) HS C3 along Tanigue East/Dagat -Dagatan.

To further improve the service levels in NSCAL, Maynilad will implement the following: (i) TPR of ACP in selected locations and of galvanized iron pipes in areas of South Caloocan and Navotas City, together with upgrading of pipe sizes; (ii) Replacement of meters; (iii) Pressure management activities; (iv) Internal programs (e.g. Collection of Arrears, Zone Visitation); (v) Campaigns against illegal connection and water meter tampering (e.g. Ikutin, Kapain, Salatin at Hugutin ang ulo ng metro program); and (vi) Analysis of the needs and behavior of big accounts to determine other business opportunities.

3. Malabon-Valenzuela BA ("MVAL")

MVAL serves 54 barangays and covers an approximate land area of 57.83 sq. km.

MVAL has a total of 175,265 WSCs, of which 95% are domestic accounts and 5% are non-domestic accounts.

MVAL's water supply comes from North B PS and Bagbag Reservoir (gravity-fed system). 80.57% of MVAL's customers enjoy 24-hour water availability. The average DMA-NRW is 36.27%.

From 2017 to 2021, Maynilad implemented pipelaying expansion projects at (i) Green Meadows, and installed 200 NWSCs, (ii) La Mesa St. reinforcement for AMVACA Subdivision bulk water supply agreement for 1,000 accounts, (iii) De Gula Compound and installed 244 NWSCs, and (iv) Disiplina Village Phase 2 and 3, Bignay in Valenzuela City. Maynilad also reinforced a pipeline at F. Alcanar

Wawang Pulo in connection with the bulk water supply to Obando Water District and Plastic City Industrial Compound.

To reduce the NRW level in MVAL, Maynilad is currently implementing a PPR project under HS Paso de Blas under two DMAs along Pinagbayanan and Lingunan.

To obtain an accurate computation of the actual supply in the DMAs, Maynilad will implement, beginning 2022, EMF replacements in McArthur South, McArthur North, Gov. Pascual, JP Rizal, Victoneta Ave., Letre, Que Grande, CJ Santos and 38 other locations.

In the next five years, Maynilad will prioritize water loss recovery or NRW management and service expansion programs in MVAL.

4. South Quezon City (“**SQC**”)

SQC serves 54 barangays, and has an approximate land area of 36.51 sq. km.

SQC has a total of 162,849 WSCs, of which 94% are domestic accounts, and 6% are non-domestic accounts.

SQC water supply comes from North B and C PS and Bagbag Reservoir (gravity-fed system). 92.38% of SQC’s customers enjoy 24-hour water supply. The average DMA-NRW is 43.69%.

To further improve water supply and pressure in its area, SQC implemented various pipe replacement projects, both total and partial from 2017 to 2019, including TPR projects at Brgys. Balon Bato, Tatalon, Manresa, Talayan, Sto. Domingo, Lourdes and Sitio Pajo in Quezon City, and PPR projects along Quirino Highway in Brgy. Bahay Toro and Brgy. Sauyo.

In 2021, Maynilad completed the PPR project along Cordillera St. at HS D. Tuazon Gravity, and recovered at least 1 MLD of NRW in the area.

To intensify NRW recovery and to further improve the service levels in SQC, Maynilad commenced TPR and PPR projects at (i) HS Quirino along San Pedro 9, (ii) Rockville, Rainbow-1, (iii) St. John Mendez, and (iv) Edsa Greenways Project of DOTR, Baler/Roosevelt.

To enhance the monitoring of the water supply in SQC, Maynilad will replace 14 EMFs in various locations.

5. North Quezon City BA (“**NQC**”)

NQC serves 17 barangays, with a land area of 38.45 sq. km.

NQC has a total of 175,861 WSCs, of which 97% are domestic accounts, and 3% are non-domestic accounts.

NQC water supply comes from North A and C PS. 99.34% of NQC’s customers enjoy 24-hour water supply. The average DMA-NRW is 25.71%.

In 2017, the replacement of old and existing ACP lines and SLI projects along Dahlia Avenue and Lilac Street in Brgy. Fairview, Winston Street, and Dona Carmen in Brgy. Commonwealth were completed. These significantly lessened the numerous mainline bursts in the area.

In 2019, as part of its program to bring water to more communities in Quezon City, Maynilad spent around ₱6.8 million to provide clean water to a large number of informal settlers in Quezon City. Maynilad completed pipe expansion projects in seven socialized housing projects, namely, Bistekville 25, Bistekville 29, Bistekville 14, Bistekville 27 in Brgy. San Agustin Gulod, Bistekville 22 and Bistekville 28 in Brgy. Nagkaisang Nayan, and Bistekville 24 in Brgy. Kaligayahan. By the end of 2022, Maynilad expects to complete its pipelaying project in Bernarty Subdivision in Brgy. Bagbag.

From 2019-2021, Maynilad was able to complete in NQC a total of 20 TPR and PPR projects. This allowed NQC to recover NRW losses and to generate additional billed volume.

Maynilad is currently implementing four TPR and PPR projects under (i) HS Dahlia along Greenview 1 and 2, (ii) HS Winstons along Luzviminda, (iii) Senatorial, and (iv) under MRT 7 along Commonwealth. These projects will reduce NQC’s NRW level, will add to its current supply, and will improve its service levels.

In the coming years, NQC will continue to undertake projects that will allow it to maintain a sustainable water supply in its area, and further improve its service levels.

B. South Business District

South Business District is both (i) gravity-fed (where flow is regulated by PRVs and valve adjustments for optimal water distribution), and (ii) supplied by surface water from LMTP 1 through the Villamor, Pasay and Pagcor PS. Some

areas source their water supply from the Putatan WTP, while certain pockets of the district are still served by deep wells.

1. Manila BA (“**MNL**”)

MNL serves 798 barangays and has an approximate land area of 38.83 sq. km.

MNL has a total of 195,856 WSCs, of which 91% are domestic, and 9% are non-domestic accounts. MNL’s water supply comes from Bagbag Reservoir; 99.56% of MNL’s customers enjoy 24-hour water supply. The average DMA-NRW is 38.45%.

In June 2018, Maynilad completed the pipelaying project along Dubai Main Road Segment 2 in Baseco Compound, Port Area. This is the extension of the original 200-mm PVC pipe laid in 2016.

From 2018 to 2021, to improve the water supply and reduce the NRW level, a TPR of the temporary facilities was implemented in some portions of Tondo and Sampaloc. Maynilad accomplished two PPR and TPR projects in the area along A. Bonifacio and UN Ave. Manila.

This year, Maynilad is currently implementing two NRW projects in HS Balut along Rodriguez/Guidot. The realignment of a 500m steel pipe due to NLEX ramp reconstruction shall also be undertaken.

In the next five years, MNL is set to further reduce its NRW level by rehabilitating its DMAs. MNL will also continue implementing its meter clustering and concrete pipe encasement activities in blighted areas.

2. Parañaque-Pasay/Makati (“**PPM**”)

PPM serves 226 barangays and covers an approximate land area of 66.67 sq. km.

PPM has a total of 178,502 WSCs, of which 95% are domestic accounts and 5% are non-domestic accounts.

PPM’s water supply comes from Villamor PS, Pasay PS, Pagcor PS, Putatan WTP. 100% of PPM’s customers enjoy 24-hour water supply. The average DMA-NRW is 27.52%.

From 2017 to 2018, Maynilad completed several short pipelaying projects to bring the much-needed potable water to mission areas such as BLS Annex 31 in Brgy. Marcelo Green and GK Ankop Homes, C5 Road

at Brgy. Sto. Niño Homes. These short pipelaying projects resulted in the installation of 349 individual WSCs.

From 2017 to 2020, Maynilad completed the TPR and PPR projects at various locations in Parañaque City and Makati area, namely: (i) Glacier St. in Brgy. Moonwalk, (ii) Hawaii Circle and Annex 45 in Brgy Sun Valley, (iii) Irene Village 2, Superville, Westborough, and (iv) Aquino Village in Brgy. Marcelo Green. The projects, which had a total pipe length of 26.12 kms and is expected to recover 4.37 MLD of NRW.

As of 2021, to reduce the NRW level, improve its service levels, and relocate an affected facility, Maynilad completed four NRW Projects under (i) HS Marcelo along Crimson Lane, (ii) HS Merville along Sitio Wella, (iii) HS MIA along South Pasay Makati area, and (iv) HS Sucat-Pasay along Evacom-Topland.

In the next five years, Maynilad will serve the water requirements of Pagcor City, a Las Vegas type of casino/resort/hotel complex and Aseana Business Park located at Macapagal Avenue, Tambo, Parañaque City, and the proposed 600-ha. beach front reclamation area from Mall of Asia to Marina Bay Area. To further reduce its NRW level, 15 NRW projects shall be undertaken.

3. East Cavite BA (“**ECav**”)

ECav serves 133 barangays and has an approximate land area of 85.07 sq. km.

ECav has a total of 108,057 WSCs, of which 98% are domestic accounts and 2% are non-domestic accounts. ECav’s water supply comes from Pagcor PS and Putatan WTP. 90.58% of ECav’s customers enjoy 24-hour water supply. The average DMA-NRW is 19.763%.

From 2017 to 2020, as part of Maynilad’s expansion projects, ECav contributed additional NWSCs from various open communities and subdivisions in Imus and Bacoar.

In the next five years, to further increase its billed volume and improve its service levels, ECav plans to (i) expand service coverage, (ii) replace pipes and (iii) construct PS.

4. West Cavite BA (“**WCav**”)

WCav serves 186 barangays and covers an approximate land area of 45.35 sq. km.

WCav has a total of 47,769 WSCs, of which 97% are domestic accounts, and 3% are non-domestic accounts. WCAV's water supply comes from Pagcor PS and Putatan WTP. 100% of WCav's customers enjoy 24-hour water supply. The average DMA-NRW is 13.01%.

To ensure sustainable water supply in the area, Maynilad is currently implementing secondary pipelaying works and interconnection at General Trias Drive in Rosario Cavite.

To reduce the NRW level in the area, Maynilad is currently implementing a project under CNRW at HS Aguinaldo South along Imus Town Proper.

In the next five years, WCav plans to implement expansion, pipe replacement and PS projects to further expand Maynilad's service coverage in the towns of Kawit, Noveleta and Rosario.

5. Muntinlupa-Las Piñas BA ("**MLP**")

MLP serves 29 barangays and covers an approximate land area of 69.40 sq. km.

MLP has a total of 176,217 WSCs, of which 98% are domestic accounts, and 2% are non-domestic accounts. MLP's water supply comes from Putatan WTP (from Laguna Lake) which serves mostly the Muntinlupa area. Supply from LMTP is distributed through Pagcor PS, Villamor PS and Pasay PS. 95.37% of MLP's customers enjoy 24-hour water supply. The average DMA-NRW is 38.03%.

From 2017 to 2020, MLP individualized the WSCs in Christianville Subdivision and Casimiro Village Phases 1 and 2 in Las Piñas City. Short pipelaying projects were also completed in Vera Ville Regency 1 and 2, Brgy. Manuyo Dos with 400 NWSCs and two large accounts for Pugad Lawin and Rebecca Dulo, Almanza Dos, both in Las Piñas City.

From 2020-2021, in order to reduce the NRW level, Maynilad completed six NRW recovery projects.

In 2021, the expansion project at Parkhomes Phase 3 and 4 was completed. In the same year, in order to address the frequent mainline burst within the subdivision, PPR projects in Greymarville, Southlane and Mother Earth in Las Piñas City were completed.

Currently, Maynilad is implementing six projects under HS Naga Loop along San Francisco Las Piñas, Southlane, J. Aguilar, Qurino Bridge, HS Quirino along Lopez Jaena and HS Putatan along Bautista Compound.

In 2022, to enhance the accuracy in the readings of the DMAs, MLP committed to replace 27 EMFs in various locations.

For the next five years, MLP will focus on SLI projects and recovery of water losses through, among others, the construction of a 150 MLD Poblacion WTP, TPR of 5.53-km primary lines, and PPR of 6.15-km secondary lines.

V. Customer Experience Initiatives

Maynilad has several touch points, which are as follows:

First is through the BA frontline services delivered by (i) customer relations specialists who assist walk-in customers, and (ii) zone specialists who visit the customers to solicit their feedback on Maynilad's water, sewerage or sanitation services, as the case may be.

Second is through Maynilad's contact center. Customer service representatives interact with customers through various platforms, such as inbound voice (hotline 1626), inbound non-voice mail (email (customer.helpdesk@mayniladwater.com.ph), SMS hotline (0998-864-1446) and social media accounts (Facebook and Twitter), and outbound voice (customer satisfaction survey and customer feedbacking).

Third is through the localized digital messaging apps such as Facebook's Messenger and Viber where customers may reach Maynilad through the latter's official social media accounts.

Fourth is through the Maynilad website which customers, clients, suppliers, and other stakeholders can visit to know more about Maynilad's business operations, corporate social responsibility updates and other related services.

Last is through the customer portal where enrolled customers may view the electronic copy of their SOA, receive various SMS notifications including payment reminders, and other related services.

In line with its shift to becoming a consumer marketing-oriented organization, Maynilad ensured that its BA offices are geographically accessible, and technically equipped to handle, process, and resolve inquiries, complaints and requests.

The following programs are currently being implemented to improve customer experience:

A. On-Site Meter Reading and Billing (Read-and-Bill “R&B” System)

Under the R&B System, meter readers from a third-party service provider, read the water meters of Maynilad’s customers, and immediately issue the SOA on-site.

Considering that the customers receive their SOAs on the same day that their water meters are read, R&B has significantly reduced the incidence of delayed issuance of SOAs and has allowed Maynilad to immediately address the customers’ bill-related concerns.

To make bills payment more convenient, Maynilad also partnered with several reputable payment facilities identified below and will continue to add more, especially on the digital space.

B. Customer Communication Portal (“CCP”)

CCP is a web-based portal where customers can enroll their account and enjoy different services such as viewing and downloading an electronic copy of their SOA, and receiving various notifications regarding the bill for the month, payment, and reminders for overdue obligations. This platform, which was developed in 2014, has already gained considerable traction. The CCP complements the Maynilad Alerts program; the customer enrolled in the portal (with mobile number) is simultaneously enrolled in the Maynilad Alerts, therefore allowing said customer to receive water interruption advisories via SMS, in addition to the other notifications received through CCP.

C. Payment Facilities

The BAs no longer accept bill payments, but several reputable payment facilities have been tapped so that customers are given a wide variety of options for paying their bills. These include the following:

Accredited Payment Outlets	
CIS Bayad Center	SM Department Stores (Bills Payment Counter)
	Robinson’s Department Stores (Bills Payment Counter)
	Authorized Third-Party Agents (TPAs)
7-Eleven	
Cebuana Lhuillier	
ECPAy	
LBC Outlets	

Mobile Fund Transfer	
Smart Money	
Globe GCash	
Bancet's Propriety Channels	
Paymaya	
Banks	
BancNet (all member banks)	ATM, Propriety Channels, www.bancnetonline.com , BancNet's Propriety Channels, online banking
RCBC	www.rcbc.com
BPI	ATM, www.bpiexpressonline.com , telephone banking (dial 89100), Credit Card/Auto Debit Arrangement
Metrobank	ATM, over the counter, Metrobank's Electronic Invoice, Presentment (<i>with enrollment</i>), Metro Collect Service, www.metrodirect.com.ph , Credit Card/Auto Debit Arrangement, telephone banking (dial 85700)
PNB	ATM, over the counter, telephone banking (dial 5738888)
Landbank	ATM, Landbank's On Line Collection (<i>with enrollment</i>), www.lbpiaccess.com.ph , telephone banking (dial 4057000)
Unionbank	ATM, Unionbank's Union Corporate Bills Payment (<i>with enrollment</i>), www.unionbankph.com , Credit Card/Auto Debit Arrangement
PSBank	ATM, www.psbank.com.ph
Banco de Oro	ATM, over the counter, www.bdo.com.ph , telephone banking (dial 6318000), Credit Card/Auto Debit Arrangement JCB, American Express, BDO Mastercard, and other BDO issued Credit Cards)
Bank of Commerce	ATM, over the counter, (<i>through enrollment</i>) www.bankcom.com.ph
Security Bank	ATM, over the counter, www.securitybank.com.ph
UCPB	Over the counter, Check Collect Service
RCBC Savings Bank	Over the counter
Citibank	Credit Card/Auto Debit Arrangement
East West Bank	Over the counter, www.eastwestbanker.com
China Savings Bank	Over the counter
Robinsons Bank	Over the counter
Planters Development Bank	www.planterbank.com.ph
Digital Partners	
CBCI Online Bills Payment	
CIMB	
Coins.ph	
Goodkredit	
Ibayad Online Ventures Mobile App	
Likecash	

Multipay (Grab, etc.)
Peppermint
Remitbox (Lazada)
True Money
Shopee Pay

D. Automated Customer Communication (“ACC”) System

ACC was developed in 2018 to provide a geographical representation of water interruption in a given area, at a given time. This is presented as an image in the Maynilad web map, and can be viewed by the call center agent, and the BA Commercial and Zone Management teams, to enable Maynilad to provide a faster and clearer response to the water supply concerns of our customers.

In 2020, the ACC was enhanced to enable it to provide real-time water interruption advisories to Maynilad’s customers, both for planned and unplanned interruptions. More than 50 notification spiels have been developed and pre-loaded in the ACC system, and can be issued, as necessary.

E. Continual Quality Improvement

To fulfill its commitment to deliver world-class customer service, Maynilad obtained international certifications in Quality Management System (ISO 9001:2008), Environment Management System (ISO 14001:2004), and Occupational Health and Safety Management (ISO 18001:2007) for its BAs. NCAL, which attained IMS status in 2011, was the first BA to receive triple ISO certifications.

As of 2016, all BAs are IMS-certified and the CXRO has QMS certification.

F. Customer Service Policies and Procedures

Customer Service policies and procedures are aligned with the MWSS-RO’s Implementing Rules and Regulations (“IRR”) on the following:

1. Disconnection and Reconnection of Water Service Connections (IRR No. 2013-01);
2. Rate Classification and Billing Scheme of Small-Scale (Home-Based) Business (IRR No. 2013-02);
3. Rate Re-classification for Places of Worship (IRR No. 2013-03);
4. Billing Scheme and Rate Classification for High-Rise and other multiple dwellings (IRR No. 2013-04);

5. Treatment and Rate Reclassification of Domestic Customers inside Military and Police Installations (IRR No. 2013-05);
6. Additional Water Meter and Transfer of Connection Tapping Point (IRR No. 2013-06); and
7. Rate Re-classification of Certain Government Institutions (IRR No. 2013-07).

Maynilad has improved on the following existing operation policies:

- (a) Handling of Service-Related Complaints and Concerns;
- (b) Special Privilege Given to Senior Citizens;
- (c) Handling of Billing Related Concerns;
- (d) WSC Application and Installation;
- (e) Writing-Off of Uncollectible Accounts;
- (f) Interconnection and Turnover of Water Reticulation System in Subdivision;
- (g) Disconnection and Reconnection of WSC; and
- (h) Rate Classification of Some Government Institutions.

Maynilad is committed to resolving and addressing customer concerns based on the standards set by the MWSS-RO.

G. Determining Customer Satisfaction

One of the Customer Contact Center programs of Maynilad involves the gathering of the latest input and feedback from its customers.

Gathering of feedback through daily outbound calls, monthly consolidation of findings, and quarterly analysis of results enable Maynilad to determine appropriate plans and programs for addressing short-term and long-term customer service concerns.

Customer satisfaction is also gauged based on the feedback obtained from parties who contacted Maynilad's call center. To determine if action was taken within the agreed turnaround time, call-outs are made after the lapse of the prescribed time to complete an activity.

H. Paperless Billing

In November 2021, Maynilad implemented the paperless billing project where about 15% of its billed services, as of end of December 2021, were enrolled. Under this program, the customers no longer receive the hard copies of their bills (SOA). Instead, customers receive an electronic statement of account (e-SOA) through their (i) accounts in the Maynilad portal, (ii) registered email address, and (iii) registered mobile number, through SMS.

Paperless billing, being contactless, reduced the risk of the transmission of the Covid-19 virus and other communicable diseases, between Maynilad field personnel and the customers.

With the reduced use of paper, paperless billing also allowed Maynilad to promote its environment-friendly and cost-saving initiatives.

I. Mobility Project

As part of the NextGen transformation strategy of Maynilad and to enable its field personnel to provide services to the customers more efficiently, Maynilad provided its zone personnel with 2-in-1 laptop computers, with the necessary Maynilad programs and systems, that they can use to create applications, requests and inquiry tickets, verify the status of applications and other requests, and provide real-time customer feedback while on-site.

J. Future Plans/Projects

Maynilad is adopting new technologies and approaches to make its operations more efficient and responsive to the changing needs of its customers. In the coming years, the Company plans to implement the following projects:

1. Workflow Management System (“WMS”) Improvements

WMS is a Customer Relations Management (“CRM”) tool that Maynilad uses to log customer applications for new service connections, miscellaneous applications, billing complaints, requests, and inquiries from all touchpoints. This allows the BA personnel to track and monitor the status of customer transactions.

There are three major enhancements lined up for WMS:

- (a) Operating System and Database Upgrade – This will provide better system capacity and speed for more efficient service to customers.

- (b) Full transition of CSIS to WMS. CSIS is a legacy system that caters to service-related customer concerns such as leaks. The initial transition that migrated vertical leaks to WMS was already implemented. However, full transition will include street leaks, service pipe leaks, hydrant leaks, other leaks, account verification/investigation, and request for certificate of desludging.
- (c) Full transition of Anti-illegal System (“AIS”) to WMS. The AIS captures and keeps historical records of an account with an illegal water service connection.

Parallel to these major enhancements, minor enhancements are also provisioned to ensure the sustainability and resiliency of our processes.

2. SAP Enhancement

SAP is Maynilad’s complete customer billing system where the meter reading and billing interface happen prior to the issuance of a SOA to the customer. Maynilad will implement the following enhancements in SAP:

- (a) Real-time payment posting. Currently, payments from the customer are transmitted by the official payment partners to Maynilad using a flat-file format per day (in three batches). Maynilad intends to collaborate with these payment partners and automate the transmission of payment from customers directly to Maynilad’s billing system in real-time. This will allow Maynilad to respond faster to customer’s requests for re-opening, billing inquiries, etc.
- (b) The calculator used for computing under-collection charges and penalties for illegal connections residing in AIS will be migrated to SAP. The result of the computation will be automatically integrated with WMS. This information will be useful especially in the processing of applications for NWSC or for other miscellaneous services, where securing of clearance against any illegality is a pre-requisite.
- (c) There are also provisions for enhancements that are driven by regulatory and legal requirements, i.e., local franchise tax, etc.

3. ACC System Enhancement

Currently, the information that the system provides is limited to the advisory that is sent out by the system to the Smart Communications Gateway. The goal is to harmonize these systems and develop a report that the information received by the gateway is likewise received by the customers. The system is still in its early phase and comprehensive reporting will be developed to reflect proof of delivery to the customer.

4. Maynilad App

The digital ecosystem included in Maynilad's Customer Experience roadmap triggered the development of the CCP into becoming the Maynilad mobile app. This platform will be converted to a mobile app to cater to digital transactions. The Maynilad App will not only include the current services in CCP, but will also allow the customer to receive push notifications about billing, applications, water interruption schedules. It will also provide the customer (i) the platform through which he/she can pay his/her Maynilad bills digitally, and (ii) a ticketing system for the filing of service applications, among others. This will empower the customer to experience Maynilad's services at their fingertips.

5. Maynilad Chatbot

Maynilad plans to implement the Maynilad Chatbot, primarily to help reduce the traffic in the transactions done through Maynilad's social media accounts, which are currently being handled by the call center. The Maynilad Chatbot can answer almost all types of inquiries from billing, leak, application, reconnection, disconnection, etc., and will integrate to SAP, ACC, WMS, CCP to make it robust in handling inquiries. This will allow the call center to focus more on strategic transactions.

6. Zone Accounts Management System ("**ZAMS**") Enhancement

ZAMS has been part of CXRO as its way of proactively addressing potential billing complaints that may arise. Using 11 pre-defined post-analysis scenarios, the BA Commercial personnel will extract the customer billing data manually on a daily basis, load it in a structured excel program, analyze then endorse investigation orders to the zone personnel for site investigation. The plan is to automate this manual process, i.e., data extraction, loading, and analysis to enable Maynilad's zone personnel to become more efficient.

The work ordering process will eventually be integrated with WMS.

7. Mobility Project

Maynilad provided its zone personnel with 2-in-1 laptop computers, with the necessary Maynilad programs and systems to enable them to provide services to the customers more efficiently. For 2022, Maynilad will evaluate the effectivity of the Mobility Project, and improve further, as needed.

8. Competency Intervention Program

Maynilad understands the value of people empowerment. Along with the process efficiency initiatives that the Company undertakes, Maynilad also implements programs to further develop its human resources. About 270 zone personnel have undergone competency upgrading and training. From 2022 onwards, these 270 zone personnel will undergo an assessment to gauge their level of learning against the desired level of competency.

In addition, training programs for commercial, technical, and administrative personnel will be implemented to ensure that the people driving the business are all competent and equipped with the relevant skills and capabilities.

9. Customer Analytics

Maynilad has aspired to utilize the existing customer data into something that could guide the organization in making informed decisions and managing business risks. Hence, Maynilad will venture into the customer data analytics exercise using predictive methodology as an approach. The goal is to develop a solid data science objective that will guide Maynilad in forming different data sets (internal and external) that, when structured properly, will give it the ability to do forecasting from consumption, collection, customer experience, disconnection, meter management, and go into partnerships with different industries.

10. SharePoint Portal Enhancement

SharePoint is a web-based portal designed as a central repository of all business documents and records for each BA office. The BAs, through their respective documents records custodians, are expected to upload various files in electronic copy, maintain and update their folders periodically. This will reduce carbon footprint and storage issues in the BA offices. Future enhancement for the user interface and utilization of reporting mechanisms is planned.

11. Outsourced Annual Customer Satisfaction Survey

A customer satisfaction survey will be implemented every five years to measure improvements made in the areas of product, process, and people through a reputable third-party service provider.

12. Digital Payment

Maynilad will encourage its customers to shift from the typical over-the-counter payments in Bayad Centers to digital platforms, i.e., Pay Maya, GCash and other digital wallets. This will promote collection efficiency as this will allow the Company to reduce its expenses related to payments collected by over-the-counter payment partners.

Chapter 6

Service Information

I. Information Technology (“IT”) and Industrial Automation and Plant Automation Design (“IAPAD”) Strategic Roadmap

A. General IT Strategy

IT is particularly difficult to predict beyond a five-year horizon. However, for the purpose of this revenue cycle, Maynilad will focus on two aspects:

- Emerging technologies; and
- Impact on Maynilad’s SOs in either reducing the overall costs of doing business or providing better service to its customers.

In general, Maynilad will leverage on the falling prices of infrastructure per gigabyte of transaction, i.e., exponentially large amounts of computer processing power one can get for similar costs today. At the same time, the new computing power will enable a number of new applications.

Maynilad needs to continue and even accelerate its spending on technology that (i) reduces the overall cost of doing business, (ii) brings more efficiency to its operations, and (iii) provides added value to the Company’s services. The core business of water and wastewater services has not changed over 100 years, but the technologies used to manage it are continually evolving, and it is to Maynilad’s advantage to harness these.

IT is becoming more and more relevant to the business today, so much so that it is almost unthinkable to manage a large business operations such as Maynilad’s without proper IT.

After five years, the investments necessary for Maynilad’s business operations are even more difficult to predict, however, our planning for Maynilad’s IT strategy will be driven by the following general guidelines. Firstly, most of the core systems in Maynilad ITS should already be in place, save for any radical technology that would be invented including, the core IT transactional systems, as well as the automation systems. Having said this, the following are Maynilad’s IT plans until 2046:

- Automation systems for new facilities that shall be put up by Maynilad, both in wastewater and water supply.
- Infrastructure revamp: servers, network switches, laptops, storage and other existing technologies will be declared obsolete eventually and support shall be stopped, therefore, these would need to be replaced.

- Application updates and upgrades – similar to infrastructure, applications will be eventually outdated and out of support, these will need to be upgraded, or if not possible, replaced with their nearest equivalent.
- Data Analytics and Business Intelligence – as transactional systems are already in place, analytical tools are needed to understand the data behind them and use the information gathered to make good business decisions. Data analytics will span across the entire business and will be continuously expanded and further refined as new tools become available for implementation.
- Customer service – new channels, modes and processes designed to facilitate interaction with the customer for payments, account processing, information on outages and other incidents shall be further enhanced
- New customer interaction channels – Facebook and Twitter are popular today, but as these evolve, Maynilad must continuously adapt and invest in order to connect and process interactions through other channels that we may have in the future.

B. Benefits from investing in IT

The benefits that Maynilad expects to receive from investing in IT include the following:

1. Reduction of overall personnel costs through automation

Automation of processes enables Maynilad to expand and increase its service levels without increasing its manpower. This includes:

- (a) instrumentation and automation of its facilities and plants at the industrial control level through the IAPAD Department; and
- (b) automation of the business processes involved at the office level.

2. Traceability and Accountability

Paper is hard to track for audit purposes. However, transactions being done on-line carry a person, date, and time stamp, which can be referred to, if needed.

3. Analysis of Data

A massive amount of data is recorded once it is put into IT/IAPAD systems. These data can be extracted, and using advanced analysis and reporting tools, can be used to determine the best operational parameters to use. This

information may also be used to identify patterns in reducing fraud, customer arrears and non-payment, among others.

4. Customer Service

Improved customer service may be attained by facilitating the user's accessibility to information such as past consumption and billing information, among others, as well as making accessible more channels that customers may use for inquiries, requests and other concerns. In making this information more pervasive and reachable to the customer, greater transparency and responsiveness is perceived by the customer.

5. Disaster Recovery

Climate risks in the Philippines are unavoidable and increasing in occurrence and intensity; it is just a matter of when a climate-related calamity strikes. As such, the necessary IT infrastructure needs to be put in place so that when this occurs, Maynilad is prepared in recovering important data. This includes restoration of customer data records, billing, as well as other critical operational data.

6. Security

This is a necessity that needs to be addressed. IT security breach attempts have now become more sophisticated. Maynilad needs to safeguard its customer information, and prevent its operational systems from being compromised.

7. NRW Reduction

Advanced tools (software and hardware) allow for detection of possible points in the network where these leaks or fraud may actually be happening. These tools are continuously evolving and improving.

C. Accomplishments for the Fifth Rate Rebasing Period

In the Fifth Rate Rebasing Period, Maynilad invested in and completed the implementation of a number of state-of-the-art technologies that have resulted in additional benefits in the way it does business. Some of these are the following:

1. Back-end systems and implementation of new modules in the Enterprise Assets Management ("**EAM**"), Meter to Cash ("**M2C**") and Contracts to Payment ("**C2P**") process areas, enabled mobile workforce and master data cleanup/ governance.

New transactional modules and functionalities were implemented in our system to cover the maintenance processes of all of the Company's WTPS and WRFs as well as the pipeline networks across the West Zone. Included in the scope of the project was the maintenance of above-ground and underground assets. The new features include the Incidence Management, Maintenance Planning, Corrective Maintenance, Work Order, Preventive Maintenance, Fixed Assets, Procurement of parts/spares, Equipment hierarchy, Integration with our IOT platform (FieldMous), Reports, Linear Asset Management and Manpower work allocation planning. This allowed Maynilad to manage and track inspection, maintenance, and repair activities in its system, thus, eliminating unforeseen, disruptive and costly equipment downtime and unavailability. Workforce mobility was enabled for Maynilad's internal maintenance team. They were provided access to the system while on the ground/at the plants. They have access to work orders via a tablet while in the plant.

Equipment and Materials Master data cleansing and standardization were also done. This is to ensure that all equipment, linear assets and spare materials are all standardized prior to uploading into the system. This will enable the system users to generate accurate reports and transactions in the system.

New features supporting key aspects of Maynilad's M2C process have also been implemented in its system. This allowed for greater operational efficiency, alongside better controls and transactional visibility. This is part of a three-phase roadmap planned for Maynilad's core commercial system.

2. Business Intelligence and Data Analytics

Multiple projects have been implemented for Finance, Commercial Operations and Human Resources, providing daily operational reports, monthly summaries and dashboards, giving factual and up-to-date status and data driven insights on commercial operations for billing, collections, consumption, human resource demographics and other important information. Data Analytics were initiated as well for Water Service Operations Division and Integrated Meter Management Department.

3. Customer Relationship Management System and CCP

Maynilad has employed several solutions for customer management and its application in the creation of new water and sewer accounts, changes to customer records, handling of customer inquiries and requests, and reporting of incidents of leaks, illegalities, and others. This system needed an upgrade to the latest software version. Thus, Maynilad took the opportunity to upgrade, as well as improve, the processes in the new system. Due to the number of processes involved, the project would be implemented in multiple phases. Phases 1, 2 and 3 have been completed. The SMS sending capability to inform

customers of their open requests, concerns and inquiries was also implemented.

The CCP, which sends automated bills to customers via SMS, email and their access to a portal, was also enhanced during this period. When the pandemic struck in 2020, it was vital for Maynilad to provide timely and correct bills/SOAs to its customers. This functionality was enabled by this system, which was also upgraded during this time. A paperless billing functionality was added to the function of the CCP in order to lessen the physical contact with and exposure of the customers to the meter readers during the pandemic. This also reduced the carbon foot print by reducing the use of paper.

The use of chatbot will be implemented in 2022 to guide customers in their online queries with Maynilad. The chatbot will enable customers to virtually interact with Maynilad. Customer inquiries are directed through the chatbot depending on the type of their inquiry. In addition, customers can also report service interruptions in their area via the chatbot. These reports will then be sent to the Customer Relationship Management System.

The Maynilad App will also be implemented in 2022. It is intended to serve as an improved version of the CCP. Maynilad will cease to use the CCP once the Maynilad App goes live. Customers can use the app and will be able to receive on-time billing notifications, water service interruption notifications, view their bills on the mobile app, raise concerns-inquiries-requests through the app, etc.

Maynilad also implemented the ACC System to automate the selection of correct spiels for sending notices of water maintenance activities/interruption to customers, through user input. It also has the capability to send ad hoc notifications to customers for water maintenance activities. Maynilad employees can visually view the extent of various water maintenance activities through the integration of the ACC with the Maynilad Webmap functionality of the GIS.

4. FieldMous System (Internet Of Things platform-IOT)

This is the repository of big data from the field, and of all technical information received from field sensors, including water reservoir levels, flows along different pipes, pressure points and plant production. This will be further enhanced with more data from the field as they become available.

5. Knowledge-based Portal

Knowledge is the key asset of Maynilad, and in order to store and improve it, a document-management knowledge-based portal has been built where different operating units/ divisions can store operational information. In the

past five years, Maynilad was able to implement the Portals for CXRO, Integrated Asset Management Division, and enhance the features of Records Management Department which is responsible for storing all the Maynilad accounts-related documents. The ITS, IAPAD as well as the WSO Portals were upgraded to the latest version of the system.

6. Geographic Information System (“GIS”)

Maynilad’s current GIS was further enhanced and strengthened by upgrading the system to a more robust enterprise grade system. The upgrade allowed better integration of the GIS with other water systems such as the FIELDMOUS (Maynilad’s IOT Platform) and the NRW management system. The upgrade also provided a decentralized access (at the different BAs) allowing updating based on actual conditions on the field, rendering it more accurate. The existing GIS dataset was enhanced with a water industry standard data set, which makes it easier to synergize location data, whenever the need arises. The enhancement was conducted simultaneously with the upgrade of the system.

7. Leak Management System (“Netbase”)

This is a system used for detecting and managing water losses in the network and this was upgraded to the latest version of the software.

8. Software Upgrades/Updates

End of life software was replaced with the recent software version in order to ensure continued product support in case of product issues and bugs, optimize performance, and provide unhampered access to new features and updates, and compliance with security measures to prevent, address, or mitigate vulnerabilities. Having the recent software version will ensure that Maynilad systems can regularly get the patches being released by the vendor to ensure that any issues in the software are addressed. While this was not included in the original budget, it was imperative to upgrade all our Software to the latest version.

9. IT Operational Efficiencies

Critical commercial batch processes, including third party batch interfaces, e.g. banks and other payment channels, are now being run automatically based on event triggers and process dependencies, and are all being managed in a single console – the “IT Workload and Scheduling Automation Tool”.

Test automation tools have been fully implemented and the test automation process has been fully institutionalized. This adoption resulted in a more efficient testing process which consequently led to faster application support,

faster software bug correction, error-free deployment as well as opportunity to reduce manpower (for the testing and resolution of bugs).

10. Software Licenses

The Company purchased additional software licenses covering our customer billing and invoicing engine, Learning Management Software (“**LMS**”), and Application Lifecycle Management (“**ALM**”). The additional customer billing and invoicing engine licenses cover Maynilad’s actual and projected customer-based growth. On the other hand, additional LMS and ALM licenses have proven to be very beneficial in promoting operational efficiency, especially amidst the pandemic-related lockdown which triggered remote trainings, testing activities and project support.

11. Maynilad Intranet

All major facilities of Maynilad are now connected to its intranet via a fast fiber optic connection, while smaller facilities are connected via DSL/3G. This means all applications are now centrally located in a secure data center, without the need to replicate information in each office.

12. Routers and Switches

State of the art switches and WiFi routers replaced old residential-grade routers. The whole network may now be centrally controlled and managed without having to displace one’s self physically. Common log-in gave seamless and uniform access across the whole Maynilad intranet, regardless of which facility an employee may be in.

13. Storage and Servers

Out-of-maintenance servers were replaced with new, 10th generation servers. Likewise, the storage was upgraded based on a five-year storage projection, while the old storage was used for development and testing purposes only. All servers were virtualized to make full use of the flexibility that virtualization offers. Additional servers and storage were added to address the massive increase of data. The increase in the need for servers due to higher computing requirements from the new and existing systems contributed to the increase in the cost of Server Tech Refresh. This is also true for storage requirements due to the increase in the volume of data being stored, requiring a corresponding increase in the allotted cost for storage requirements. The increase is 20% and 30% respectively, from the budgeted cost under the Company’s CAPEX Program.

14. Phishing Simulator

With the emergence of phishing attacks and other cyber threats in the preceding years, it became imperative to spread cyber security awareness in helping employees recognize, avoid and report potential threats that can compromise critical business data and systems. This includes phishing, malware and other cybersecurity threats. Periodic simulation and training helped Maynilad's employees fight phishing attacks and promote a cyber security culture or mindset.

15. Penetration Testing

Because cyber-attacks are becoming the norm, it became more important to undertake regular vulnerability scans and penetration testing to identify vulnerabilities and ensure that the cyber security controls are working. This enabled Maynilad to detect recently discovered and/or previously unknown vulnerabilities. Part of its findings led to the strengthening and improvement of Maynilad's security controls and strategy.

16. Maynilad Central Control Room, SCADA and FieldMOUS

Through the SCADA with FieldMOUS, Maynilad is able to remotely control its automated water and wastewater facilities, thus, ensuring the facilities' continuous operation.

17. 3G Routers and Industrial Wireless

Remote water and wastewater facilities were connected to the Maynilad network through 3G routers, ensuring 24/7 connection and monitoring. Likewise, remote instruments inside and outside Maynilad facilities are connected to the control system through industrial wireless communication.

18. Digital Twin

A digital version of Maynilad's critical infrastructure, such as the water / wastewater treatment plants, was developed to improve and optimize the treatment plant operations without affecting the actual plant. This platform serves as a tool for process improvement, change management and the training of operators.

19. Treatment Plant Optimization through Automation

The control system and instrumentation of several Maynilad facilities were rehabilitated to achieve optimized operation and 24/7 reliability. These facilities are now operating automatically, guided by the operational parameters measured by the instrumentation installed.

These programs have resulted in significant efficiencies to Maynilad, including regulatory compliance, and were able to provide the necessary tools and support across the whole organization. Maynilad foresees continual improvements and enhancements to the foregoing infrastructure and systems.

D. Plans and Programs for the Sixth Rate Rebasing Period and Beyond

1. Information Systems

(a) Back-end Systems and New Modules

With the increasing number of projects, processes and data to be managed, the Company recognized the need for better coordination and data exchange among its operations, administration and accounting processes.

The strategy of the IT Services Division (“ITS”) is to centralize operational decision-making. Its goal is to collect, store, protect and make available, information for Maynilad operations, and improve risk analysis and decision-making by utilizing technology and system applications. This strategy allows Maynilad to integrate its day-to-day operations and improve the maintenance of its assets, thereby delivering better services to its customers.

Data is provided to the people who need it. The goal is to have accurate data available. Managing the data is crucial for process review and improvement, internal and contractor auditing, decision-making, and maintaining documents and records.

Maynilad has, and will employ, systems that align with this goal – integrating processes, solutions and data along the value chain. Information systems and technologies allow the support and maintenance of diverse processes such as meter-reading and billing, contract-billing, accounting, materials-planning, inventory/warehouse management, plant-facilities maintenance, HR management and project management. It ensures real-time collaboration, data integration and data transformation so that the departments that need the data can access it, understand it and fit it into their processes.

ITS employed innovative solutions in the area of data accessibility by enabling role-based access through multiple channels like desktops, laptops, tablets, phones, email and internet. This is done through Active Directory, SAP and its auxiliaries.

For the period 2023-2046, it is proposed that all back-end systems be reviewed every five years and enhanced, if necessary, based on the changes and improvements that will occur in the business processes. It is prudent to adjust the back-end systems according to the changing landscape, needs and processes of the business. The following modules will be reviewed and enhanced every five years: (i) Finance Management, (ii) Materials Management, (iii) HR Management, (iv) Enterprise Assets Management, (v) Meter-Reading and Billing Management, (vi) Projects Management, and (vii) Contracts Management.

(b) Master Data Clean-up/ Governance Projects

Taxonomy and data governance standards are proposed to be implemented to consolidate master data maintenance in a single repository, synchronize and distribute master data to all concerned units, and enhance the functionality of existing back-end systems using master data such as purchasing, plant maintenance, vendor management, customer profile, etc. Ultimately, this will help Maynilad improve business efficiency by eliminating the need for manual look-ups, make better-informed decisions with more reliable analysis and ensure maximum returns on business intelligence initiatives.

For the period 2023-2046, it is proposed that all taxonomy and governance standards of master data for the back-end systems be reviewed every five years, and maintained based on the changes and improvements that will occur in the business processes.

(c) Business Intelligence and Data Analytics

This aims to enable seconds-response time to *ad hoc* queries on petabyte-sized data. This will open up a huge range of possibilities in terms of analysis and reporting that was not previously possible because of the expense in running such computationally-expensive queries. More up-to-date information will be made available to management to enable it to react faster to situations, resulting in improved customer service and timely delivery of service. This can also help design more appropriately-sized WTPs based on the actual requirements in the field.

For the period 2023-2046, it is proposed that all sets of reports per division be reviewed every five years, and enhanced, if necessary, based on the changes and improvements that will occur in the business processes. It is prudent to adjust the reports according to the changing back-end systems.

The following division reports will be reviewed and enhanced, if necessary, every five years: (i) BA Operations, (ii) Finance, (iii) Logistics, (iv) HR, (v) Enterprise Assets Management, (vi) Projects Management, and (vii) Wastewater Management.

The list of proposed business intelligence and Data Analytics projects for the period 2023-2046 is presented below.

Business Intelligence and Data Analytics Projects
• Data Warehouse Solutions Business Intelligence Project (BA/ Finance)
• Data Warehouse Solutions Business Intelligence Project (HR)
• Data Warehouse Solutions Business Intelligence Project (CNRW)
• Data Warehouse Solutions Business Intelligence Project (Materials Mgmt.)
• Data Warehouse Solutions Business Intelligence Project (Project System)
• Data Warehouse Solutions Business Intelligence Project (Wastewater Mgmt.)
• Data Warehouse Solutions Business Intelligence Project (Enterprise Assets Management)

(d) Customer Relationship Management System (“**CRMS**”) Projects

These projects are enabling self-service solutions to end-customers through the web, and applications that enable services at the corporate back-end. These will result in a more streamlined process resulting in less manual work and errors, and improved customer service.

ITS will provide customers more direct access to Maynilad’s business systems. This will give them the benefit of being able to easily access data and communicate with Maynilad however and whenever they want.

Currently, Maynilad employs several solutions for customer management and its application in the creation of new water and sewer accounts, changes in customer records, handling of customer inquiries and requests, and reporting of incidents of leaks and illegalities.

For the Sixth Rate Rebasing Period, the following major projects are proposed to be implemented:

- (i) Enhancing the existing CRMS by enabling it to integrate with the Chatbot and the Maynilad App; and
- (ii) Enabling the CRMS to be accessed by Zone Specialists in the field to allow them to view and close their work orders.

For the period 2023-2046, it is also proposed that the CRMS be reviewed every five years, and enhanced, if necessary, based on the changes and improvements that will occur in the business processes. It is prudent to adjust the CRM according to the changing landscape and processes of the business.

The list of proposed CRMS-related projects for the period 2023-2046 is presented below.

CRMS Projects
• CRM • Mobile Customer Relationship Management

- (e) Enablement of Corporate Applications in Mobile Devices (Mobile Workforce)

This will promote a seamless integration between corporate back-end systems and mobile devices. This will enable the workforce to access GIS, CRM systems, maintenance and operational data while on the field. This Mobile Workforce would result in more efficient operations, maintenance of facilities, as well as improved service levels to the customers.

Currently, access to Maynilad's corporate systems is within the Maynilad intranet. Remote access to these tools via internet using mobile devices in the form of tablets and smartphones will enable the employees to access information when needed in the field. Maynilad foresees significant advances made in the areas of maintenance and access to operational data, including reports and field data. The ability to access these data will need specific applications as well as the correct security appliance to provide access in a secure manner so as not to compromise the back-end systems. The benefits to mobility include reduction in manpower, faster response time to leaks and other reported incidents, as well as a more empowered and knowledgeable workforce that can conduct work in a more efficient manner.

For the period 2023-2046, it is proposed that maintenance review and enhancements of these programs be conducted every five years.

(f) Knowledge Management Portal Projects

Due to the large number of documents being kept in paper form, ITS employed a system to manage multiple types of documents across the different divisions of Maynilad. This system includes scanning, indexing, filing and archiving.

In order to improve internal collaboration and strengthen effective decision-making, a single infrastructure for all business websites will be put up. This will enable sharing of documents among the employees, managing of projects with partners and team members, and distributing reports, databases, and other information to key people within the organization for use in strategic planning and decision-making.

For the period 2023-2046, it is proposed that a maintenance review be conducted every five years, and enhancements be made, if necessary. Also, if needed, provide timely upgrade to the version of the system so as to avoid obsolescence and running out of support from the software manufacturer.

Knowledge Management Portal Projects

- | |
|---|
| <ul style="list-style-type: none"> • Portal Upgrade |
| <ul style="list-style-type: none"> • New Portal/s Implementation for other Divisions |
| <ul style="list-style-type: none"> • Portal Governance |

(g) Operational Efficiency Projects

Operations and maintenance activities for all applications ensure their continuous optimized performance in support of Maynilad's business processes. Both corrective and enhancement activities for these applications are undertaken by ITS.

Changes resulting from either a corrective activity or enhancement need to be fully tested before applying them into production (systems that are in operation). Otherwise, there is a risk that these updates will interfere with other components or will not deliver the intended functionality without errors.

Additionally, with continuous streamlining and optimization of our backend applications, the number of batch processes and integrations has been steadily increasing. Proper batch scheduling, consolidated management and monitoring, as well as timely alert/notification features are important in ensuring complete, timely and accurate performance of these processes by the IT Operations.

For the period 2023-2046, it is proposed that the configuration of our IT Operations Workload and Scheduling Automation tool be reviewed periodically and enhanced, if necessary, based on the changes and improvements made to our backend applications. It should be made to adapt and be reconfigured for any batch processes and integrations made in the various applications that it caters, for full optimized benefit. Additionally, ITS proposes to resume the implementation of a solution for Governance, Risk and Compliance to automate the management and monitoring of system privileges and access authorizations, as such task is becoming more complex and tedious given the constant implementation of new systems and modules.

The list of operational efficiency projects for the period 2023-2046 is presented below.

Operational Efficiency Projects
• Operational Efficiency - Automated Testing
• Reporting Interface to Service Desk/Desktop Management Systems
• Operational Efficiency - Application Lifecycle Management Tool
• Governance, Risk and Compliance Tool (Access Control)
• IT Workload and Scheduling Automation

(h) Meter Reading Software and Hardware Refresh

Maynilad owns the meter reading software that is being used by its current third-party service provider for the onsite billing services. Like any software solution, periodic upgrade and enhancements are envisioned in order to ensure not only its optimized performance and maintainability, but more importantly, to adapt and respond to possible changes in Maynilad's business requirements.

The same is true for the hardware components. In the conduct of onsite billing, the handheld terminals and mobile printers are considered as the essential pieces of equipment. An IT equipment has an average useful life of three to five years, and given the daily usage of these handheld terminals and mobile printers, the usual wear and tear often comes early. By then, new technology is expected as hardware support (repairs and maintenance) is more challenging and, oftentimes, more costly for ageing equipment.

Within a five-year interval, the upgrade for both hardware and software will be recurring until 2046 to maintain support and prevent obsolescence. Depending on the technology in the coming years, ITS

will evaluate the equipment that would best serve the business requirements of Maynilad.

Software and Hardware Related Projects

- Meter Reading Software and Hardware Refresh

(i) Software Licenses and Upgrades

The current software license of Maynilad for its customer data management and repository, billing and invoicing, device (meter) management and collection process, is computed based on customer accounts. On the other hand, additional licenses for Application ALM and LMS allow for expanded and optimized use of these tools. ALM is the backend application for test management, being used in minor enhancement as well as major project implementations. LMS is a powerful tool that promotes a non-conventional, faster and effective learning process for Maynilad employees in their use of critical Maynilad applications through the creation of context-sensitive-user help transactions, documentations, simulations, test scripts and assessment tests. With the lockdown and work-from-home setup since 2020 on account of the pandemic, these two tools have proven to be very helpful in ensuring testing and training activities even through remote work.

ITS is planning for the purchase of additional licenses for ERP (backend applications), and new licenses for Business Intelligence reporting tool. The need for additional ERP and Business Intelligence licenses arises from Maynilad's implementation and expansion of backend applications modules, including their integration to other applications and IOT platforms, as well as new Business Intelligence reports with a new set of report recipients/users.

For the period 2023-2046, ITS anticipates additional license purchases with the increase in Maynilad's customer-base. Additionally, with the enhancements and implementations for the back-end systems, with more and more complex integrations, ITS would need to acquire additional licenses for the expanded use of its Workload and Scheduling Automation tool. This will optimize the management and monitoring of these interfaces and help achieve the objective of achieving faster and pro-active response to any event/alert due to failure. For existing software being used, periodic version upgrades or possible replacement, depending on the emerging need and cost-benefit study, is also planned in order to ensure continuous maintenance support and eliminate the risk of obsolescence.

Software Licenses

- | |
|---|
| <ul style="list-style-type: none"> • Billing and Invoicing Licenses (Customer-Based) • Application Lifecycle Management Tool Licenses • IT Workload and Scheduling Automation Tool Licenses • Learning Management System (LMS) Software |
|---|

Software Refresh/ Upgrade/ Replacement

- | |
|---|
| <ul style="list-style-type: none"> • Service Desk Management and Desktop Management Software Upgrade and Replacement • IT Workload and Scheduling Automation Software Upgrade |
|---|

(j) CCP

The CCP, which sends automated bills and service interruption notifications to the customer via SMS, email, chatbot, the web portal, or a mobile application will be upgraded and expanded to adapt to new communication channels of the future. Once an upgrade is accomplished, it needs to be maintained. Subsequently, if there is a need to enhance the systems due to changes in future processes, process optimization, efficiencies, these changes to the system will be conducted during the period covering 2023 to 2046.

When the pandemic hit in 2020, it was vital for the Company to provide timely and correct bills and/or SOAs to its customers and lessen physical contact of the meter readers with the customers. Maynilad envisions that these functionalities will still be needed in the future, requiring the necessary upgrade, upkeep and update of the system to keep it from obsolescence.

For 2023 to 2046, the Company plans to do further enhancements to the system to provide its customers an upgraded system that allows them to have access to their bills, water interruption announcements and receive notification via a mobile application. These projects were not part of the approved ABP but were included to further improve the customer experience, as well as promote touch-free communication to prevent Covid-19 transmission during the pandemic.

Customer Communication Portal Projects

- | |
|--|
| <ul style="list-style-type: none"> • Maynilad Mobile App/ Web Portal • Chatbot • Automated Customer Communication |
|--|

2. IT Hardware

To continually support critical systems for Maynilad's operations, regular capacity review, upgrading and technology refresh are required for basic IT infrastructure, such as servers, disk storage, network switches, data security, as well as information security solutions to meet system requirements every five years.

Although difficult to predict, some of the infrastructure that Maynilad will acquire are the following:

(a) Next Generation Servers and Storage

With disruptive technology, the Company sees faster and larger servers and storage for the same price of a much smaller server of a few years ago. Storage shall be moving from magnetic hard disks to solid-state disks which are faster in the magnitude of >100X, and this is expected to happen in the next five years. This means that the next generation of servers and storage should be able to handle larger amounts of data at much faster speeds, which will enable applications that currently run for hours, run in just minutes. This gives infinite possibilities in processing, from the almost real-time processing of billing, collections information, as well as making these reports available almost real-time. Given that data is significantly increasing over time, there is a need for a facility to archive those old data and store them in a much lower type of storage. This project will ensure that the production environment will run at optimal level while ensuring that old data are still available when needed.

Hardware Related Projects
• Server Tech Refresh
• Server Virtualization Tech Refresh
• Storage Tech Refresh

- Server Tech Refresh
- Server Virtualization Tech Refresh
- Storage Tech Refresh

(b) Next Generation Switches and Routers

From LAN and WiFi speeds in the 100MBps range, these should eventually go up to the TBit speed level, enabling even more computing power to the end-devices, PCs, laptops and mobile phones. This will require not only state-of-the-art switches and routers, but also physical re-cabling so that these speeds can be supported. This is not just a desired state, but will be a requirement, so that Maynilad's infrastructure will not be deemed obsolete. Also, network devices typically have a life of five years, after which they become untenable and expensive to maintain. A re-investment in these devices will be

necessary. Moving to new technology such as wifi 6 and the next generation firewall would be needed so that the organization can catch up with the demand of new technology.

(i) SDWAN Implementation

Leveraging on this new technology will ensure that Maynilad can catch up with the demand for a higher internet bandwidth as more employees will soon maximize the use of internet. Unlike the previous years where most of the meetings were face-to-face, the effect of the work-from-home setup led to more Maynilad employees participating in online meetings. People from different branches/facilities will no longer be required to go to the head office for a meeting, but rather leverage the use of online meetings. Foreseeing the demand for online meetings, trainings and presentation, ITS expects that the demand for internet bandwidth will be significantly higher. To address the concern for higher communication cost, there is a need to switch from the traditional MPLS connection into SDWAN connection. SDWAN will leverage the now lower internet cost instead of using the traditional MPLS cost. With this implementation, there would be no significant increase in communication cost even if the bandwidth utilization will be more than doubled.

(ii) Firewall Upgrade and Redundancy

Work-from-home, paperless billing and other activities that require the use of new technology would require higher availability of Maynilad IT infrastructure. Given the demand for higher availability, there is a need to upgrade the existing firewall to the next generation firewall. There is also a need to have redundancy on this particular IT equipment to ensure continuous connectivity of the Maynilad network to the internet.

Network Infra Tech Refresh

- | |
|-------------------------------------|
| • Wireless LAN Tech Refresh |
| • Network Software Licenses |
| • Firewall Upgrade and Redundancy |
| • Network LAN Tech Refresh |
| • SDWAN Phase 2 and 3 |
| • Office Structured Cabling Upgrade |

(c) Security Appliances and Tech Refresh

Security intrusion attempts will become more complex, and the number of attacks masquerading as applications via the internet will be more prevalent. Thus, more sophisticated security appliances will have to be adopted. The price of security is hard to determine, but a breach into a company such as Maynilad, which provides a basic service, has major implications in terms of customer data confidentiality, as well as serious risks if its billing and payment data are compromised. It is thus imperative to invest in state-of-the-art security software and appliances.

(i) Anti-Malware/Anti-Exploit Server

New update features, such as Endpoint Detection and Response will now be included, threat hunting, ransomware rollback, brute force protection, etc. Increased endpoint security is adamant specially during work from home as external threats are rising.

(ii) NAC (Network Access Control) Enterprise and Assessment license

This enforces security policy, compliance and management of access control to a network. It is a network solution that enables only compliant, authenticated and trusted endpoint devices and nodes to access network resources and infrastructure. This is vital to prevent unauthorized access inside the network from external threats.

(iii) Certificate Encryption license

This keeps data safe with enterprise-grade drive encryption, secures network file shares and protects removable media, such as USB flash drives and data in cloud storage services. Key features, such as file encryption and drive encryption, are critical in preventing data theft.

(iv) Application Control Server license

This is a major security tool that blocks or restricts unauthorized applications from executing in ways that put data at risk. It only allows white-listed applications, and is an additional security control to prevent malware or viruses from running.

(v) Phishing Simulator

This helps provide security awareness and phishing simulation exercises to strengthen the cyber security stance of an organization. It is a key security component that helps mitigate the risk of phishing attacks and enhances the Company's security culture.

(vi) Endpoint Backup Management Server

This has the ability to create and deploy backup image or a clone of a computer desktop, laptop or server, and is capable of massively backing-up and restoring endpoints by schedule or by demand, which in turn improves availability and efficiency in restoring backups.

(vii) Network Detection and Response (“NDR”)

This has the capability to detect and prevent malicious network activity, investigate and perform forensics to determine the root cause, respond to, and mitigate threats. NDR will allow the Company to be more preventive rather than reactive in dealing with cyber threats or attacks.

Security Software and Appliances

Information Security Tech Refresh

- Anti-Malware/ Anti-Exploit Server
- NAC Enterprise and Assessment license
- Certificate Encryption License
- Data Leak Protection
- Application Control Server license
- Phishing Simulator
- Privilege Access Management
- Endpoint Backup Management Server
- Network Detection and Response

Backup Solution Tech Refresh

- Backup Software (NetBackup) Upgrade
- Tape Library
- Backup Appliance (DXI)
- Tape Media

(d) Software Licenses

The Company aims to correctly follow the requirements for software licensing, allowing Maynilad to have access to all new patches being provided by the software provider. This will also ensure that the Company is compliant when it comes to the use of software licenses, when audited by a third party.

Software Licenses
• Microsoft License Upgrade
• SharePoint License Upgrade
• Operating System (OS) and Database (DB) License Upgrade

- Microsoft License Upgrade
- SharePoint License Upgrade
- Operating System (OS) and Database (DB) License Upgrade

3. IAPAD - formerly A&I

Automation consists of technological tools that enable significant improvements and efficiency in operational, environmental and economic management of the Company. An automation system allows monitoring and control of facilities from a single location called the control center. Automation provides improved quality of service through the following:

(a) Real-time Control and Monitoring

From the control room, operators know in real-time what is happening in the most important facilities of the network.

(b) Optimal Programmed Operation of Facilities

By using automatic modes with programmed actions and behaviors, the elements controlled by the remote-control system can operate in an optimal way.

(c) Quick Response

Emergency or abnormal situations in the hydraulic network will be detected through alarms in real-time. This will enable the operators to react very quickly, and send commands from the control room to minimize the impact of the problem. If necessary, maintenance operators and technicians could be sent quickly to the installations or facilities.

(d) Information

The remote-control systems provide a huge amount of information regarding the performance of the facilities. This could be used to feed into other expert systems and decision-making support platforms.

(e) Savings and Efficiency

Automation will result in optimized and efficient plant operations which, in turn, can also reduce energy costs and chemical consumption. Through automation, human resources can be optimized, processes can be improved, and operational costs can be reduced. As stated above, the following programs will be implemented:

(i) Control Center and SCADA

Control Center users will have access to all facilities included in the automation and remote-control system of Maynilad. The benefits from remote control include enabling the facilities to be operated 24x7, and be monitored and controlled from, and the most significant parameters and variables of the facility be sent to, the general control center.

For the period 2023-2046, it is proposed that all control room equipment and systems be reviewed every five years, and enhanced and updated, if necessary, based on the changes and improvements that will occur in the business operations and due to technological improvements.

It is also proposed that all newly automated water and wastewater facilities be integrated in a central control room for remote monitoring and control. This integration will include pump stations, inline boosters, lift stations, WRFs and WTPs. A digital twin and advance process control shall be developed for the critical facilities to aid plant operators in optimization, training, and simulation.

Software Related Projects

Enterprise SCADA

-
- Tags and Licenses for CCR SCADA
-
- Local and Enterprise SCADA Display Development
-
- Digital Twin of Maynilad Facilities
-
- Advanced Process Control
-

Hardware Related Projects

- | |
|---|
| <ul style="list-style-type: none"> • Central Control Room (Physical) |
| <ul style="list-style-type: none"> • Main CCR |
| <ul style="list-style-type: none"> • Auxiliary CCR |
| <ul style="list-style-type: none"> • SCADA Server Replacement |

(ii) FIELDMOUS (IOT Platform)

This IOT Platform is a repository of all technical information and big data from the field received from field sensors. For the period 2023-37, it is proposed that all technical data from existing and newly built facilities be stored in the FieldMOUS like the control room SCADA. This will be used to feed into other expert systems and decision-making support platforms. Data would include details on: (i) water reservoir levels, (ii) flows along different pipes, (iii) pressure reading points, (iv) plant production and conditions, and (v) quality.

Software Related Projects

FIELDMOUS (IOT Platform)

- | |
|---|
| <ul style="list-style-type: none"> • Additional Tags and Server Licenses |
|---|

(iii) Safety and Security Management

Safety and security are of primordial importance in plant operations, and come in two general forms:

- Protection against intrusion and improper /unauthorized access to plant systems; and
- Safety of Maynilad personnel.

This area improves over time. Thus, it is proposed that investments and upgrades be done every five years in terms of safety and security appliances, software and hardware that support safety and security processes. With time, security breach attempts have become more sophisticated, and will become even more so. Maynilad needs to safeguard its valuable operational systems from being compromised.

Hardware Related Projects

- | |
|---|
| <ul style="list-style-type: none"> • Safety and Security Management |
| <ul style="list-style-type: none"> • Industrial Safety and Security System |

(iv) Control Systems Technology Refresh

It is proposed that every five years, the control system of the critical treatment plants and equipment be replaced and updated to maintain its operation and availability. This includes the optimization of the control system with the newest and stable technology available in the market.

Hardware Related Projects

- | |
|---|
| • PWTP1 SCADA System |
| • PWTP2 DCS Servers and Application |
| • LLWTP DCS Servers and Application |
| • CAMANA DCS Servers and Application |
| • LMTP1 SCADA System |
| • LMTP2 SCADA System |
| • Paranaque Water Reclamation Facility SCADA system |
| • Pasay Water Reclamation Facility SCADA system |
| • Master Controller for various facilities |
| • OEM Controller Standardization |
| • UPS Technology Refresh |
| • Control System for various Maynilad Facilities |

(v) Industrial Control Network (“ICN”) Firewall, Communications, Appliances and Software

It is proposed that every five years, all communication and workstation systems be upgraded due to rapid improvement, obsolescence of old hardware and the demand to improve the business operations. A very important aspect in remote control systems is for communication links to be established between the control center and the remote stations. The remote station performs the acquisition, processing and storage of information from field instrumentation. The remote-controlled electro-mechanical devices then send this information to the control center. A technical upgrade will be needed in the following: (i) layer 2 and 3 switches, (ii) industrial wireless system, (iii) ICN Firewall and other security appliances and software, and (iv) industrial-grade workstations.

Hardware Related Projects

Industrial Control Network (ICN) Firewall, Comms, appliances and Software

- | |
|---|
| • Layer 2 Switches, Layer 3 Switches |
| • ICN Firewall |
| • Industrial Workstation technology refresh |

- Industrial Wireless System

(vi) Online Water Quality

It is proposed that every five years, water quality monitoring devices be upgraded and rehabilitated. Remote monitoring prompts the control center when there are abnormalities in water quality. These remote stations will be used mainly to monitor such quality measurements as chlorine concentration, turbidity, pH and other parameters that may be needed in the future operations of water and wastewater facilities.

Hardware Related Projects

Water Quality

- | |
|---|
| <ul style="list-style-type: none"> • Online Analyzer for Water Facilities (Source, Pumping Station, Distribution) • Online Analyzer for Wastewater Facilities (Conveyance System) |
|---|

(vii) Condition-Based Monitoring

It is proposed that condition-based monitoring sensors be installed, and as the case may be, rehabilitated due to wear and tear, or replaced due to obsolescence as more advanced “smart” sensors become available. Condition-based monitoring refers to the on-line monitoring of parameters which are indicative of the conditions of major, costly machinery such as pumps, motors and blowers. Signals to be monitored include vibration, winding temperature, bearing temperature, current consumption and others. Certain trends and behaviors in these parameters help in identifying a developing fault before it actually happens, saving the Company money in the replacement or repair of these major machineries through a predictive fault analysis. Aside from the sensors, specific hardware and software are needed in order to receive these signals and analyze their behavior.

Hardware Related Projects

Condition Based Monitoring

- | |
|--|
| <ul style="list-style-type: none"> • Temperature and Vibration Instrument |
|--|

(viii) Pneumatic Block Modules and Positioner Rehab

The pneumatic modules and positioners must be rehabilitated every 10 years to increase the overall reliability of the plant and

its major equipment. This guarantees the reliability of plant operations.

Hardware Related Projects

Pneumatic Block Modules and Positioner Rehab

- Putatan WTP 1
- Putatan WTP 2
- LMTP 1 and 2

(ix) Weather Station – Prediction Inflow

It is proposed that additional weather stations be installed and rehabilitated every five years for the early prediction of water quality issues from the water source to the WTP. The elements to be supervised and controlled by this remote station include relative humidity, barometric pressure, wind direction, wind speed, solar radiation, precipitation, battery voltage, water level and temperature.

Hardware Related Projects

Weather Station - Prediction of Inflow

- Industrial Instrument, Sensor and Integration

E. Pervasive Computing and the Internet of Things

The explosion of sensors and data coming from the treatment plants, water network, and sewerage, has to be treated using new, specialized tools. This is related to big data where IOI has become a reality. As the price of sensors, transmitters, loggers, as well as their communications go down significantly, it becomes more feasible to measure many different parameters from many points. This, together with advanced analysis tools, will enable the Company to access detailed operational information real-time, which will then allow the Company to react fast, resulting in reduced operational costs, and a more efficient delivery of services to the customers.

F. Plant automation Ethernet

Treatment plants have traditionally been run as totally separate entities with no connection from outside due to security reasons. However, the use of Internet Protocol (IP)-based protocols can make communication, labor and equipment much cheaper because there are well-established standards that can be sourced from different vendors (as opposed to proprietary ones). This will dramatically improve the reliability of treatment plants.

G. Industrial Wireless

Traditionally, plant automation has been wired. However, with the advent of industrial wireless which is secure, there is no longer a need to wire each and every device that is added to the plant automation network. This results in lower costs in terms of cabling, manpower and adding flexibility to the infrastructure. This may be initially done to non-critical areas that can afford some downtime in terms of signal availability, and expanded further as the technology improves.

Overall, it may be said that as technology progresses, the cost of each byte of technology decreases. Concurrently, consumption of technology will continue to increase due to the much larger demand for these specialized services. According to the “Jevons Paradox” effect, due to the greater prevalence of technology, the resulting use of, and dependency on, technology tends to increase the overall rate of its consumption, which increases the overall cost to the business.

Given that the Company’s dependency on IT and technology will increase overtime, the challenge is to find the right balance between the cost of such dependence and its benefits to the Company and its customers.

II. Geographic Information Systems (“GIS”)

General GIS Strategy

In today's environment where everything is online, there is a growing demand for increasingly complex data. This feature of the digital age requires an accurate and updated GIS and database to support the business needs of the Company and meet customer expectations. Maynilad is no exception to this digital transformation.

In the Fifth Rate Rebasing Period, Maynilad has started setting up the foundations of its GIS environment in the form of the Enterprise GIS upgrade, database migration, and data updating. For the Sixth Rate Rebasing Period, Maynilad will continue to update its data in order to provide timely and accurate information to the Regulator for the latter’s monitoring and evaluation of Maynilad’s performance and compliance with its Service Obligations (“SOs”). Maynilad will also strive for efficiency by integrating its existing systems with GIS while ensuring that it meets the business needs of the Company.

A. Accomplishments for the Fifth Rate Rebasing Period

1. Upgrade to Enterprise GIS

The Maynilad Enterprise GIS Upgrade Project was intended to address the existing limitations of the previous GIS system and to meet the integration

requirements of other systems currently being utilized by the Company. The Enterprise GIS Upgrade Project has been completed, with the production server going live in December 2020, and the Maynilad WebMap in January 2021. This upgrade to Maynilad's main GIS platform is a crucial initial step for the integration of its GIS with other systems utilized within the organization. The added functionalities of the upgraded GIS greatly increased the use and application of Maynilad's geographic data for planning, analysis and operational efficiency.

2. Database Migration (Oracle to SQL)

When Maynilad transitioned to Enterprise GIS, it provided the necessary unified asset information required by the organization, ensured efficient database management, and increased and enhanced the relevance and quality of performance of the different operating units, which enabled the Company to improve its services to its customers and stakeholders. In-line with the upgrade, Maynilad replaced the Oracle database with the SQL database that now serves as the storage of all geographic data and information. This database also manages large sets of structured data, such as base maps, spatial data, attribute data, and customizable 2D and 3D maps that can easily be shared as web maps, which can be utilized in numerous ways to fit the needs of the organization. With this upgrade, the costs for the maintenance and support of our database has been significantly reduced.

3. Acquisition of Unmanned Aerial Vehicle ("UAV")

Maynilad acquired one unit of UAV equipment, obtained pilot licenses, and has successfully acquired the Remotely Piloted Aircraft System Operator Certificate. With the securing of the certificate and pilot licenses, the activity for base map updating has started in 2020.

4. Acquisition and Update of Maynilad Datasets

Maynilad acquired more than 24 kms of digital parcel within ROW segments. These datasets will help Maynilad identify all land parcels within the vicinity of the ROW to account for all leased, acquired and turned-over properties that encroached the ROW, which, in turn, will help enhance the security and maintenance of the ROW. Having these data sets benefits the Company by (i) ensuring the availability, accuracy and completeness of information off the shelf; (ii) resolving issues in plotting technical descriptions, which is also a challenge due to inconsistencies in, and readability of, transfer certificates of title; and (iii) supporting the Company's programs in handling and/or relocation of informal settlers.

5. Updating of Network Data

Maynilad is periodically updating its network data using surveying and mapping equipment. This ensures that the data collected are spatially accurate, thus, improving the efficiency, planning and analysis, and maintenance activities of its various operating units.

Maynilad ensures the accuracy of the locations of previously mapped network assets through its water and wastewater network audit. This activity is in line with the creation of a Linear Asset Registry for the Computerized Maintenance Management System (“**CMMS**”), which is part of the asset management initiatives of the Company.

6. Geo-location of Customer Meters and Premises

Maynilad has mapped out a total of 1.3 million customer accounts, reflected in the Maynilad WebMap. These data are used in improving the response time to customer complaints, and for geographic analysis in terms of service coverage. It is also used in sewer and septage analysis for the management of wastewater projects, and in the preparations for Water Outage Management and future integration with different Maynilad systems.

B. Plans and Programs for the Sixth Rate Rebasing Period and Beyond

1. GIS System Integration

Maynilad will continue to have an Enterprise Licensing Agreement (“**ELA**”) to keep the pace with the evolving market climate, the growing number of users utilizing GIS, and emerging technologies. This will enable the Company to improve its versatility to match business objectives and optimize its expenditure on technology by reducing the expense of ad hoc and intermittent software enforcement and ordering licenses. This venture with the ELA shall facilitate further developments in GIS technologies, which will start with the integration of other Maynilad systems with GIS.

(a) Linking and Integration of GIS to existing systems

The role of data integration in ensuring the efficient use of corporate data cannot be overlooked given that big data are the driving force behind business intelligence and analytics. Therefore, it is essential to use efficient database integration tools for the proper management of database processes that can transform digital interaction problems to operational efficiency.

The next step for Maynilad after the Enterprise GIS upgrade is to implement the integration of GIS into different systems available within the organization. This will integrate other applications offering "end-to-end" business processes. Data from the operational technology systems will be integrated on a daily basis with information technology system data, which will geospatially enable Maynilad to manage all of its assets and infrastructure. The integration can improve asset management and, consequently, will aid in decision-making, the sharing of data across the organization, and data validation. This will allow Maynilad to be more efficient, provide better response to problems in infrastructure as they become apparent, and reduce the cost of the response- time to those problems.

(i) Outage Management

Maynilad intends to improve the Automated Customer Communication System which identifies the affected customers on a DMA or MRU level, by developing an Outage Management System that can localize outages up to street level. This will greatly improve the identification of affected customers and management of service interruptions.

(ii) GIS – WMS Integration

The integration of GIS into Maynilad's WMS will further support Maynilad's operations with real-time intelligent mapping. This will be critical to both on-site and in-house management of maintenance activities for faster and successful decision-making.

In order to establish this integrated system, Maynilad needs to acquire the following components: (i) integration software; (ii) application server; and (iii) mobile devices. Mobile devices will be deployed to Maynilad's field workers to enable them to capture information of incidents, real-time. An integration tool will be used to aid the exchange of data between GIS and WMS. These data will then be displayed in a unified view using the application server. With these components, field and office personnel can use their mobile application and review critical data provided to them through location-based alerts. Immediate superiors can also efficiently locate and generate job orders using the interactive maps, perfectly synchronized with the data captured on field and on the web map. By consolidating fieldwork assignments through job groupings in specific geographical areas, productivity per resource could be greatly improved.

2. GIS Data Updating and Sustenance

(a) Mapping Activities

As Maynilad continues to upgrade and expand its network to comply with its SOs, GIS will continue its mapping operations and the accounting of all asset information to ensure better planning and customer management.

The following activities are the results of collaboration with other divisions within Maynilad to come up with beneficial programs that will provide the Company with reliable data for use in more efficient planning and analysis, and maintenance activities. These activities will require manpower services, equipment, hardware and software.

(i) Network Data Updating

The mapping and updating of pipe-laying activities and expansion projects will provide relevant and updated data to GIS, and ensure its reliability for design, planning and analysis.

(ii) Pipe Network Audit

This will capture the alignment and conditions of pipes, and ensure the accuracy of asset information that will be used in the CMMS. This will also be used in the preparation of the Outage Management System.

(iii) Customer Meters and Premises Tagging

The output from this activity will also help in determining and analyzing billed volume losses. Data generated from this activity will also be utilized to improve response time to customer complaints, and geographic analysis in terms of service coverage. It is also used in sewer and septage analysis in managing wastewater projects.

(iv) Basemap Updating

With the vast developments in land use, it is imperative for Maynilad to continue updating its basemap. The current basemap was acquired seven years ago, requiring progressive updates, which Maynilad is currently undertaking through the use of its UAV. The updates shall include areas with changes in land use, such as those converted from agricultural to residential and commercial uses, as well as service expansion

areas. This will improve further the operational efficiency of the BAs. The updating of raster and the vector basemaps will support the expansion, maintenance, planning, and engineering design activities of Maynilad's operations. An updated road network is also needed in digitizing and updating water and wastewater networks.

3. Replacement of Surveying and Mapping Equipment

It is necessary for Maynilad to replace and upgrade its surveying and mapping equipment, as needed, to keep up with the requirements of its operations. Such upgrade is imperative for network data updating, pipe network audit, and customer meters and premises tagging, as well as surveying requirements for different projects. Notwithstanding the implementation of preventive maintenance programs that have extended the useful life of Maynilad's current equipment, the same are fully depreciated and have reached their end of life. Its timely replacement will also enable Maynilad to keep abreast with the latest technology, ensuring the accuracy of data provided.

(a) Global Navigation Satellite System (“GNSS”)

GNSS equipment is a vital tool in data collection and in updating the GIS database. It records and accurately locates Maynilad assets. Updating of network data contributes to the efficiency of team deployment in Maynilad's operations. These activities are also vital in the inventory and databasing of assets, which are part of the Company's SOs.

(b) Electronic Total Station (“ETS”)

ETS technology has been in use and is vital in the field-surveying activities of Maynilad. The equipment is primarily being used for topographic surveys which are pre-requisites in the engineering designs of PMD and CNRW. ETS is also pertinent in conducting lot surveys which is part of the requirements prior to the design and construction of the different Maynilad facilities.

(i) UAV

This modern technology, currently being employed in updating portions of the Maynilad basemap, can produce the same and even better quality orthorectified images than the current Maynilad basemap. The resulting aerial images can be used in various applications for remote sensing and analysis, in aerial surveying as an aid in lot surveys, topographic surveys and project monitoring. Currently, Maynilad has only one unit of UAV which is nearing the end of its life cycle, requiring a replacement for operational continuity. The

replacement of the UAV will also address the current technical limitations of the current unit.

4. Acquisition of New Survey Equipment

Maynilad will purchase a Terrestrial Laser Scanner (“**TLS**”) or Light Detection and Ranging Scanner.

TLS is a sophisticated surveying equipment that accurately measures dense 3-D point clouds rapidly and efficiently. The primary purpose of acquiring this technology is for the Building Information Modeling, to be applied to various existing Maynilad facilities, creating 3-D models in virtual and visual reality. This activity was not implemented in the 2018 ABP because Maynilad prioritized other projects such as the mapping of pipe networks and basemap updating using UAV. With the increasing need for this technology, Maynilad will implement this in the Sixth Rate Rebasing Period.

5. Acquisition and Updating of Maynilad Datasets

Maynilad will continue to acquire digital parcel datasets to completely account for all land parcels that fall within the corridor of Maynilad ROW, including all leased, acquired and turned-over properties. It will support the programs of various operating units in the handling and/or relocation of informal settlers that have encroached the Maynilad ROW.

6. Surveying Services

Various GIS undertakings mentioned in the previous sections will continue in the succeeding rate rebasing periods. Consequently, Maynilad will continue its surveying services to support such activities which will require manpower, logistics and other resources.

III. Telemetry

A. Monitoring Points

The Company measures the water supply flow and pressure in primary to tertiary lines across the West Zone using the following:

- PMPs
- PRVs
- Gauging Points (“**GP**”)
- District Meters (“**DM**”)

These monitoring points enable the Company to accurately monitor its Key Performance Indicators (“KPI”) and improve the efficiency of its operations. They also play a vital role in the supply system diagnostic activities in order to address NRW and manage supply.

The increasing number of monitoring points, as indicated in Table 6.1, is based on the projected DMA splitting, identified critical points, and installation of PRVs. These monitoring points are maintained by the Telemetry Department. Plans of maintaining production GPs are currently being studied.

Number of Monitoring Points (per year)					
	2023	2024	2025	2026	2027
No. of monitoring points	4,463	4,870	5,128	5,324	5,484

Table 6.1: Telemetry’s Monitoring Points

B. Telemetry Programs and Activities

1. Upgrading of existing Fixed Flowmeters (“FM”)

Fixed FMs are equipment installed in the field at a permanent location. These FMs provide more accurate flow data inside the primary lines compared to the insertion type-FMs which are installed in the pipeline for a short period of time. Fixed FMs can either be electromagnetic full-bore (“EMF”) or the Ultrasonic (“US”). These FMs account for the supply and NRW figures of an HS and municipal boundary to support the reconfiguration of the BAs.

The flow metering project, which involves the installation of new, replacement and rehabilitation of certain existing FMs, will increase meter reliability and the accuracy of flow and pressure measurement in Maynilad’s primary lines that can aid NRW recovery projects. These FMs can also detect possible underground breakages and can be used as reference meters for future CAPEX and service expansion projects.

For the next five years, Telemetry will continue to install new GPs and rehabilitate defective FMs found along municipal boundaries and HS in the West Zone.

2. Utilization of Insertion Type FM

Insertion type FMs are intended for spot measurement of flow inside the pipelines at designated areas along the network. Most of Maynilad’s existing insertion type FMs are being used for network-related activities such as conducting water audits and supply flexibility for a short period of time. Supply flexibility pertains to the ability to divert water from other areas to

improve supply. Maynilad will continue to utilize insertion type FMs in its operations.

3. Reactive and Preventive Maintenance of EMF, Dataloggers and US FM

The preventive maintenance of dataloggers, EMFs and US FMs is implemented on a periodic basis to ensure that the data being generated by the device are reliable.

4. Conduct of Telemetry All-Works Activities

PMP/DM instrumentation boxes ("**I-box**"), GP manholes, and enclosures are some of the appurtenances that house the FM, dataloggers and other instruments used by Telemetry. The I-box is used to contain the equipment for added security and ease of access. These appurtenances tend to deteriorate over time due to varying field conditions; they are also prone to damage and theft. Maynilad will continue to perform rectification works on these field assets.

Telemetry will install accessories to certain instruments. An example of which is the addition of the Taoglas antenna to dataloggers at the ground level to increase the strength of the signal. Telemetry will also upgrade and rectify the vaults to further improve maintenance activities. Maynilad will continue to outsource these activities.

5. Calibration of Measuring Equipment

Telemetry will conduct a regular and comprehensive calibration of its measuring equipment (such as the pressure calibrator, etc.) in compliance with Maynilad's IMS.

6. Continuous Improvement of the Telemetry Architecture

To ensure a more secure and reliable database, Telemetry will be upgrading its current software to Utilicore which is a web-based tool used for configuration. Dataloggers may now be configured remotely which is more efficient as it will lessen fieldwork. It also uses SQL server which provides more data capacity. On-going development to use Application Programming Interface ("**API**") for Utilicore is expected to be implemented in 2023. API has been around for quite some time and is widely-used to access data, server software or other applications.

Telemetry is constantly searching for new technologies and improving its processes to ensure that Maynilad is aligned with the fast-changing technologies. We are gearing towards the IOT platform which is a system of

interrelated, internet-connected objects that are able to collect and transfer data over a wireless network without human intervention. Constant coordination with Maynilad's network provider is being done for this initiative.

In order to have a more reliable data sending and receiving process, we are continuously in search for devices that have a stable signal for sending data. One of the activities being pursued by Telemetry is to gradually replace field-installed devices with those which are capable of sending data through the SMS platform. This will be done gradually until 2027. This move will help improve data availability, resulting in a more reliable and efficient network analysis.

7. Maintenance of Datalogger and EMF

Dataloggers are electronic devices which automatically monitor and record environmental parameters over time, allowing conditions such as flow and pressure to be measured, documented, analyzed and validated. The benefits of maintaining dataloggers are: (i) data acquisition will be automated, (ii) data will be readily available all times, (iii) data loggers provide better network analysis, and (iv) dataloggers ensures that network alarms are triggered real-time. Dataloggers are also being used for diagnostic activities and accounting of other Maynilad operating groups for NRW, supply and pressure management.

EMFs are being used to measure flow at the DMA level. This type of FM has modular parts that can either be repaired or replaced, and needs periodic maintenance work. The Company's direction is to continue utilizing these types of FMs to better manage its NRW.

IV. Administration

The Administration Department, organized under the SCM, manages the operations, maintenance, repairs and improvements of the Company's buildings, offices and warehouses ("**Administrative Facilities**") and ensures that the safety, security and functionality of these facilities are maintained at all times.

The Administration Department, in order to (i) further improve Maynilad's service delivery and customer satisfaction, (ii) uphold the protection of the environment, and (iii) maintain Maynilad's compliance with ISO certifications, seeks to promote the efficient use of resources in the Administrative Facilities by expanding the implementation of energy conservation measures and the use of new technologies applicable in the day-to-day operations of these facilities.

Considering that most of the Administrative Facilities have already been renovated, the Administrative Department, for the period of 2023-2046, shall continue to focus its CAPEX projects in maintaining the physical condition of the Administrative Facilities (“**Administrative CAPEX**”) (i) based on the results of the ACR, and (ii) following as guidelines, the standard and acceptable practices set forth below:

1. Repainting of facilities every five years depending on, among others, paint life span, paint warranties against discoloration, weather exposure, pollution, and the results of the physical inspection of the asset;
2. Renovation of offices every five years based on materials’ deterioration and warranty;
3. Assessment and replacement of office furniture every five years depending on usage and availability of parts;
4. Replacement of facility signages every three to five years depending on, among others, the exposure to changing weather conditions and pollution, and standard suppliers’ warranty;
5. Construction of a records disposal facility under records management;
6. Incorporation of environmental programs based on current trends on facilities management and innovation;
7. Upgrading of CCTV system every five years depending on, among others, the suppliers’ warranties and availability of parts.

For the Sixth Rate Rebasing Period, the Administration Department plans to implement the following projects:

1. Head Office Renovation (Phase 6) 2023



In response to the changes in the work environment brought about by the pandemic, Maynilad plans to rationalize office space, as may be required by health and safety protocols issued by the national and local governments. In addition, Maynilad plans to improve the Head Office, including, among others, establishing permanent supply electrical lines, and repairing the parapet wall and sewer line at the motor pool area for the fleet vehicles.

2. Temporary Fencing of Various Maynilad Vacant Lots (2023 – 2027)



In order to secure the acquired properties of Maynilad and to protect the same from trespassers and informal settlers, the Administration Department shall erect temporary fences around these properties.

3. East Cavite Business Area at Cavite City (2023)



In relation to the expansion of Maynilad's services in Cavite, and to provide more efficient customer service in the area, the Administration Department shall construct an office for East Cavite BA in Cavite City.

4. Repainting of Various Facilities (CY 2023 – 2027)



Pursuant to its mandate to maintain the physical condition of the Administrative Facilities, the Administration Department shall repaint various facilities.

5. Renovation of Binuksuk and South Caloocan Disposal Facilities (CY 2024)

The Administration Department shall renovate the Binuksuk and South Caloocan disposal facilities to make them suitable storage areas for Maynilad's records.

6. Rehabilitation and Retrofitting of Various Facilities (CY 2023 – 2027)

The Administration Department shall rehabilitate and retrofit certain administrative facilities, as may be necessary, to address possible occurrences of unforeseen calamities.

7. Proposed Installation of Facility ID Signage on Various Facility (CY 2023 – 2027)



In compliance with the standard on facility signages and to strengthen the Maynilad brand, the Administration Department shall replace the facility identification signages of the Administrative Facilities every three to five years. The Branding Equity Department under Corporate Affairs and Communication plans to release the revised Maynilad logo in 2022.

8. Proposed Branding of Customer Service Areas (CY 2023 - 2024)



Our customer service areas serve as the major touchpoint for our customers. In order to further improve customer experience, we plan to improve the customer service areas located in our BA offices.

9. Proposed Construction of Records Storage Facility at Dahlia Vacant Lot (CY 2025)

The Administration Department plans to construct a storage facility at the Dahlia property to serve as storage area for the records of the BA offices under the North Business District. A standard records file library shelving system, compliant with the minimum temperature and humidity requirements set under the IMS standards, will be implemented in the records' storage facility.

10. Purchase and Installation of CCTV (CY 2023 - 2027)



In order to ensure the security of the Administrative Facilities and to improve emergency response rate, the Company will purchase and install standard CCTV equipment that will allow the monitoring of the new facilities.

11. Update and Standardization of Office Furniture System (CY 2023 - 2025)



Appropriate and ergonomic office furniture helps create a healthy work environment which, in turn, helps increase the productivity of the workforce. This project aims to update and improve the existing office furniture based on the standards on office furniture.

12. Renovation of Various Maynilad Offices (CY 2023 – 2027)



Renovation of offices does not only improve the current set up, but also allows for more meaningful interactions among the Company's employees. This project aims to improve the Administrative Facilities every five years, based on data generated by project profile monitoring.

13. Supply and Installation of Hybrid Solar Power System to Various Facilities (CY 2024 – 2027)



Most of our facilities rely on on-grid energy supply. As the Company's response to the call for energy management and conservation, this project aims to develop power sources out of the grid and install solar panels using a hybrid system to enable the Administrative Facilities to benefit from solar energy. This is

part of the Company's efforts to promote green facilities to create a healthy and sustainable environment.

14. Renovation of La Mesa Living Quarters (CY 2023 - 2024)

The renovation of the La Mesa Living Quarters is necessary to prevent further deterioration. Green products shall be incorporated in the materials to be used in the living quarters to ensure that materials are durable, environment-friendly and sustainable.

15. Upgrading and Improvement of Arroceros Compound (CY 2023 - 2024)

This project aims to upgrade the landscape, asphalt road, perimeter lights and premises of the Arroceros Compound using available green and innovative products to ensure that materials are durable, environment-friendly and sustainable.

Chapter 7 Capital Expenditure Program

The CAPEX program of Maynilad for the period 2023 to 2046 consists of water, wastewater, and customer service and information projects.

I. Water CAPEX

Water CAPEX is composed of four major CAPEX programs for (i) water sources and treatment, (ii) operations support, (iii) NRW management, and (iv) service expansion.

A. Water Sources Program

As discussed in Chapter 3, Maynilad will be implementing major projects such as the (i) 300-MLD Teresa WTP and Conveyance, (ii) rehabilitation of BNAQ-4 and BNAQ-5, (iii) maintenance of CPF, and (iv) construction of a perimeter fence for an aqueduct ROW.

The projects under the rehabilitation/refurbishment of CPF appurtenances include water source reliability and adaptation to climate change that are meant to (i) address raw water security by ensuring the availability of 48 CMS water supply at all times, (ii) address the need to develop additional future water sources, (iii) enhance operating efficiencies, (iv) optimize the operations of the raw water conveyance system, and (v) make existing assets more adaptable to climate change risks.

The annual project cost of water sources and treatment CAPEX category for 2023-2027 is shown in the table below.

<i>Program Description</i>	Project Cost Estimate (in million pesos)					
	2023-27	2023	2024	2025	2026	2027
Maynilad Projects	33,401	1,295	32,090	-	-	16
Common Purpose Facilities	4,849	338	518	22	2,374	1,597
Total Water Sources and Treatment Program	38,250	1,633	32,608	22	2,374	1,612

Table 7.1: Annual Project Cost of Water Sources & Treatment CAPEX

The table below shows the total project cost of water sources and treatment CAPEX from 2023 to 2046 in five-year intervals. Annex 7-B shows the annual CAPEX commitment and disbursement schedule of this CAPEX category.

<i>Program Description</i>	Project Cost Estimate (in million pesos)					
	2023-46	2023-27	2028-32	2033-37	2038-2042	2043-46
Maynilad Projects	33,401	33,401	-	-	-	-
Common Purpose Facilities	4,849	4,849	-	-	-	-
Total Water Sources and Treatment Program	38,250	38,250	-	-	-	-

Table 7.2: Total Project Cost of Water Sources and Treatment CAPEX

B. Operations Support Program

This program aims to sustain, enhance, and expand the water facilities and operations of the Company. Its main components are (i) service level at 24 hours water availability at a minimum 16 psi water pressure, (ii) water coverage, (iii) reliability, flexibility and adaptation to climate change, and (iv) ROW and lot acquisition for water facilities.

Maynilad plans to invest in improving the reliability of its water distribution system specifically by increasing its reserve capacity to allow continuous supply during maintenance and service interruptions. Currently, the total reserve capacity of Maynilad is limited to 7.5 hours only versus the standard reserve capacity of 12 hours. The Company needs to construct more reservoirs to increase its reserve capacity by two hours to allot time for the maintenance team to resolve any problem in the network. Continual rehabilitation/upgrade of pump stations is also needed to ensure reliable and efficient operations. Lastly, options for water reuse from Maynilad's wastewater facilities will also be considered.

The annual project cost of the operations support CAPEX category for 2023-2027 is provided below.

<i>Program Description</i>		Project Cost Estimate (in million pesos)					
		2023-27	2023	2024	2025	2026	2027
WS1	Service Level (24 Hours WA & 16 psi HP)	5,437	130	3,958	4	871	474
WS2	Water Coverage	25,904	2,275	2,031	17,374	581	3,643
WS3	Reliability, Flexibility and Adaptation to Climate Change	7,549	1,094	2,805	291	1,718	1,640
PM1	Right of Way and Lot Acquisition for Water Facilities	797	-	411	4	-	382
Total Operations Support		39,687	3,499	9,206	17,672	3,171	6,139

Table 7.3: Annual Project Cost of the Operations Support CAPEX

The total project cost of the operations support from 2023 to 2046 in five-year intervals is shown below. Annex 7.C shows the annual CAPEX commitment and disbursement schedule of the operations support program.

Program Description		Project Cost Estimate (in million pesos)					
		2023-46	2023-27	2028-32	2033-37	2038-42	2043-46
WS1	Service Level (24-hours WA & 16 psi HP)	10,746	5,437	3,490	650	650	520
WS2	Water Coverage	25,904	25,904	-	-	-	-
WS3	Reliability, Flexibility and Adaptation to Climate Change	16,924	7,549	2,417	2,454	2,875	1,628
PM1	Right of Way and Lot Acquisition for Water Facilities	1,021	797	224	-	-	-
Total Operations Support		54,595	39,687	6,131	3,103	3,525	2,148

Table 7.4: Total Project Cost of the Operations Support CAPEX

C. Non-Revenue Water Management

The NRW Management Program involves the recovery of water losses, reallocation of the recovered volume and reselling to under-served and unserved customers.

The NRW management program aims to achieve the average DMA NRW level of 20% by 2026, and Total NRW of 25% by 2027 and 20% by 2030, and will focus on (i) DMA splitting, diagnostic and leak repair, (ii) meter management; (iii) purchase of leak detection equipment; (iv) selective pipe replacement, and (v) primary line assessment, leak repair, and replacement. Water that will be recovered from these activities will be reallocated to support the Company's service expansion program.

Table below shows the annual project cost of the NRW management and service expansion program for 2023-2027.

Program Description		Project Cost Estimate (in million pesos)					
		2023-27	2023	2024	2025	2026	2027
NR1	DMA Splitting, Diagnostic and Leak Repair	2,511	594	541	545	520	311
NR2	Meter Management	3,200	898	896	518	429	458
NR3	Leak Detection Equipment	125	13	-	9	95	8
NR4	ACP SDS/TDS Line Replacement	369	369	-	-	-	-
NR5	GIP/Tem-facil Line Replacement	762	630	132	-	-	-
NR6	Full and Partial Pipe Replacement	1,971	418	591	687	138	138
NR7	Primary Line Assessment and Leak Repair	772	281	243	93	78	78

<i>Program Description</i>		Project Cost Estimate (in million pesos)					
		2023-27	2023	2024	2025	2026	2027
NR8	ACP Primary Line Replacement	221	221	-	-	-	-
NR9	Selective Primary Pipe Replacement	6,612	616	2,740	1,059	1,068	1,130
Total NRW Management and Service Expansion		16,544	4,039	5,144	2,911	2,328	2,122

Table 7.5: Annual Project Cost of the NRW Management and Service Expansion CAPEX

The table below shows the total project cost of the NRW for 2023 to 2046 in five-year intervals.

<i>Program Description</i>		Project Cost Estimate (in million pesos)					
		2023-46	2023-27	2028-32	2033-37	2038-42	2043-46
NR1	DMA Splitting, Diagnostic and Leak Repair	7,416	2,511	1,437	1,340	1,330	798
NR2	Meter Management	13,312	3,200	2,075	3,118	2,408	2,511
NR3	Leak Detection Equipment	715	125	214	134	211	31
NR4	ACP SDS/TDS Line Replacement	369	369	-	-	-	-
NR5	GIP/Tem-facil Line Replacement	762	762	-	-	-	-
NR6	Full and Partial Pipe Replacement	4,451	1,971	689	689	689	413
NR7	Primary Line Assessment and Leak Repair	1,663	772	306	225	225	135
NR8	ACP Primary Line Replacement	221	221	-	-	-	-
NR9	Selective Primary Pipe Replacement	8,659	6,612	568	568	568	341
Total NRW Management		37,568	16,544	5,289	6,075	5,431	4,229

Table 7.6: Total Project Cost of the NRW Management and Service Expansion CAPEX

D. Service Expansion Program

The service expansion program of the BAs is designed to provide water to unserved areas in the West Zone. Its activities include pipe-laying and network improvement projects that will directly benefit residents not receiving piped-in water service from the Company and will bring Maynilad's water service coverage to 95.1%, serving approximately 10.5 million, by the end of 2026. By 2046, Maynilad expects to serve at most 98.6% or 11.8 million people in its service area. This service expansion program also includes the conversion of the existing bulk accounts in subdivisions to individual accounts and maintenance works for short pipe laying activities.

The figures below show the annual project cost of the service expansion program for 2023-2027.

<i>Program Description</i>		Project Cost Estimate (in million pesos)					
		2023-27	2023	2024	2025	2026	2027
BA1	Pipelaying of Secondary and Tertiary Pipelines	7,378	625	614	2,092	2,028	2,019
Total Service Expansion		7,378	625	614	2,092	2,028	2,019

Table 7.7: Annual Project Cost of the Service Expansion Program

The total project cost of the service expansion for 2023 to 2046 in five-year intervals is provided below.

<i>Program Description</i>			Project Cost Estimate (in million pesos)				
		2023-46	2023-27	2028-32	2033-37	2038-42	2043-46
BA1	Pipelaying of Secondary and Tertiary Pipelines	17,512	7,378	3,862	2,240	2,240	1,792
Total Service Expansion		17,512	7,378	3,862	2,240	2,240	1,792

Table 7.8: Total Project Cost of the Service Expansion Program

II. Wastewater CAPEX

The wastewater CAPEX program specifies the general obligations of Maynilad for the provision of sewerage and sanitation services to its customers. This includes (i) provision of sewerage services to its customers, (ii) compliance with wastewater standards, and (iii) offering of septic and sanitation cleaning services.

A. Sewerage Program

In compliance with the RCA and the 2008 Supreme Court writ of continuing mandamus, the plan for the wastewater program considers full wastewater coverage by the end of the CA, in five-year time slices, consistent with the compliance years. Maynilad's main objective for this rate rebasing is to achieve the sewer coverage target of 33% by 2026 (compliance year). To achieve this target, Maynilad is currently implementing several sewerage projects in the cities of Muntinlupa (in Barangay Cupang and Tunasan), Valenzuela and Las Piñas. Wastewater flow enhancement projects will also be implemented in Muntinlupa and Parañaque to maximize the use of the WRFs.

The figures below show the annual project cost of the sewerage programs for 2023-2027.

Program Description		Project Cost Estimate (in million pesos)					
		2023-27	2023	2024	2025	2026	2027
SS1	Sewage Treatment Plant	737	217	112	-	61	346
SS2	Conveyance	25,348	6,665	9,818	5,631	2,618	616
SS3	Right of Way and Lot Acquisition for Wastewater	363	12	-	-	262	89
SS4	Retrofitting	3,569	14	3,119	131	256	49
SS5	Maintenance	342	56	84	67	67	67
SS6	Sewer Network	-	-	-	-	-	-
SS7	Feasibility Studies	22	-	22	-	-	-
Total Sewerage		30,381	6,964	13,155	5,830	3,265	1,167

Table 7.9: Annual Project Cost of the Sewerage Program

The table below shows the total project cost of the sewerage program for 2023-2046 in five-year intervals. Maynilad will have 100% wastewater coverage by the end of 2046, with 76% served by sewer services and the balance served by sanitation services.

Program Description		Project Cost Estimate (in million pesos)					
		2023-46	2023-27	2028-32	2033-37	2038-42	2043-46
SS1	Sewage Treatment Plant	58,358	737	25,973	6,143	25,505	-
SS2	Conveyance	78,823	25,348	37,272	5,336	10,437	430
SS3	Right of Way and Lot Acquisition for Wastewater	3,571	363	1,811	600	797	-
SS4	Retrofitting	3,996	3,569	145	249	17	17
SS5	Maintenance	1,618	342	336	336	336	269
SS6	Sewer Network	-	-	-	-	-	-
SS7	Feasibility Studies	22	22	-	-	-	-
Total Sewerage		146,390	30,381	65,537	12,664	37,092	716

Table 7.10: Total Project Cost of the Sewerage Program

Annex 7.F shows the annual CAPEX commitment and disbursement schedule of this program.

B. Sanitation Program

For the sixth-rate rebasing period, Maynilad estimates that only 45% of its customers who will be offered desludging services in 2022 and 2023, and 50% in 2024 to 2026 will accept or avail of desludging services. The low acceptance rate of the customers due to health and safety reasons has been evident since

2020 and will continue to affect desludging operations. But as lockdowns ease and community quarantines are lifted, Maynilad anticipates that the acceptance rate will increase to 60% from 2027 onwards.

The table below shows the annual project cost of the Sanitation programs for 2023-27.

<i>Program Description</i>		Project Cost Estimate (in million pesos)					
		2023-27	2023	2024	2025	2026	2027
SS10	Vacuum Truck Units (acquisition and re-fleeting)	273	-	26	247	-	0
Total Sanitation		273	-	26	247	-	0

Table 7.11: Annual Project Cost of the Sanitation Programs

The total project cost for sanitation for 2023-2046 in five-year intervals is shown below. The sanitation CAPEX program in the future years will be for the re-fleeting of the Maynilad's VTUs to continue to meet its SO on sanitation coverage.

Annex 7.G shows the annual CAPEX commitment and disbursement schedule of the sanitation program.

Program Description			Project Cost Estimate (in million pesos)				
		2023-46	2023-27	2028-32	2033-37	2038-42	2043-46
SS10	Vacuum Truck Units (acquisition and re-fleeting)	1,737	273	629	262	102	471
Total Sanitation		1,737	273	629	262	102	471

Table 7.12: Total Project Cost for Sanitation

III. Customer Service and Information CAPEX

This program addresses the needs of Maynilad's customers and consists of investments in (i) ITS, (ii) GIS, (iii) Telemetry System, and (iv) other support requirements such as improvement of buildings, offices, warehouses, and general administrative equipment.

This program will also allow the Company to continue complying with the information requirements of the MWSS such as (i) updated maps, plans and GIS files for water supply, sewerage services, and areas served, (ii) locations and physical features of key assets, and (iii) numbers and locations of customers, and (iv) customer relations including queries, complaints, notices, and responses, among others.

The annual project cost of the customer service and information program for 2018-2022 is provided in the table below.

<i>Program Description</i>		Project Cost Estimate (in million pesos)					
		2023-27	2023	2024	2025	2026	2027
ITS	Information Technology	1,220	108	311	253	250	297
TSD1	Geographic Information System	173	63	19	7	77	7
TSD2	Telemetry & Data loggers	1,265	152	210	284	301	318
ADM	Buildings/Offices/Warehouses	1,353	463	262	241	193	195
GAE	Equipment and Vehicles	1,066	96	151	225	269	325
Total Customer Service and Information		5,077	883	953	1,009	1,090	1,142

Table 7.13: Annual Project Cost of the Customer Service and Information Program

Subsequently, the following table shows the total project cost of the customer service and information for 2023-46 in five-year intervals.

Annex 7.H shows the annual CAPEX commitment and disbursement schedule of Customer Service and Information projects.

<i>Program Description</i>		Project Cost Estimate (in million pesos)					
		2023-46	2023-27	2028-32	2033-37	2038-42	2043-46
ITS	Information Technology	3,262	1,220	1,053	988	-	-
SD1	Geographic Information System	596	173	176	86	108	54
TSD2	Telemetry & Data loggers	5,454	1,265	978	1,112	1,260	839
ADM	Buildings/Offices/Warehouse	3,552	1,353	700	680	411	409
GAE	Equipment and Vehicles	3,715	1,066	1,290	1,004	202	154
Total Customer Service and Information		16,579	5,077	4,198	3,871	1,979	1,455

Table 7.14: Total Project Cost of the Customer Service and Information Program

The Company's annual project cost for 2023-27 aim to meet its SO in 2026, comply with new standards, enhance operating efficiencies, and improve customer satisfaction.

The table below shows the annual project cost for Maynilad's total CAPEX program for 2023-27. The succeeding table provides the total project cost for 2023-46 in five-year intervals.

<i>Program Description</i>	Project Cost Estimate (in million pesos)					
	2023-27	2023	2024	2025	2026	2027
I. Water CAPEX	101,859	9,796	47,572	22,697	9,901	11,893
1. Water Sources Program	38,250	1,633	32,608	22	2,374	1,612

2. Operations Support Programs	39,687	3,499	9,206	17,672	3,171	6,139
3. NRW Management Program	16,544	4,039	5,144	2,911	2,328	2,122
4. Expansion Program	7,378	625	614	2,092	2,028	2,019
II. Wastewater CAPEX	30,654	6,964	13,181	6,077	3,265	1,167
5. Sewerage Program	30,381	6,964	13,155	5,830	3,265	1,167
6. Sanitation Program	273	-	26	247	-	0
III. Customer Service and Information CAPEX	5,077	883	953	1,009	1,090	1,142
Total CAPEX 2023-27	137,590	17,643	61,707	29,784	14,255	14,202

Table 7.15: Annual Project Cost of the Total CAPEX Program

<i>Program Description</i>	Project Cost Estimate (in million pesos)					
	2023-46	2023-27	2028-32	2033-37	2038-42	2043-46
I. Water CAPEX	147,925	101,859	15,282	11,418	11,196	8,169
1. Water Sources Program	38,250	38,250	-	-	-	-
2. Operations Support Programs	54,595	39,687	6,131	3,103	3,525	2,148
3. NRW Management Programs	37,568	16,544	5,289	6,075	5,431	4,229
4. Expansion Program	17,512	7,378	3,862	2,240	2,240	1,792
II. Wastewater CAPEX	148,127	30,654	66,166	12,927	37,194	1,186
4. Sewerage Program	146,390	30,381	65,537	12,664	37,092	716
5. Sanitation Program	1,737	273	629	262	102	471
III. Customer Service and Information CAPEX	16,579	5,077	4,198	3,871	1,979	1,455
Total CAPEX 2023-46	312,631	137,590	85,646	28,215	50,370	10,810

Table 7.16: Total Project Cost of the Total CAPEX Program

Annex 7.I shows the annual CAPEX commitment and disbursement schedule of Maynilad's CAPEX program for this rate rebasing exercise.

Annex 7.J shows the profile of big ticket CAPEX projects for the 6th Rate Rebasing Period.

Chapter 8 Financial Plan

The financial plan translates the financial impact of the Company's demand forecast, supply requirements, water and wastewater plans, customer service plans, and service information plans into the required Rebasing Adjustment for the Sixth Rate Rebasing Period that will allow Maynilad to recover its Opening Cash Position ("**OCP**") over the life of the Concession.

This Approved Business Plan assumes an end date of 2047 for the West Concession.

I. **OCP**

The OCP is the net present value of investments made by Maynilad that are allowed to be recovered through the tariff. This is composed of receipts and expenditures from 2018 to 2022, as well as the OCP as of 2017. The MWSS-approved Appropriate Discount Rate of 7.39% real rate was applied to the OCP from 2018 to May 2021, and 12% nominal rate thereafter.

Maynilad's OCP for 2023 is a negative ₱100,354 million.

A. **Receipts**

Receipts come from collections from the provision of water and wastewater services. Fees are also generated from other services including revenue from legalized water, septic sludge disposal fees, water and sewer installation charges, closing and re-opening of service connection charges, metering charges, tapping charges, laboratory service charges and other fees.

By the end of 2022, Maynilad's billed customers is estimated at 1,523,429 WSC.

The tables below summarize the number of Maynilad's customers per category, their respective billed volume and revenue contribution from 2018 up to 2022. These tables show that, while domestic customers account for around 95% of Maynilad's customer base of Maynilad, they only account for between 80% to 84% of billed volume, and an even lower contribution to basic revenues of between 57% to 63%.

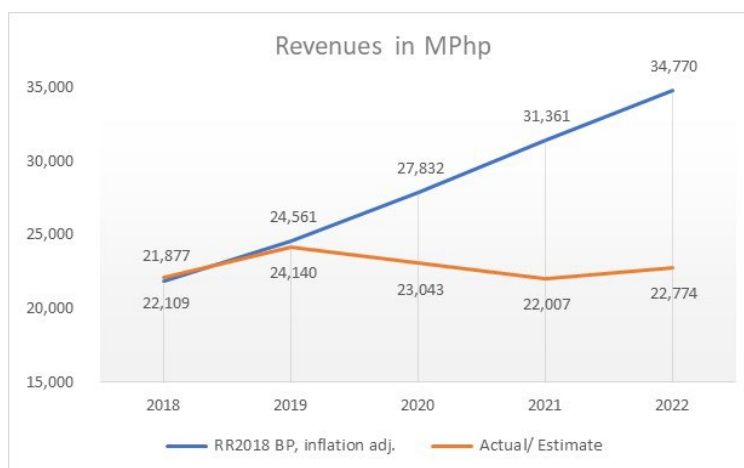
No. of Billed Water Services	2018	2019	2020	2021	2022E
	1,407,503	1,453,979	1,484,128	1,501,371	1,523,429
Residential	91.9%	91.9%	92.2%	92.3%	92.2%
Semi-business	3.5%	3.4%	3.3%	3.3%	3.2%
Domestic	95.4%	95.4%	95.6%	95.5%	95.4%
Commercial	3.9%	3.9%	3.7%	3.8%	3.8%
Industrial	0.7%	0.7%	0.7%	0.7%	0.7%
Non-domestic	4.6%	4.6%	4.4%	4.5%	4.6%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Billed volume in MCM	2018	2019	2020	2021	2022E
	527.15	535.34	536.40	519.65	527.93
Residential	72.9%	72.8%	76.7%	77.0%	76.1%
Semi-business	7.6%	7.5%	7.2%	6.9%	6.9%
Domestic	80.5%	80.3%	83.8%	83.9%	83.0%
Commercial	14.8%	14.8%	11.7%	11.4%	11.9%
Industrial	4.7%	4.9%	4.5%	4.7%	5.1%
Non-domestic	19.5%	19.7%	16.2%	16.1%	17.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Basic Revenues in MPhp	2018	2019	2020	2021	2022E
	17,802	19,418	18,757	17,925	18,531
Residential	50.1%	49.5%	55.8%	55.5%	54.3%
Semi-business	7.4%	7.3%	7.2%	7.0%	6.8%
Domestic	57.4%	56.8%	63.0%	62.5%	61.1%
Commercial	31.4%	31.6%	25.8%	25.5%	26.2%
Industrial	11.2%	11.7%	11.2%	11.9%	12.7%
Non-domestic	42.6%	43.3%	37.0%	37.5%	38.9%
Total	100.0%	100.1%	100.0%	100.0%	100.0%

Compared to the 2018 Approved Business Plan (“**2018 ABP**”), Maynilad’s actual billed volumes for 2018 and 2019 exceeded the targets by 0.67 and 0.83 MCM, respectively. However, the Covid-19 pandemic in 2020 changed the consumption behavior of our customers, especially the commercial and industrial customers. From the usual 80:20 billed volume mix of domestic vs. non-domestic accounts, consumption skewed more heavily to domestic accounts at a mix of 84:16, as Metro Manila went on a lockdown and companies implemented work-from-home arrangements.

Combine the lower billed volume and lower revenue mix with no tariff adjustments since 2020, revenues are tracking below the 2018 ABP.



B. CAPEX Spending

For the 2018 CAPEX Program, the target commitment based on the 2018 ABP was Php39.43 billion. However, because of the delay in the approval of the 2018 Business Plan, which approval was granted only in September 2018, Maynilad had to re-prioritize its 2018 CAPEX projects line-up. Proposed projects that required acquisition of land(s)/lot(s), and those with ROW issues were deprioritized.

Projects that were prioritized for implementation were those with structurally unstable findings, those related to billed volume generation and service level improvement, and those without ROW issues. The actual commitment in 2018 amounted to Php9,029 million or 23% of the 2018 ABP target commitment of Php39,435 million.

Based on the 2018 ABP, the target commitment for the 2019 CAPEX program was Php20.01 billion. Due to the uncertainty in the implementation of a tariff adjustment during the CAPEX budget allocation, Maynilad was constrained to identify projects from the submitted 2019 CAPEX projects to be prioritized, which are as follows:

- (i) Revenue- (billed-volume) generating projects without ROW /documentation issues,
- (ii) Water and wastewater service level improvement projects without ROW issues, and
- (iii) Projects that are necessary to comply with updated environmental parameters and requirements ((i) to (iii) are referred collectively as Priority 1 projects).

As part of Maynilad's CAPEX acceleration plan, it undertook the evaluation and pre-construction works for identified Priority 2 projects so that these projects could be awarded once the necessary budget becomes available.

The actual commitment under the 2019 CAPEX Program reached Php48.98 billion, which was 245% above the 2018 ABP commitment target of Php20.01 billion. Projects that were not awarded because of the re-prioritization were primary pipelaying projects in various locations, conversion of the lagoons in the LMTPs to a reservoir, upgrading of existing WRFs (Lots 2, 3 & 5) to comply with DAO 2016-08, Kawit WRF and conveyance, and Bacoar and Imus sewer conveyances (which require land for a pump and lift station).

Notable big-ticket projects the contracts of which were awarded are the Poblacion WTP, upgrading of Dagat-Dagatan Sewage Treatment Facility (CAMANA WRF), Cavite City WRF, Central Manila Sewerage System (CMSS) WRF, upgrading of existing WRFs

(Lots 1 & 4) to comply with DAO 2016-08, which has been superseded by DAO 2021-19, and Las Piñas Conveyance System (Packages 1 & 2).

Year 2020 presented a story different from 2019 as regards Maynilad's CAPEX commitment. The uncertainty of the tariff adjustment and the CA review which both impaired Maynilad's borrowing capacity resulted in a reduced CAPEX Program for 2020. This was also aggravated by the Covid-19 pandemic that continues to affect the whole nation. The actual commitment in 2020 was Php2.65 billion which is 14% of the 2018 ABP commitment target of Php18.92 billion.

The major projects that did not proceed due to the above constraints, and the corresponding cost of each of these projects, are as follows:

1. Teresa WTP and distribution lines – Php16.7 billion;
2. BNAQ7 – Php1.6 billion;
3. Bagbag Reservoir upgrade – Php723 million;
4. Primary distribution system at Quirino Highway, Araneta-Langit to Zabarte – Php520 million.

Under the 2020 CAPEX Program, the MTPs for Ligas and Molino were deferred due to lot acquisition issues. The deepwell reactivation project was only partially implemented because of the low well yields based on the results of the assessment conducted for the existing deepwells. From the original 64 deepwells planned for reactivation, 23 were cancelled either prior to, or during, the assessment period because of possible low well yield and objections from homeowners. Only 41 deepwells were assessed, 13 of which were found feasible. Of the 13 deepwells that were recommended for reactivation, only two were completed. Instead of developing the 11 remaining deepwells, its budget was reallocated to the MTPs as these were determined to be more cost-efficient and sustainable, given the deepwells' relatively small volumes in different locations and varying water quality.

For the 2021 CAPEX program, Maynilad was able to implement several projects despite the uncertainties brought about by the CA review and the continuing effect of the COVID-19 pandemic. These priority projects focused on improving operational efficiency and in further bringing down NRW levels, providing water service to customers and continuation of the Company's wastewater projects. The actual commitment under the 2021 CAPEX program was Php7.24 billion, which is 46% of the 2018 ABP commitment target of Php15.74 billion.

The major CAPEX projects that were awarded in 2021 are as follows:

1. Service expansion, pipe replacement/relocation and metering projects;
2. Design and construction of 6.6 MLD MTP in Anabu Dam Phase 2; and

3. Design and Build of the Proposed Angat Water Transmission and Improvement Project (Tunnel 5).

On the other hand, the projects that were included in the 2018 ABP but were not implemented in 2021 due to Maynilad's re-prioritization include the following:

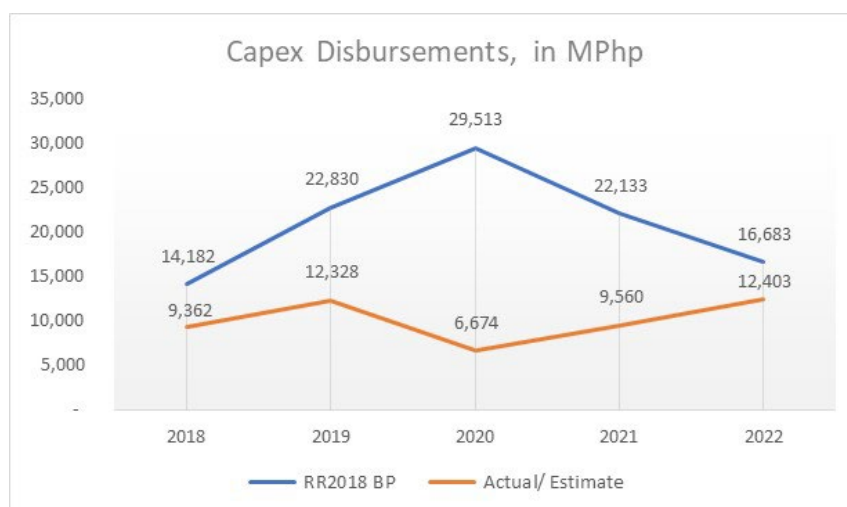
1. Replacement of over-loaded pipes – Php146 million;
2. Retrofitting of Reservoirs - Php296 million;
3. Bagbag Reservoir upgrade – Php737 million;
4. Expansion and Pipe replacement projects – Php500 million; and
5. Lot Acquisitions for Water and Wastewater Facilities – Php2.3 billion.

The commitment for the 2022 CAPEX program based on the 2018 ABP is Php6.04 billion. Maynilad's commitment for the year 2022 is projected at Php29.98 billion, VAT inclusive. Major projects that will be implemented are the following:

1. Installation of primary distribution lines for the Poblacion Water Treatment Plant (Phase 2);
2. Design and Construction of 18.6 MLD MTP at Ligas Dam and 5.5 MLD MTP at Molino Dam;
3. Upgrading of 46.6 MLD Pasay and 10MLD Alabang WRF to comply with DAO 2016-08. This was awarded in 2019 but its implementation was indefinitely postponed due to the review of Maynilad's CA and the effect of Covid-19 pandemic;
4. Design and Build of 140 MLD WRF for CMSS which was awarded in 2019 but not started. CMSS WRF project also included the acquisition of lot due to scarcity of lands in Metro Manila and difficulty in finding suitable lands for the wastewater facility. During the compliance period of the notice of award requirement, the consortium partner (VA Tech Wabag) encountered problems with its other ongoing projects with Maynilad. It was decided to pursue the land that the civil works contractor (RII Builders) proposed during the bidding as this is the only available land that will meet the technical requirements of the project. In a separate contract between Maynilad and the civil works contractor, one of the conditions of the sale of the land is to award the Project to a consortium or joint venture (where RII Builders will be the civil works contractor) at a cost not exceeding the cost of Award established through open competitive bidding. The foregoing considered, Maynilad was constrained to accept RII Builder's proposal to change its partner;

5. Proposed Sewer Lines along Buendia Street and Bubogan; and remaining works for the pump station of the Muntinlupa conveyance in Muntinlupa City;
6. Trenchless sewer pipelaying for Malate 4 CMSS (pipeline rehabilitation);
7. Pipe replacements and service expansion;
8. Primary line maintenance activity;
9. Relocation of primary pipelines affected by DOTr-PNR projects;
10. Sewerage All-works and maintenance CAPEX; and
11. Lot acquisition for Parada pump station and reservoir.

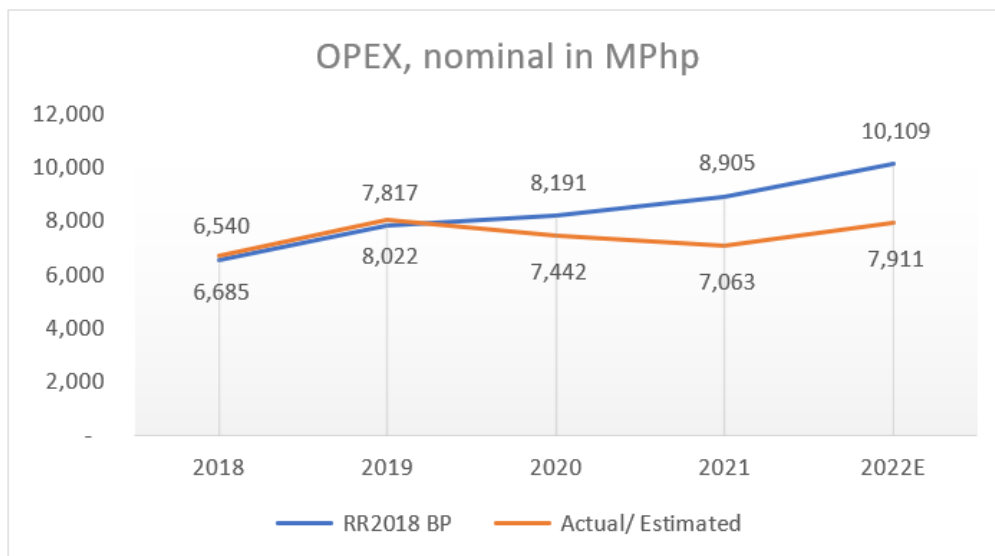
These awarded projects translated to a CAPEX disbursement of P50.3 billion from 2018 to 2022.



C. Operating Expenses

Due to the delayed implementation of CAPEX projects, operating expenses are tracking below the projections in the 2018 ABP. The onslaught of the pandemic brought down further the operating expenses in 2020 and 2021, particularly repairs and maintenance which registered lower billings compared to prior years because of work stoppages during quarantine periods. Outside services were also lower than expected, with activities such as meter readings and desludging affected by the imposed quarantines. Costs related to collections also decreased from prior years as collection efficiency fell below 50% in 2020, particularly during the early months of the pandemic. This is because the MWSS-RO issued a moratorium on disconnections,

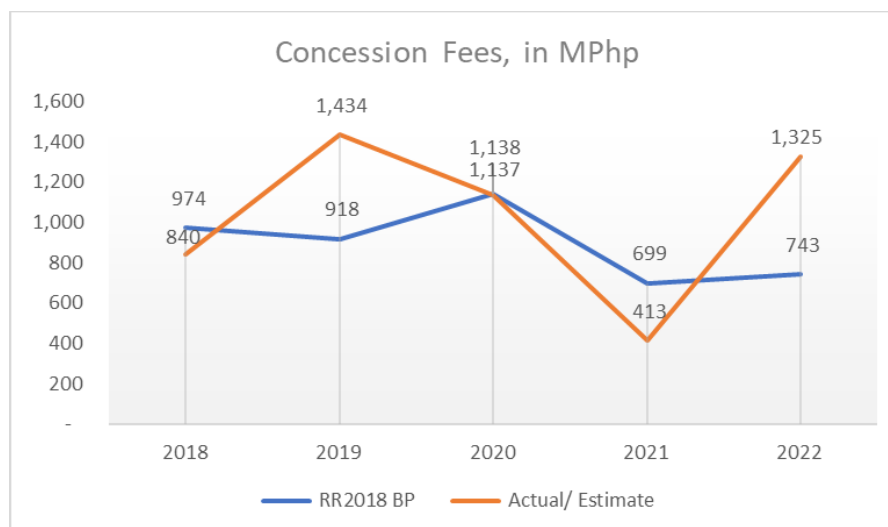
and Bayanihan to Recover as One Act (Republic Act No. 11494) allowed the staggered payment of water bills.



D. Concession Fees

Aside from continuing the payment of concession fees on MWSS loans obtained before the privatization, Maynilad also assumed in the 2018 ABP the payment of concession fees for new loans taken out for the Angat Water Transmission Improvement Project and the local component cost for the New Centennial Water Source- Kaliwa Dam Project.

The actual concession fees paid are tracking higher than what is in the 2018 ABP mainly because of a payment made for the Japan Bank of International Cooperation loan (“**JBIC Loan**”) amounting to Php677 million which was not included in the 2018 ABP. See related discussion below. In addition, Maynilad’s share in the Kaliwa Dam Project for 2022 is currently estimated at Php667 million against the 2018 ABP estimate of Php363 million.



The JBIC Loan is covered by a loan agreement dated 9 February 1990 between the Philippine government and JBIC (formerly Overseas Economic Cooperation Fund). The proceeds of the loan were used to fund the Angat Water Supply Optimization Project, with MWSS as the implementing agency. Prior to the privatization of the MWSS operations, actual drawdowns from the loan were recorded by MWSS as equity from the Philippine government, while the drawdowns following the privatization were assumed and paid by the Concessionaires. The sharing was 61.83% and 38.17% for Maynilad and Manila Water, respectively.

In June 2019, Maynilad learned that the drawdowns made on the JBIC Loan prior to the privatization were considered loans, and not equity of the Philippine government, as earlier advised. As such, MWSS requested Maynilad to pay Php821 million (**“Invoiced Amount”**). MWSS’s request for the Concessionaires to pay was triggered by an instruction from the Department of Finance to the Bureau of Treasury, to have the Concessionaires reimburse the Philippine government for the latter’s payments of the JBIC Loan.¹ Maynilad fully paid its share on the JBIC Loan on 18 February 2020.

¹ Maynilad replied to MWSS on 1 July 2019 to clarify the Invoiced Amount. Maynilad posited that it should pay only Php677 million because it remitted to the MWSS Php113 million representing Guarantee Fees based on MWSS’s invoice. However, the JBIC loan made no reference to, and did not include, the payment of Guarantee Fees, the borrower being the Philippine government itself. This being the case, the Guarantee Fees that Maynilad remitted to MWSS must be set off or applied against the Invoiced Amount. In addition, while Maynilad always paid the foreign exchange shortfall in the debt servicing of MWSS-contracted loans, there was no need for Maynilad to pay the forex shortfall of Php31 million in the JBIC Loan catch-up payment. The difference in the foreign exchange rate (from Japanese Yen to Philippine Peso) had already been captured and reflected in the total peso amount billed by the Bureau of Treasury.

Maynilad also requested that it be allowed to pay the Php677 million in eight monthly installments of Php84.6 million, to commence in July 2019 until February 2020, to coincide with the full payment / maturity of the JBIC loan.

II. Macro-economic Assumptions

A. Inflation Assumption

The projected Philippine inflation used in this Business Plan for 2023 is 4.1% which is based on the latest Bangko Sentral ng Pilipinas' inflation forecasts published in September 2022.

	2023	2024	2025	2026	2027
Inflation rate	4.1%	3.0%	3.0%	3.0%	3.0%

B. Exchange Rate Assumption

The following exchange rates were assumed for the foreign currencies relevant to the Concession Fees.

Foreign Currency	Exchange Rate ₱
US Dollar	53.51
Japanese Yen	0.44

III. Revenue Assumptions

The revenue sources of the Company are (i) water charge, (ii) sewerage charge, (iii) environmental charge, (iv) Maintenance Service Charge ("MSC"), and (v) other operating revenues.

The critical drivers of water revenues are billed volume, basic water tariff per cu.m. and customer mix. The projected billed volume is based on the consumption estimates and the water service coverage targets discussed in Chapter 1.

From 2023 to 2046, total billed volume is estimated at 17,963 MCM, with an average mix of 78:22 in favor of domestic consumption.

In mcm	2023-2027	2028-2032	2033-2037	2038-2042	2043-2046	TOTAL
Billed volume	2,781	3,222	3,681	4,280	3,999	17,963

Mix, average						
Domestic	83.17%	77.42%	76.70%	76.55%	76.64%	78.20%
Non domestic	16.83%	22.58%	23.30%	23.45%	23.36%	21.80%

Although Guarantee Fees or Guarantee Deposits ("GD") are not recorded as part of the revenue line in Maynilad's financial statements, it is included under the revenue line in computing the Rate Rebasing Future Cash Flows. This, because GDs are

payments of Maynilad's customers upon application for water service connections to secure their payment of water charges, but are refunded to the customers (net of any outstanding water charges), upon the termination of their water service connection with Maynilad.

GDs are estimated at ₱500.00 per connection in this Rate Rebasing financial model.

IV. Capital Expenditures Disbursement

The CAPEX disbursement of the Company is predicated on meeting its SO targets for water, sewerage and sanitation services, enhancing customer service quality, improving service performance information, and complying with the effluent standards of DAO-2021-19.

For the Sixth Rate Rebasing Period, Maynilad projects to spend approximately ₱163 billion (the breakdown of which is shown below) to meet its targets and plans.

Amounts in Bn Php	2023-2027	2028-2032	2033-2037	2038-2042	2043-2046	TOTAL
Water	103	37	12	11	9	171
Wastewater	55	46	16	46	15	178
Others	5	4	4	2	1	17
Total Capex Disbursements	163	87	32	59	26	366

Chapter 1 of the New Business Plan contains a discussion on the SO targets, while Chapter 7 provides the details of the different programs to be implemented during the Sixth Rate Rebasing Period.

V. Operating Expenses

The total cash Opex from 2023 to 2046 is Php489 million.

Amounts in Bn Php	2023-2027	2028-2032	2033-2037	2038-2042	2043-2046	TOTAL
Cash Opex & Working Cap	48	69	109	130	133	489

Major costs (in Bn Php):	2023-2027	2028-2032	2033-2037	2038-2042	2043-2046	TOTAL
Salaries	14	17	21	25	23	100
Power	7	12	17	21	21	79
Contracted services	7	9	11	13	12	53
Repairs & maintenance	6	9	12	14	13	52
Treatment costs	3	5	7	11	11	36
SubTotal	37	52	68	83	80	320

The major Opex items, expressed as a percentage of the projected total operating expenses for the period 2023 to 2047 (the "Total Opex"), are as follows:

Opex	Share in the Total Opex (%)
Salaries, Wages and Benefits	20
Power	16
Contracted Services	11
Repairs & Maintenance	11
Treatment Cost	7

A. Salaries, Wages and Benefits

Salaries, Wages and Benefits refer to all costs of manpower, including, without limitation, the basic pay, statutory bonuses and discretionary bonuses, regular allowances (such as representation and transportation allowance), fringe benefits tax and other employee benefits.

The Company expects to increase its manpower as (i) it continues to beef up its newly established divisions, and (ii) newly-constructed facilities are commissioned to comply with its SOs.

The manpower requirements for wastewater services are anchored on the expected increase in the number of the Company's WRFs as it continues to expand its sewerage service coverage.

B. Power

Power refers to the electricity charges incurred in the delivery of water and wastewater services to the customers.

Power consumption is driven by the volume of water produced and distributed to the customers.

Power consumption is also expected to increase with the construction of several reservoirs, pump stations and boosters in order to supply the West Zone customers with continuous water at the required pressure.

As Maynilad completes its WRFs, power consumption will also increase.

Other facilities such as the Company's Head Office, BA offices, warehouses, and laboratories also consume power.

C. Treatment Cost

Treatment shall include the costs of chemicals used in the treatment of water and wastewater.

Maynilad's chemical consumption is primarily dependent on the volume of water produced, volume of wastewater treated, and the technology that is used in the treatment of water and wastewater.

For water treatment, the chemicals used include, but are not limited to, liquid chlorine, liquid aluminum sulfate, liquid poly aluminum chloride, and polymer.

For treatment of wastewater/used water, the chemicals used, include, but are not limited to, sodium hypochloride, polymer, and odor-control chemicals. Additional chemical cost was forecast to remove phosphorous from used water.

D. Materials and Supplies

Materials and supplies refer to expenses for materials, supplies, equipment and parts used by the Concessionaires in their administrative and office support activities. These include, but are not limited to, expenses for office supplies, computer parts and supplies.

The forecast for materials and supplies is pegged to the growth of water service connections.

E. Repairs and Maintenance ("R&M")

R&M refers to the non-capitalizable cost of supplies and services incurred in the repair and maintenance of all water and wastewater facilities, administrative building, transportation equipment, and other office and technical equipment. Also included in this account are construction materials and hardware acquired for the repairs and maintenance of buildings, structures, facilities, vehicles, and equipment etc.

The R&M of transmission lines and distribution facility is pegged to the growth rate of the fixed assets.

The R&M for PSs and their related equipment is anchored on the number of PS facilities that will be operational in the future.

The R&M of WRFs is also based on the new infrastructure that will be operational in the future. The R&M for WRFs is expected to increase as the Company's WRFs comply with the DAO 2021-19 effluent standards.

F. Contracted Services

Contracted services refer to the costs incurred for outsourced services obtained to provide water and wastewater services, and to perform general and administrative functions. These services include, but are not limited to, meter-reading, bill-printing,

customer services, fleet management, wastewater services and various administrative and technical functions.

G. New Service Connections

New service connections refer to the costs of labor and materials incurred in installing new service connections for both water and wastewater.

For new WSCs, the cost refers to those incurred from the tapping point up to the MSA, although the cost of the MSA (which includes the water meter) is capitalized.

H. Occupancy Costs

Occupancy costs refer to the expenses incurred for the lease of lands, buildings and facilities. This account also includes the expenses for security and janitorial services.

The lease of the lands and office buildings assumes a 0% growth rate, while the expenses for security and janitorial services are based on the required number of security guards and janitors for the Company's facilities.

I. Collection Charges

Collection charges refer to the expenses incurred in the use of payment facilities provided by Bayad Centers, banks, convenience stores, etc., and other collection-related services.

The Company assumes that it will be able to collect 99.75% of its total bills from its customers, with a collection charge of ₱10.00/bill.

J. Insurance

Insurance refers to the payments made by the Company for the management of risks. This includes, but is not limited to, premiums paid for life insurance of employees, executives and directors, insurance coverage of facilities, properties and equipment against theft, fire, etc.

K. Transportation and Travel

Transportation and travel expenses are incurred to attend product/services evaluation and orientation, twinning arrangements, best practices sharing, business conferences, industry awards and recognition, and other similar events.

However, transportation and travel expenses to attend trainings and seminars for employee development are reported under Salaries and Wages account.

Expenses related to local and foreign travels include airfare, travel tax and terminal fees; visa application and processing fees; travel insurance; lodging, per diem, and clothing allowance; transport fares; parking and toll fees; fuel for vehicles; and other expenses not incurred for employee development trainings and seminars .

These costs are projected based on the growth rate of the billed services.

L. Business Meetings and Representations

Business meetings and representations refer to the expenses incurred for meetings and conferences, such as meals, utilities, logistics, representation and other expenses.

These include expenses incurred by the officers to represent the Company, and to promote, establish and maintain good public image and relations.

These costs are projected based on the growth rate of the billed services.

M. Information and Publicity

Information and publicity refer to the amounts disbursed for placements in, and public notices through, the radio and television, yellow pages, magazines and newspapers of general circulation; television appearances relating to water interruptions, adjustments in water rates, water quality monitoring, tariff advisories; pre-qualification/bid invitations, company billboards and signages, tree-planting events, issuance and publication of annual reports, sustainability reports and the Company's newsletters.

N. Communications

Communication costs refer to those relating to postage, telecommunications, financial terminal fees, radio communications, and internet and intranet systems. These costs are projected based on the growth rate of the billed services.

O. Water and Sewer Utility Charges

Water and sewer utility charges refer to payments for the consumption of electricity and water and sewer service in the Company's facilities.

These costs are projected based on the growth rate of the billed services, except for wastewater which is based on the WRFs that will be operational in the future.

P. Regulatory Costs

Regulatory costs refer to the portion of the Concession Fees that Maynilad pays, that represent its share in the annual budget of MWSS and the MWSS-RO in accordance with Sections 6.4.(b) and 11.2 of the CA.

Q. Other Expenses

1. Rentals

Rentals refer to the lease of office machineries, vehicles and equipment used in the provision of water and wastewater services, and administrative and office support (e.g. rent of photocopying machines, digital imaging machine and leak detection equipment and vehicles). Rentals also include the lease of transportation equipment to complement existing vehicle fleet, and water tankers used during major water interruption/emergency cases.

The rentals of office machines and transportation equipment are based on the growth rate of the billed services.

2. Others

Other operating expenses include semi-expendable items, subscriptions to periodicals, joint venture expenses, management and professional fees, water quality assurances, membership fees and premium for the Performance Bond.

VI. Performance Bond

In anticipation of the implementation of the RCA, Maynilad adopted the required performance bond computation in Section 6.10.

Maynilad intends to obtain a surety bond for its projected Total Project Cost. The RCA requires that the surety bond be at least 10% of the Total Project Cost. The latter is defined as "the total amount of Expenditure contained in the Concessionaire's spending plan for a given Rate Rebasing Period." The estimated costs for the performance bond per Rate Rebasing Period are as follows:

Amounts in MPhp	Rate Rebasing Period					TOTAL
	2023-2027	2028-2032	2033-2037	2038-2042	2043-2046	
Total Project Cost	219,528	164,422	149,159	193,870	160,579	
10% of Total Project Cost	21,953	16,442	14,916	19,387	16,058	
Premium per RR period	176	132	119	155	128	710
Doc Stamps	22	16	15	19	16	89
VAT	21	16	14	19	15	85
Local Gov't Tax	0.35	0.26	0.24	0.31	0.26	1.42
Total Performance Bond	219	164	149	193	160	885

VII. Taxation

Taxes and licenses are reported as part the Company's operating expenses and include the following:

- (a) Real property taxes on land and above-ground fixed assets owned by the Company to operate the business; and
- (b) Other taxes and licenses which include permits, registration fees, license renewals, documentary stamp taxes, discharge fees, abstraction fees and taxes and fees related to land acquisitions, among others.

Following Maynilad's formal acceptance on 21 March 2022 of the terms and conditions of the legislative franchise granted to it, Maynilad will no longer be subject to VAT but to franchise tax. Thus,

- (a) Maynilad can no longer charge VAT to its customers;
- (b) it can no longer claim input VAT on its purchases but will continue to pay the same. As a result, VAT will form part of the expenditures for CAPEX projects, property, equipment, and for OPEX;
- (c) a Franchise tax of 2% replaces the local business taxes; and
- (d) a Local franchise tax of between 0.50% and 0.825%

VIII. Working Capital

A. Bad Debts Provision

Throughout the remaining life of the Concession, the assumption for bad debt provision is 0.25% of the Company's total operating revenues.

B. Days Receivable

The financial projections assume a collection period of 60 days until the end of the Concession.

C. Days Payable

The financial projections assume a payment period of 80 days throughout the projected period.

IX. Concession Fees

Maynilad will spend approximately Php32 billion between 2023 to 2046 for Concession Fees. Concession Fees are payments made to the MWSS for servicing MWSS's debt obligations and the annual funding for the MWSS and the MWSS RO.

Amounts in Bn Php	2023-2027	2028-2032	2033-2037	2038-2042	2043-2046	TOTAL
Concession Fees	8	8	8	5	2	32

The financial projections include the remaining Concession Fees payable for the MWSS's water source projects, namely the *Angat Water Transmission Improvement Project* ("**AWTIP**") and *Angat Water Transmission Improvement Project – Additional Financing for Aqueduct 7* ("**AWTIP AQ7**"). Concession Fees for AWTIP are expected to continue until 2041, with estimated total debt service payments of ₱2.2 billion and ₱2.3 million local component costs, while Concession Fees for AWTIP AQ7 are expected to end in 2045, with an estimated total debt service cost of ₱4.3 billion and ₱399 million local component cost.

The financial projections also include Concession Fees for the new MWSS's water source project *New Centennial Water Source* ("**Kaliwa Dam**"). The Concession Fees for the Kaliwa Dam project are expected to continue until 2039 and include an estimated total debt service cost of ₱6.9 billion and corresponding local component cost of ₱1.5 billion.

Watershed programs for Ipo, La Mesa, and Gen. Nakar are also included in the Concession Fee projections as part of the local component costs.

X. Environment charge and Sewerage Charge

Maynilad proposes to increase the environmental charge to reflect future and incremental +5 percentage point increases in the sewer coverage. These adjustments to the environmental charge shall be expected to begin when Maynilad achieves 25% sewerage coverage by year 2024 or earlier.

For commercial and industrial customers connected to sewer lines, the sewerage charge will remain at 20%.

XI. Appropriate Discount Rate ("ADR")

The ADR for future cashflows is equal to nominal 12%, pursuant to the RCA.

For prior years, the ADR that was approved by the MWSS was used, i.e., 7.39% real rate for the 5th Rate Rebasing Period.

XII. Rate Rebasing Adjustment (“R”)

To enable Maynilad to achieve the SO targets it has set in this New Business Plan, it is proposing a one-time tariff increase of **35.61%** of the pre-rebased tariff of ₱35.10 per cu.m. which will be implemented on a staggered basis over the Rebasing Period, as follows.

MAYNILAD		2023	2024	2025	2026	2027
Rebasing Adjustment with Kaliwa Dam Water Source completed on or before 2028	"R" factor in PhP	3.29	6.26	2.12	1.01	1.01
	"R" factor in %	(9.37%)	(16.30%)	(4.75%)	(2.17%)	(2.12%)
Rebasing Adjustment with Kaliwa Dam Water Source completed after 2028	"R" factor in PhP	3.29	6.26	2.12	0.84	0.80
	"R" factor in %	(9.37%)	(16.30%)	(4.75%)	(1.80%)	(1.68%)

The key assumptions used in the R are as follows:

Assumptions	Unit	Total 2023 to 2047
OCP 2023	M Php	(100,354)
ADR 2018-2022	%	7.39% real 10.08% in 2021 12% in 2022
ADR 2023-2047		12%
Environmental Charge		20%, until 2024 25% by 2025
Sewerage Charge		20%
Billed Volume	MCM	17,963
Operating expenses	M Php	491,197
CAPEX:		365,855
Water	M Php	171,136
Wastewater	M Php	177,602
Customer service	M Php	17,117
Concession fees	M Php	31,537

With the proposed R and staggered implementation and two-thirds of the estimated Consumer Price Index (“C”) of 5.6%, Maynilad’s Rate Adjustment Limit in 2023 is equivalent to 13.10%. For residential customers who are consuming 10 cu.m. or less, the first tranche of the Rebasing adjustment plus “C” will translate to a monthly water bill of **₱135.70**. This translates to approximately **0.52% of the monthly average household income** in the Philippines and 0.68% of its monthly average expenditure. For most of Maynilad’s customers who consume 20 cu.m. per month, their monthly bill will be ₱509.11. This is equivalent to 1.96% of the average Philippine household

income. The United Nations Development Programme recommends that water costs should not exceed 3% of household income. The average monthly income and expenditures are based on the results of the 2018 Family Income and Expenditures Survey which was released by the Philippine Statistics Authority in June 2020.

In keeping with its commitment to make water accessible and affordable to its customers, Maynilad is looking into exempting its low-income earning customers from the “R” adjustment. To do this, Maynilad will need to conduct a survey of its lifeline customers to determine who will qualify for the exemption. Currently, a customer is classified as a lifeline customer for as long as his/her account consumes 10 cu.m. or less per month. The 41% discount over the regular basic charge is given to these customers, regardless of their economic status.

For details on the OCP computation and the “R”, please refer to Annex 8-2: Rate Rebasing Financial Model, submitted as an e-copy.

XIII. Debt Plan

Even with the “R” adjustment, Maynilad will need to take out new loans amounting to approximately ₱342 billion from 2023 to 2047. For the years covering the Sixth Rate Rebasing Period, Maynilad will need to borrow **₱121 billion** in order to fund its expenditures. The table below provides the debt assumptions of Maynilad for the upcoming Rate Rebasing period.

Amounts in Bn Php	2023	2024	2025	2026	2027	TOTAL
New borrowing required	14	25	31	27	25	121
Terms: Bullet loan repayment 10-year loan Market interest rate + spread						



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Quezon City, 1105, Philippines

Customer hotline: 1626
Cavite Toll-Free hotline:
1800-1000-WATER